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Front cover: In Pakistan, young girl students engage in sports to help enhance a positive body image and increase self-confidence. © 2016 Khaula Jameel/AAHUNG.

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Glob Health Sci Pract. 2018;6(1):1–5

<https://doi.org/10.9745/GHSP-D-18-00050>

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James D Shelton

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<https://doi.org/10.9745/GHSP-D-18-00092>

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A New World Health Era

Unprecedented economic progress and demands for social protection have engendered an economic transition in health in many low- and middle-income countries, characterized by major increases in domestic health spending and growing national autonomy. At the global level, development assistance is refocusing on fragile states, the poorest communities, and cooperation on global public goods like health security, technical norms, and innovation. Intergovernmental organizations like WHO need the wherewithal and support to provide leadership and to properly advance this new world health era.

Ariel Pablos-Méndez, Mario C Raviglione

Glob Health Sci Pract. 2018;6(1):8–16

<https://doi.org/10.9745/GHSP-D-17-00297>

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Liftoff: The Blossoming of Contraceptive Implant Use in Africa

Contraceptive implant use is rising rapidly, substantially, and equitably in many sub-Saharan African countries, across almost all sociodemographic categories. Gains in implant use have exceeded combined gains for IUDs, pills, and injectables. Key contributing factors include sizeable reductions in commodity cost, much-increased commodity supply, greater government commitment to expanded method choice, and wider adoption of high-impact service delivery practices that broaden access and better reach underserved populations. Continued progress in meeting women's reproductive intentions with implants calls for further investment in quality services for both insertion and removal, and for addressing issues of financing and sustainability.

Roy Jacobstein

Glob Health Sci Pract. 2018;6(1):17–39
<https://doi.org/10.9745/GHSP-D-17-00396>

Family Planning in the Democratic Republic of the Congo: Encouraging Momentum, Formidable Challenges

Formidable challenges: uncertain political situation, cultural norms favoring high fertility, a thin patchwork of service delivery institutions, logistical issues in a vast country with weak infrastructure, and low capacity of the population to pay for contraceptive services. **Encouraging progress:** increasing government and donor support, openness to progressive service delivery policies, innovative programming including robust social marketing and initiatives with nursing schools and the military, strong collaboration among stakeholders, high unmet need suggesting strong latent demand for family planning, and an increasingly balanced method mix including long-acting methods.

Dieudonné Kwete, Arsene Binanga, Thibaut Mukaba, Théophile Nemuandjare, Muanda Fidele Mbadu, Marie-Thérèse Kyungu, Perri Sutton, Jane T Bertrand

Glob Health Sci Pract. 2018;6(1):40–54
<https://doi.org/10.9745/GHSP-D-17-00346>

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Expanding Access to Injectable Contraception: Results From Pilot Introduction of Subcutaneous Depot Medroxyprogesterone Acetate (DMPA-SC) in 4 African Countries

Nearly half a million doses of DMPA-SC were administered over 2 years in Burkina Faso, Niger, Senegal, and Uganda, with 29% of doses provided to first-time family planning users and 44% (in 3 countries) to adolescent girls and young women under age 25. Switching from intramuscular DMPA (DMPA-IM) was not widespread and generally decreased over time. Community health workers provided a higher proportion of DMPA-SC than DMPA-IM injections. Stock-outs in 2 countries hindered product uptake, highlighting the need to strengthen logistics systems when introducing a new method.

Anna Stout, Siri Wood, George Barigye, Alain Kaboré, Daouda Siddo, Ida Ndione

Glob Health Sci Pract. 2018;6(1):55–72
<https://doi.org/10.9745/GHSP-D-17-00250>

Rapid Uptake of the Subcutaneous Injectable in Burkina Faso: Evidence From PMA2020 Cross-Sectional Surveys

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Guiella Georges, Turke Shani, Coulibaly Hamadou, Scott Radloff, Choi Yoonjoung

Glob Health Sci Pract. 2018;6(1):73–81

<https://doi.org/10.9745/GHSP-D-17-00260>

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The 5-year medical education and research strengthening initiative in Zimbabwe increased faculty retention and student enrollment, improved information technology infrastructure, provided mentoring for postgraduates and clinical training in specialty areas, instituted a competency-based curriculum reform process, and created new departments and centers to institutionalize health education and research implementation. A comprehensive review of the curriculum is still underway and uptake of technology-assisted teaching has been slower than expected.

James G Hakim, Midion M Chidzonga, Margaret Z Borok, Kusum J Nathoo, Jonathan Matenga, Edward Havranek, Frances Cowan, Melanie Abas, Eva Aagaard, Susan Connors, Sanele Nkomani, Chiratidzo E Ndhlovu, Antony Matsika, Michele Barry, Thomas B Campbell

Glob Health Sci Pract. 2018;6(1):82–92

<https://doi.org/10.9745/GHSP-D-17-00052>

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Estimates of the modern contraceptive prevalence rate (mCPR), a population-level indicator, that are derived directly from family planning service statistics lack sufficient accuracy to serve as stand-alone substitutes for survey-based estimates. However, data on contraceptive commodities distributed to clients, family planning service visits, and current users tend to track trends in mCPR fairly accurately and, when combined with survey data in new tools, can be used to approximate the annual mCPR in the absence of annual surveys.

Robert J Magnani, John Ross, Jessica Williamson, Michelle Weinberger

Glob Health Sci Pract. 2018;6(1):93–102

<https://doi.org/10.9745/GHSP-D-17-00341>

Community-Based Management of Acute Malnutrition to Reduce Wasting in Urban Informal Settlements of Mumbai, India: A Mixed-Methods Evaluation

Under the NGO–government partnership, wasting among children under age 3 decreased by 28% in intervention areas and by only 5% in comparison areas. Success factors included persuading and engaging with communities including delivery of tailored information, close presence and supervision of field staff, and holistic management of other issues beyond acute malnutrition. This intensive approach may be challenging for the government to adapt effectively at large scale.

Neena Shah More, Anagha Waingankar, Sudha Ramani, Sheila Chanani, Vanessa D'Souza, Shanti Pantvaitya, Armida Fernandez, Anuja Jayaraman

Glob Health Sci Pract. 2018;6(1):103–127

<https://doi.org/10.9745/GHSP-D-17-00182>

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While there is no one-size-fits-all approach to building community support for such programs, key strategies in Pakistan included: (1) sensitizing and engaging key stakeholders, including religious groups, schools, health and education government officials, parents, and adolescents themselves; (2) tactfully designing and framing the curricula with careful consideration of context and sensitive topics; (3) institutionalizing the programs within the school system; (4) showcasing school programs to increase transparency; and (5) engaging the media to build positive public perceptions.

Venkatraman Chandra-Mouli, Marina Plesons, Sheena Hadi, Qadeer Baig, Iliana Lang

Glob Health Sci Pract. 2018;6(1):128–136
<https://doi.org/10.9745/GHSP-D-17-00285>

Evolution and Resistance to Sexuality Education in Mexico

Mexico's efforts at sexuality education have progressively evolved, from a biological focus in the socialist era in the 1930s, to adding a demographically concerned family planning component in the 1970s and including a wider reproductive health perspective in the 1990s, and finally shifting to a broader sociological context in the early 21st century. Opposition to sexuality education rose steadily in the time period considered, with a growing range of more organized and well-financed actors. Despite this opposition, alliances between academic, government, civil society, and NGO champions have helped ensure sustainability.

Venkatraman Chandra-Mouli, Lucia Gómez Garbero, Marina Plesons, Iliana Lang, Esther Corona Vargas

Glob Health Sci Pract. 2018;6(1):137–149
<https://doi.org/10.9745/GHSP-D-17-00284>

Let's Stop Trying to Quantify Household Vulnerability: The Problem With Simple Scales for Targeting and Evaluating Economic Strengthening Programs

Simple scales developed to measure broad constructs of household economic vulnerability in 3 countries did not accurately measure susceptibility to negative economic outcomes or generate valid classifications of economic status to use for targeting and monitoring and evaluation. We recommend designing tailored monitoring and evaluation instruments to capture narrower definitions of economic vulnerability based on characteristics that economic strengthening programs intend to affect and using separate tools for client targeting based on presence of context-specific "red flag" indicators.

Whitney M Moret

Glob Health Sci Pract. 2018;6(1):150–160
<https://doi.org/10.9745/GHSP-D-17-00291>

Using Program Data to Improve Access to Family Planning and Enhance the Method Mix in Conflict-Affected Areas of the Democratic Republic of the Congo

Analysis of program data and a formative assessment informed several program changes, including improved coaching and supportive supervision, introduction of postpartum IUDs and the levonorgestrel-releasing intrauterine system, and enhanced behavior change communication. These changes substantially increased family planning adoption, from a monthly average of 14 adopters per facility to 37 per facility. Implants continued to be the most popular method, but the percentage of adopters choosing the IUD increased from 2% in 2012 to 13% in 2016, and it was the most popular method among postabortion care clients.

Lara S Ho, Erin Wheeler

Glob Health Sci Pract. 2018;6(1):161–177

<https://doi.org/10.9745/GHSP-D-17-00365>

Effective Collaboration for Scaling Up Health Technologies: A Case Study of the Chlorhexidine for Umbilical Cord Care Experience

Facilitating factors for the Chlorhexidine Working Group: (1) strong, transparent leadership by a neutral broker, promoting shared ownership among all members; (2) reliable internal and external communication; (3) well-defined terms of reference building on common interest around a simple, effective health intervention; (4) clear benefits of participation, including access to evidence and technical assistance; and (5) adequate resources to support the secretariat functions.

Patricia S Coffey, Steve Hodgins, Amie Bishop

Glob Health Sci Pract. 2018;6(1):178–191

<https://doi.org/10.9745/GHSP-D-17-00380>

FIELD ACTION REPORTS

Positive Influence of Behavior Change Communication on Knowledge, Attitudes, and Practices for Visceral Leishmaniasis/Kala-azar in India

After 8 months of behavior change communication activities, largely using group and interpersonal communication, refusal of indoor residual spraying to prevent visceral leishmaniasis was significantly lower among households in intervention villages (8%) than control villages (25%). Knowledge and attitudes were also better among the households in the intervention villages than control villages.

Raghavan Srinivasan, Tanwir Ahmad, Vidya Raghavan, Manisha Kaushik, Ramakant Pathak

Glob Health Sci Pract. 2018;6(1):192–209

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STUDENT ARTICLES – UNDERGRADUATE**Palm Oil in Myanmar: A Spatiotemporal Analysis of the Effects of Industrial Farming on Biodiversity Loss**

Satellite imagery analysis reveals a progressive shift from smallholder farming to industrial oil palm plantations in rural Myanmar, concomitant with biodiversity loss. Although industrial palm oil cultivation may help the local economy flourish, rural communities assume the dual burden of ecosystem instability from deforestation and potential health risks from increased palm oil consumption.

Christopher Nicholas, Jessica Fanzo, Kytt MacManus

Glob Health Sci Pract. 2018;6(1):210–222
<https://doi.org/10.9745/GHSP-D-17-00132>

LETTERS TO THE EDITOR**Yazidi Women: Healing the Invisible Wounds**

Global health cannot be improved without addressing the plight of the survivors and victims of brutal armed conflicts, especially minorities and marginalized people.

Dilshad Jaff

Glob Health Sci Pract. 2018;6(1):223–224
<https://doi.org/10.9745/GHSP-D-18-00024>

UPDATES**Update of: Kara et al., The BetterBirth Program: Pursuing Effective Adoption and Sustained Use of the WHO Safe Childbirth Checklist Through Coaching-Based Implementation in Uttar Pradesh, India**

Nabihah Kara, Rebecca Firestone, Tapan Kalita, Atul A Gawande, Vishwajeet Kumar, Bhala Kodkany, Rajiv Saurastri, Vinay Pratap Singh, Pinki Maji, Ami Karlage, Lisa R Hirschhorn, Katherine EA Semrau; on behalf of the BetterBirth Trial Group

Glob Health Sci Pract. 2018;6(1):225–226
<https://doi.org/10.9745/GHSP-D-18-00065>

Update of: Marx Delaney et al., Improving Adherence to Essential Birth Practices Using the WHO Safe Childbirth Checklist With Peer Coaching: Experience From 60 Public Health Facilities in Uttar Pradesh, India

Megan Marx Delaney, Pinki Maji, Tapan Kalita, Nabihah Kara, Darpan Rana, Krishan Kumar, Jenny Masoinneuve, Simon Cousens, Atul A Gawande, Vishwajeet Kumar, Bhala Kodkany, Narender Sharma, Rajiv Saurastri, Vinay Pratap Singh, Lisa R Hirschhorn, Katherine EA Semrau, Rebecca Firestone

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The Coming-of-Age of Subcutaneous Injectable Contraception

Kimberly Cole,^a Abdulmumin Saad^b

DMPA-SC is a contraceptive injectable formulation that provides women and couples another important voluntary family planning option. It offers characteristics that many women like, including cost and time savings, and has the potential to be delivered by a range of health care cadres in a variety of service delivery channels.

➔ See related articles by [Stout et al.](#) and by [Georges et al.](#)

Thirty-one years ago, Uniject—a prefilled, single-dose syringe and needle package that features a collapsible blister—was conceptualized.¹ Seventeen years later Uniject was approved to administer 104 mg of the contraceptive depot medroxyprogesterone acetate subcutaneously (DMPA-SC).² DMPA-SC is still nascent in many countries, but in others it has transitioned to prominence even where there is already an intramuscular DMPA (DMPA-IM) product on the market. DMPA-SC is now coming of age, and offering it alongside a broad range of other contraceptive options, including fertility awareness methods, long-acting reversible methods, and permanent methods, increases choice and access to voluntary family planning.

This issue of GHSP includes 2 articles that present data on DMPA-SC introduction experiences in 4 countries that were among the earliest to introduce DMPA-SC and have shown great progress: Burkina Faso (Stout et al.³ and Georges et al.⁴), and Niger, Senegal, and Uganda (Stout et al.³).

THE CONTEXT

In developing regions, 214 million women of reproductive age want to avoid pregnancy but are not using a modern contraceptive method.⁵ The Family Planning 2020 (FP2020) global partnership has set an ambitious goal to reach more than half of these women with voluntary family planning, yet we are not on track to achieve this goal.^{6,7} Given the great challenge, adding another voluntary contraceptive option to the method

mix will help women and couples to optimally time and space their pregnancies for the safest and healthiest outcomes. It cannot be overemphasized that voluntarism, informed choice, and a respect for clients' rights must be central to any family planning program.

WHAT'S NEW?

Globally, there is a strong association between the range of voluntary contraceptive choices and contraceptive use: use increases when more methods are available and also when current methods are improved.⁸ DMPA-SC is an improvement upon the intramuscular DMPA formulation. The subcutaneous formulation features a 30% lower dose of DMPA, yet provides the same efficacy and length of protection as DMPA-IM.

In a growing number of countries, the client herself can self-inject. Where women can self-inject, DMPA-SC offers the most effective woman-controlled contraceptive option available.

It is important that providers counsel clients on all methods they might wish to discuss. It is also important that both provider and client understand the differences between DMPA-SC and DMPA-IM (Table).

DMPA-SC HAS THE POTENTIAL TO REACH MORE CLIENTS AND IMPROVE SATISFACTION

Both articles included in this issue of GHSP demonstrate that DMPA-SC offers more women (especially those who face barriers when interacting with the health system) access to a new voluntary contraceptive method that could meet their needs and reproductive intentions. Of the 120 million women that FP2020 seeks to reach, 75 million have never used a contraceptive method (never-users) and 45 million have used a method in the past but have discontinued (discontinuers).^{10,11}

DMPA-SC has been shown through introduction experiences, such as the ones described in this issue,³ to be attractive to never-users. Like past studies, the Stout

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TABLE. A Comparison Between DMPA-SC and DMPA-IM Injectables

| Characteristic | DMPA-SC | DMPA-IM |
|--------------------------------------|---|---|
| Formulation | 104 mg/0.65 mL of DMPA in the Uniject injection system; all-in-one Uniject system simplifies procurement and logistics | 150 mg/mL of DMPA, administered by intramuscular injection, available in vials or prefilled syringes |
| Needle | 3/8" needle; 23 gauge ultra-thin | 1" needle; 22 gauge with a 21–23 gauge range option |
| Administration | Where permitted, can be administered by CHWs, pharmacists, or by the woman herself | Typically administered by a provider, but can be administered by CHWs and pharmacists where permitted |
| Shelf life | 3 years | 5 years |
| Efficacy | 99% contraceptive efficacy | |
| Safety | Similar safety profile | |
| Duration and mechanism of action | Provides 3 months of contraceptive protection per dose by preventing ovulation and thickening cervical mucus | |
| Safety during breastfeeding | Safe for breastfeeding mothers at 6 weeks postpartum | |
| Health benefits | <ul style="list-style-type: none"> • Reduces the risk of endometrial and ovarian cancer • Protects from uterine fibroids, endometrial cancer, ectopic pregnancy, and symptomatic pelvic inflammatory disease • May reduce sickle cell crises in some women with sickle cell anemia • Prevents seizures in some women with epilepsy • Prevents iron deficiency anemia in some women | |
| Side effects | May cause headaches, bleeding irregularities, weight gain, injection-site reactions | |
| Protection against HIV or other STIs | Does not protect against HIV or other STIs | |

Abbreviations: CHW, community health worker; DMPA, depot medroxyprogesterone acetate; DMPA-IM, intramuscular DMPA; DMPA-SC, subcutaneous DMPA; STI, sexually transmitted infection.

Source: Spieler (2010)¹ and Family Health International (2010).⁹

Introducing DMPA-SC into the method mix can increase voluntary uptake of contraceptive methods overall, not just of DMPA-SC.

article was able to show that many new acceptors of voluntary family planning (i.e., never-users) have shown a preference for DMPA-SC. New acceptors often include younger clients, and younger clients may prefer DMPA-SC if it is available closer to their homes and because the needle is smaller than the intramuscular needle, although proximity and needle size are traits that many users find attractive.

Previous studies have also established the acceptability of DMPA-SC, and many clients prefer it to other methods.^{12,13} One reason that clients are attracted to DMPA-SC is the cost and time savings that it offers. In community-based distribution settings, a woman wouldn't need to travel to a clinic since it is offered in her community. In self-injection settings, clients are often given 2 to 3 doses, reducing the number of trips they would need for resupply.

DMPA-SC may also ameliorate the high contraceptive discontinuation rates that are typical of

injectables. The typical discontinuation rate at 12 months for DMPA-IM is 40% to 50%, but studies have found that DMPA-SC self-injectors have a more than 50% increase in continuation through 12 months compared with a provider-administered injection.^{14–16}

Program data demonstrate that the process of introducing DMPA-SC into the method mix can increase voluntary uptake of contraceptive methods overall, not just of DMPA-SC.¹⁷ This is likely happening because when programs are introducing DMPA-SC they are taking the opportunity to retrain providers on all voluntary family planning methods and reinforcing the importance of voluntarism and informed choice.

■ ADVANCING ACCESS AND QUALITY

DMPA-SC can be programmed in a health system through a variety of delivery channels. By introducing the product at different levels and types of

health facilities, in pharmacies and drug shops, and through community health workers, clients have more voluntary contraceptive options. In most parts of the world, community-based family planning programs and the private sector are important segments of the market.^{18,19} DMPA-SC is an ideal product for these sectors, but it requires an enabling environment for success. The articles in GHSP highlight the importance of task sharing. This product has been shown to be especially acceptable and in demand at the community level and through pharmacies. Task sharing can increase contraceptive access by expanding the range of methods that community health workers, lay health workers, and pharmacists can offer.

Programs have faced common challenges that include ensuring high-quality training and adequate supportive supervision. Misunderstandings and inconsistencies, even among experienced providers, may persist even after training.²⁰ Additional coaching at both the facility and community levels can mitigate this weakness. Providers often need additional time and support to become comfortable counseling on new methods.

PROGRAMMING TAKEAWAYS FOR SUCCESSFUL INTRODUCTION AND SCALE UP OF DMPA-SC

The Stout article describes a variety of different introduction approaches, illustrating the many options a country may consider. Globally, countries tend to co-position DMPA-SC alongside DMPA-IM, transition from IM to SC, or roll out targeted introduction by piloting different

approaches. There is no "right" introduction approach; country-level decisions around programming and procurement of contraceptive methods are complex, involve multiple stakeholders, and require thoughtful planning. However the intended outcome should be that more women have voluntary access to this method if it meets their needs.

The Box summarizes some of the conditions necessary for successful introduction, many drawn from the Stout and Georges articles.

PROGRAMMING UNKNOWNNS AND WORDS OF CAUTION AROUND HIV

There is evidence of a possible increased risk of acquiring HIV among progestin-only injectable users. Uncertainty exists about whether this is due to methodological issues with the evidence or to a real biological effect.²¹ Currently there are no epidemiological data available on possible association between DMPA-SC specifically and risk of acquiring HIV. On March 2, 2017, the World Health Organization, in its *Medical Eligibility Criteria for Contraceptive Use*, changed use of DMPA injectable products among women at high risk of HIV acquisition from category 1 to category 2.²² This means that for women at high risk of HIV, the advantages of using DMPA products generally outweigh the theoretical or proven risk. Women should not be denied progestin-only injectables because of concerns about the possible increased risk of HIV. Rather, women considering progestin-only injectables should be advised about these concerns, about the uncertainty over

BOX. Elements Promoting Successful Introduction of DMPA-SC

Policy

- Encourage strong Ministry of Health leadership.
- Promote task sharing: Countries can achieve high impact without including task sharing, but policies that allow for community health worker or pharmacist administration and/or self-injection maximize its potential.

Service Delivery

- Use a rapid, cascade approach to provider training.
- Counsel on all voluntary family planning methods, including those available through referral while ensuring comprehensible information is provided on the method chosen.
- Counsel on the method's characteristics including bleeding changes as well as the need for simultaneous use of condoms for dual protection to prevent HIV and other sexually transmitted infections.
- Offer the method through community channels, mobile outreach, and the private sector, supported by extensive demand-generation activities.

Integration

- Integrate with maternal and child health and other health and non-health services.
- Quickly make DMPA-SC a normal part of commodity planning to increase commodity security and leverage existing distribution systems.

Monitoring and Evaluation

- Disaggregate health information system data by injectable type (IM vs. SC) and collect data more frequently than semiannually.
- Disaggregate users by age to better understand user dynamics, and by prior contraceptive use to track new users.
- Share data openly, especially between the public and private sectors.

whether there is a causal relationship, and about how to minimize their risk of acquiring HIV, including correct and consistent use of condoms, antiretroviral therapy initiation for partners living with HIV where appropriate, and pre-exposure prophylaxis where available. A wide range of voluntary family planning methods must be available, and when introducing a new method such as DMPA-SC, consideration should be given to retraining providers on clinical and counseling skills for all contraceptive methods and HIV risks.^{23,24}

Given the inconclusive data, the question of whether DMPA increases women's risk of HIV is a critical public health issue requiring the strongest evidence possible. The ongoing Evidence for Contraceptive Options and HIV Outcomes (ECHO) study is designed to fill this gap and provide robust evidence on the relative risks (HIV acquisition) and benefits (pregnancy prevention) between 3 effective contraceptive methods (DMPA-IM; levonorgestrel implant; copper intrauterine device).²⁵ It is important to note that the study does not include DMPA-SC, but the results may affect the introduction and rollout of DMPA-SC.

■ ACCESSIBILITY OVER THE LONG TERM

Countries and implementers understandably want long-term access to affordable DMPA-SC before initiating a program at scale. For the DMPA-SC product marketed under the brand name Sayana Press and manufactured by Pfizer, the current price is \$0.85 per dose for the next 6 years in the 69 FP2020 countries. Those countries can currently procure DMPA-IM for \$0.88 per dose, or less. A partnership of global donors and other stakeholders is committed to ensuring long-term sustainability and access to an affordable DMPA-SC product. These organizations are working toward ensuring a healthy market for DMPA-SC supply, including supplier diversity, sufficient demand, and increasingly affordable pricing for DMPA-SC in FP2020 countries.

Another requirement for long-term accessibility is supply chain security. Supply chain systems should be strengthened to mitigate negative outcomes (stock-outs occurred in half of the country experiences described in this issue). The product itself enables simplified logistics because of its all-in-one packaging. This translates into easier transportation and storage due to reduced weight and

volume, and there is less waste to dispose. To strengthen commodity security, the Stout article offers the Senegal experience where stock-outs were negligible due in part to the Informed Push Model.

■ CONCLUSION

Decades of research and development led to the approval of DMPA-SC approximately 14 years ago. This product is now coming of age. Countries are adding it to their basket of voluntary contraceptive methods so more women will have access to a new choice. As more women of reproductive age learn about healthy timing and spacing of pregnancies, they are well served by the affordable availability of better and more contraceptive options to enable them to achieve their desired family size. DMPA-SC is one more option to help them do it.

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Human Resources for Health: The Best Learning, the Best Skill Mix, and the Most Impact

James D Shelton^a

Acting in a difficult environment, constructive efforts to improve medical education in Zimbabwe included revised curricula, investing in faculty and improved teaching skills, competency-based learning, and modern technology. But an ideal approach to health systems strengthening would put more emphasis on primary care and prevention, equity, and the many other vital health cadres besides physicians.

➔ See related article by *Hakim et al.*

We have witnessed markedly increased attention to the health workforce in low- and middle-income countries (LMICs) in the last 2 decades. And with good reason. Health workers are the backbone of all health systems, and the situation is generally dire. A good write-up is found in the recent *Lancet* Commission on the future of health in sub-Saharan Africa.¹ Some key themes:

- Huge need for additional staff
- Priority for primary care and prevention
- Priority for a diverse set of health cadres
- Equity for underserved populations
- Competency-based learning
- Information technology for learning
- Institution strengthening and sustainability, including lifelong learning
- Collaboration across countries—of both pedagogic and technical content

Addressing all this is of course a very tall order. In this issue of GHSP, we feature one helpful step addressing this immense challenge at the preservice level. Hakim and colleagues² describe their efforts to strengthen medical education at the University of Zimbabwe, under the auspices of the Medical Education Partnership Initiative (MEPI) funded by the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) at \$13 million over 5 years.

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PEPFAR is to be commended for undertaking this initiative, consistent with the proposition that overall health systems strengthening will be necessary for HIV control to be sustainable in the long term.³

■ AT ITS FOUNDATION: A DEFINITE STRATEGY AIMED AT IMPROVING THE MEDICAL EDUCATION SYSTEM

First, recognize that medical education in Zimbabwe had been in serious disarray following a series of economic crises. Under those constraints, as described in their article, Hakim and colleagues creditably focused on a number of the areas listed in the bullets to the left. These included strengthening and reforms at the medical school level, such as revising curricula; implementing competency-based learning approaches; improving faculty teaching skills, including an intensive faculty development and scholarship program; recruiting new faculty; increasing student enrollment; improving use of modern digital technology in learning; and collaborating with international partners.

Limited Ability to Assess Both Process and Outcomes

Still, Hakim and colleagues provide only limited evidence for clear effectiveness of their efforts. Findings presented are mainly derived from surveys of participants, such as in workshops. Thus, we are given little documentation of what actually happened in trainings and no objective assessment of improvements in knowledge or practice. Moreover, the numbers of respondents reported in the surveys are often rather modest, limiting interpretability. Findings from the surveys are generally positive, though such surveys can, of course, be highly subject to courtesy bias.

The authors do present some statements about outcomes but without clear substantiation. For example, regarding the new HIV curriculum, they assert that its effects "... were noticed in the main teaching hospitals first, and then extended out as doctors and specialists became more qualified and spread to other parts of the country." But supporting evidence or elaboration is not provided. They also point to a marked increase in numbers of practitioners in Zimbabwe during this time period. But the number of new graduates is not nearly enough to account for this large increase. Rather, the main explanation appears to be returning physicians who had previously left the country during times of extreme economic and political stress. And because of the limited time scope of the article, we have little sense of potential long-term effects.

Shortcomings of the Approach: Level and Equity of Interventions and Range of Cadres

The fundamental goal for any health system should be to have the most impact to improve health across the population. That should include emphasis on primary care and prevention including healthy lifestyle and structural prevention interventions like sanitation. Such needs are especially great in LMICs like Zimbabwe. The effort clearly did focus on improving HIV care and the article includes a passing reference to social determinants of health. Yet the program succumbed very substantially to the seemingly inevitable drive in medical culture to gravitate toward subspecialty care and technical procedures to include components like forensic psychiatry, pacemaker implantation, electroencephalography for epilepsy patients, and bronchoscopy.

Likewise, the objective of equity calls for particular efforts toward interventions directed to rural areas, where few physicians reside, as well as toward the most needy in the population. Unfortunately, there is only some very limited description of "community-based education" and

efforts to improve it, and little discernable specific attention to reaching the neediest.

Lastly, all health systems need many other categories of health professionals besides physicians. Indeed, in resource-poor countries, optimal provision of services calls for even more emphasis on less-trained categories of health workers. Physicians arguably should not even be the first priority. While MEPI had a collateral effort to support nursing (NEPI), the *Lancet* Commission rightly emphasizes the importance of task shifting and task sharing and support for many other cadres. The long list of other key cadres, which often get insufficient attention, include clinical officers, community health workers, pharmacists and pharmacy assistants, midwives, sanitarians, social workers, lab technicians, emergency technicians, anesthesia technicians, logistics specialists, epidemiologists, safety engineers, computer technologists, behavioral scientists, and managers.

MEPI was obviously created to focus on physicians, so the authors needed to work within that framework. But physicians have an important role in supporting and aligning with these other cadres. This facilitating aspect was not addressed by the authors.

CONCLUSION

Rome was not built in a day. And the perfect should not be the enemy of the good. The efforts by Hakim certainly appear to have moved in the direction to improve the health system in Zimbabwe. But what is really needed in LMICs in general is a broader, more complete approach.

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Health systems should place emphasis on primary care and prevention.

The objective of equity calls for particular efforts toward interventions directed to rural areas and to the most needy in the population.

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COMMENTARY

A New World Health Era

Ariel Pablos-Méndez,^a Mario C Raviglione^b

Unprecedented economic progress and demands for social protection have engendered an economic transition in health in many low- and middle-income countries, characterized by major increases in domestic health spending and growing national autonomy. At the global level, development assistance is refocusing on fragile states, the poorest communities, and cooperation on global public goods like health security, technical norms, and innovation. Intergovernmental organizations like WHO need the wherewithal and support to provide leadership and to properly advance this new world health era.

Between 2010 and 2015, development assistance for health (DAH) reached over US\$30 billion a year,¹ and the Millennium Development Goals (MDGs)² helped drive unprecedented gains in development and health equity.³ While those accomplishments are cause for celebration,⁴ DAH budgets have tightened¹ as the world confronts new health challenges, and the global health community is worried about human rights reversals by recently elected populist governments.⁵ Health financing at the country level looks more promising and could be the basis for a new world health era.

■ AN ECONOMIC TRANSITION IN HEALTH

After centuries of flat incomes per capita, the world has experienced a 20-fold increase in gross domestic product (GDP) during the last 50 years.^{6,7} The majority of countries that were considered low-income in 1990, including Bolivia, Bangladesh, and the Republic of Congo, have moved to lower-middle or middle-income status.⁸

Health spending is very closely correlated with GDP and it accounts for an expanding fraction of any growing economy.⁹ While that is often a fiscal and political headache for richer countries, for a growing number of lower-income countries the increase in health resources has the potential to cover the average cost per capita of essential lifesaving commodities and services.⁹

As DAH plateaued in recent years,¹ many low-income countries saw total health spending grow at 10% per year (based on data from National Health Accounts compiled by USAID in 2015). Public and private domestic resources now dwarf DAH (Figure 1). The growth of health spending, however, follows a surge in the demand for health services that is often met by unregulated private services paid out-of-pocket, an inefficient and regressive form of health financing.¹¹ This

transition is linked to the economics of countries at different stages of development. Thus, these changes have already occurred in several countries and may not be complete in others by 2030.

■ A HISTORICAL PENDULUM IN THE POLITICAL ECONOMY

Political economy is the branch of social science that studies the relationships between individuals and society and between markets and the state.¹² The liberal forces galvanized by the Enlightenment, the 18th century philosophical movement in Europe that promoted freedom, fraternity, solidarity, and equality, have brought unprecedented well-being to our civilization,¹³ but progress has not been linear. Periodic structural shifts in the political economy, whether arising from global crises or national elections, bring new challenges and opportunities and change the ways in which the health agenda is advanced.

After World War II, with the end of European colonialism, what was known as geographic or "tropical medicine" became firmly established as "international health," with newly created international agencies and new and assertive nations committed to primary health care (Figure 2).¹⁴ The World Health Organization (WHO) was the unquestionable leader of the period, but its uniqueness started being challenged in the early 1990s.^{15–18}

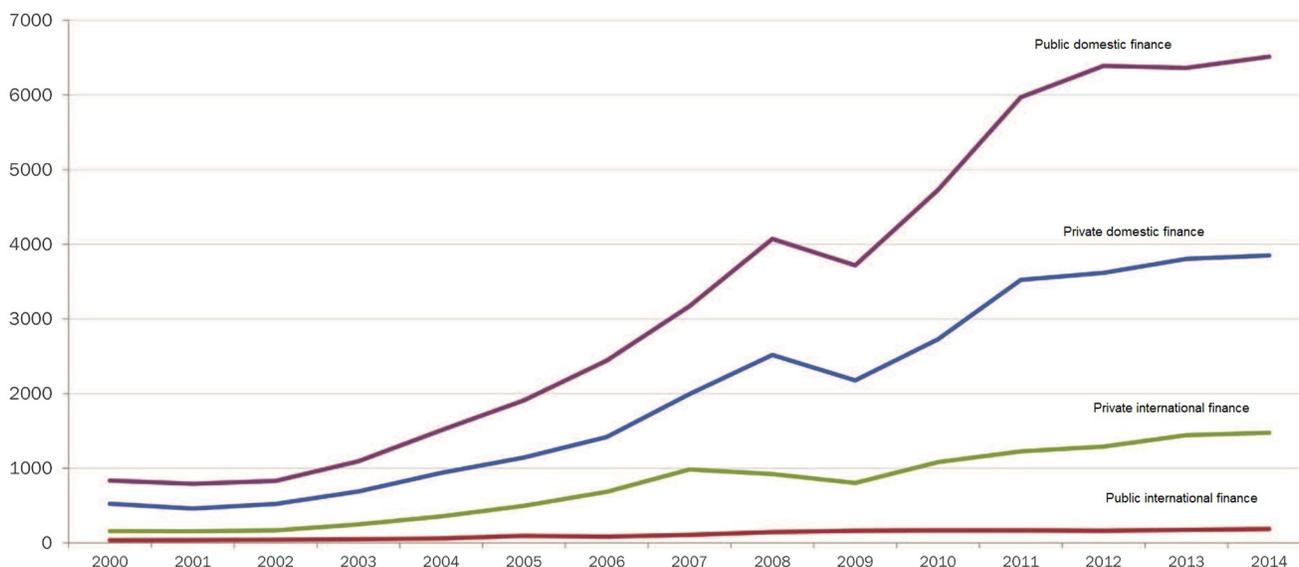
At that time, after the collapse of the Soviet Union, the Washington Consensus—the set of market economic ideas supported by the International Monetary Fund and the World Bank—downplayed national government and promoted neoliberal policies, i.e., a strong market-based approach to globalization, decentralization, and privatization.¹⁹ New philanthropy and the AIDS movement were additional ingredients of what became "global health."²⁰ WHO's influence waned^{21,22} amidst a plethora of new public-private partnerships advancing donor-supported initiatives against AIDS, tuberculosis, malaria, and vaccine-preventable diseases.^{14,23} While some experts worried about open-

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FIGURE 1. Financing Trends in Developing Countries, 2000–2014 (in US\$, billions, 2013 prices)



Note: Public domestic finance is defined as total government revenue. Gross-fixed capital formation by the private sector was used as an indicator for private domestic finance. Private international finance is the sum of foreign direct investment, portfolio equity and bonds, commercial banking and other lending, and personal remittances. Public international finance equals the total official flows (official development assistance and other official flows).

Source: United Nations Research Institute for Social Development (2016).¹⁰

source anarchy and undue influence,²⁴ these global partnerships contributed to achieving several MDGs.

We are at a new inflexion point. The Great Recession of 2008 caused a reduction in global GDP and global trade for the first time in half a century.²⁵ While markets have recovered since, their failure caused ongoing social pain and revealed severe inequalities,²⁶ leading to economic insecurity and growing political demand for social protection and popular rejection of globalization.^{5,27}

National governments are reasserting themselves, in extreme cases with protectionism and xenophobia.²⁸ Countries that responded to the crisis with fiscal austerity have faced a wave of antiestablishment, ethnopolitist elections not seen since the 1930s.²⁹ This creates many domestic problems of its own and pushes back against the international cooperation and altruism that characterized the golden era of global health. In the long run, populism is no substitute for sound governance and it carries risks.³⁰ Good technical and political leadership is needed to address the underlying economic inequalities responsible for the social turmoil seen in many countries.

■ A NEW WORLD HEALTH ERA?

Economic growth and increasing health spending in many "developing" countries, along with stagnant DAH and a wave of populist policies, pave the way for a number of profound changes in our field (Table). At the national level, there will be more country ownership and domestic resource mobilization (DRM), with an increasingly feasible possibility of achieving universal health coverage (UHC). At the global level, the power of DAH is diluted and likely to refocus on fragile states and global public goods with benefits to all countries (see below). As a result, member-state organizations like WHO and the World Bank, in coordination with other influential public and private actors, have new opportunities to address existing and emerging health challenges.³¹ Many existing organizations at the global and national level will adjust the role they play and how they fund their work in this new world health era.

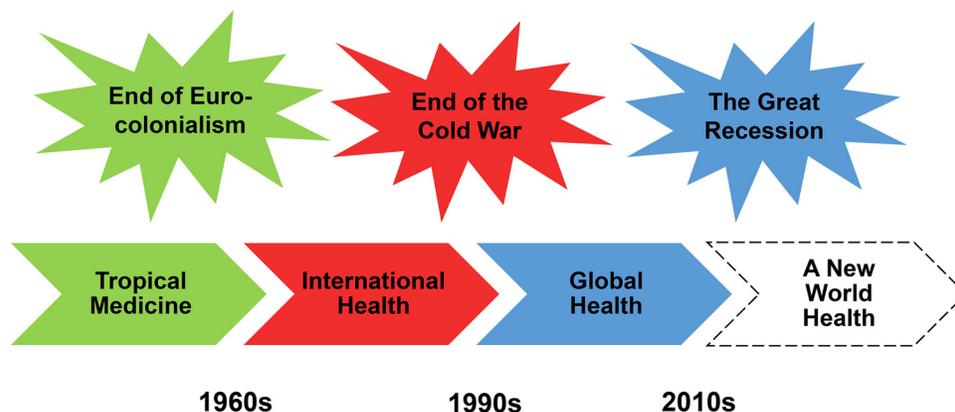
Domestic Resource Mobilization

With emerging economies growing, the Third International Conference on Financing for Development, held in Addis Ababa, Ethiopia,

Health spending accounts for an expanding fraction of total spending for any growing economy.

Good technical and political leadership is needed to address the underlying economic inequalities responsible for the social turmoil seen in many countries.

FIGURE 2. A New Chapter in International Health History



Note: This graph is only a didactic tool; historical periods often overlap and vary from one country or region to another, and many components of one period carry over to future ones.

Universal health coverage means access for all to appropriate health services without financial hardship.

positioned DRM at the heart of the post-2015 agenda.³² The World Bank estimates that simply bringing laggards to the median government revenue level by increasing tax ratios to the median 23% of GDP in low- and middle-income countries would add US\$26 billion each year for public expenditure in health.³³ In addition, increasing the government budget allocation for health to just the median level of 10% would generate an extra \$50 billion each year.³³ Tobacco taxes can contribute to general taxation and also reduce one of the main drivers for chronic diseases. Additional DRM possibilities include leveraging concessionary loans from development banks (e.g. the Global Financing Facility),³⁴ innovative financing (e.g., social impact bonds, loan guarantees),³⁵ and shaping responsible markets.³⁶ Countries like Ghana, Ethiopia, and Rwanda have shown it is possible to increase health budgets significantly.

Universal Health Coverage

As shown in Figure 1, health spending is rising and will likely continue to do so as GDP expands. In the absence of government policy on public or private insurance, health spending is often paid out-of-pocket by individuals, which sends millions of families back into poverty.^{37,38} Such expenditures account for 50% of total health spending in most African countries and up to 80% in large South Asian nations—versus less than 20% in most countries of the Organisation for Economic Co-operation and Development

(OECD).¹¹ In response to this growing challenge, UHC is becoming the organizing principle for health systems everywhere.^{39,40}

UHC means 3 things: (1) access for all to (2) appropriate health services (at a minimum, health promotion and primary care, with additional services depending on local epidemiology and economics), and (3) without financial hardship (financial hardship is defined as 25% or more of total household expenditures spent on out-of-pocket health expenditures).³⁷ UHC is not about donors buying health insurance but about national governments organizing health financing in equitable, prepaid risk pools.³² The services covered under UHC should be not only curative but also public health and preventive, like immunization, nutrition, family planning, and road safety interventions. Indeed a major challenge is to prioritize such services in the face of huge demand for expensive tertiary care for urban elites. According to the International Labour Organization, over 60 countries have achieved UHC and several more are halfway in their decades-long reforms (Figure 3).⁴¹ Many countries, especially in Africa, are asking for technical assistance to reorient their health sector toward UHC.

A global movement toward the progressive realization of UHC is unfolding.^{37,42} Following the *World Health Report 2010*,³⁷ the United Nations (UN) General Assembly passed a resolution supporting UHC,⁴³ which is now enshrined in the Sustainable Development Goal (SDG) targets for 2030.⁴⁴ The G7 and the G20—the international

TABLE. Changes in the Health Field, 1960s to Present Day

| Period | International Health 1960s to 1990s | Global Health 1990s to circa 2015 | New World Health 2008 to Present |
|-----------------------------------|---|--|--|
| Geopolitical origins | End of European Colonialism with new voting members in a newly formed UN | End of the Cold War (and the Soviet Union), freer trade, Internet, and AIDS | Financial markets crash, OECD recession, and emergent developing economies |
| Political economy tone | Cold War with East-West divide | "Government is the problem," markets and civil society the solution | Reassertion of nation-state and demands for social protection |
| Construction of health | WHO holistic definition and social construction of health | Simultaneously, human rights and reductionist technology | Multisectoral, social determinants, and universalism |
| Predominant approach | Primary health care, "Health for All," and solidarity as universal principles and movements | Top-down programs and PPPs to fight key diseases of poverty in developing countries | Grand convergence between North and South, progressive realization of UHC and global health security |
| International cooperation | Colored by foreign affairs (East-West competition, with exceptions like smallpox eradication) | Explosion of NGOs, PPPs, and new philanthropy tackling the MDGs in poor countries | Assertive but interdependent nation-states sign up to the universal SDGs |
| Development assistance for health | Newly created UN agencies like WHO and bilateral donors like USAID | Billion-dollar platforms (Gavi, The Global Fund, PEPFAR), Bill & Melinda Gates Foundation a major player, <i>golden era of DAH</i> | DAH stagnation, domestic resource mobilization, and graduation from assistance (except fragile states) |
| Governance | WHO takes center stage in the UN architecture | "Open source anarchy" (WHO's authority diluted) | Sovereign states reasserted; opportunity for WHO |
| Private sector | Essentially proscribed from UN settings and agenda | Rise in prominence both through PPPs and philanthropy, IT enables global communications | Half of the health sector provision and growing markets in emerging economies |
| Civil society and community role | Empowerment of communities after Alma-Ata Declaration of 1978 | Growing activism, especially linked with HIV/AIDS | National NGOs very important despite closing space in some countries |

Abbreviations: DAH, development assistance for health; IT, information technology; MDGs, Millennium Development Goals; OECD, Organisation for Economic Co-operation and Development; PEPFAR, U.S. President's Emergency Plan for AIDS Relief; PPPs, public-private partnerships; SDGs, Sustainable Development Goals; UHC, universal health coverage; UN, United Nations; USAID, United States Agency for International Development; WHO, World Health Organization.

summits where leaders from the world's advanced and emerging economies meet to discuss critical global issues—support UHC, and a UHC Alliance has been born to foster and track progress to 2030. At the December 2017 Universal Health Coverage Forum in Tokyo, Japan's Prime Minister Shinzo Abe pledged US\$2.9 billion for UHC while UN Secretary-General António Guterres announced UHC will be the subject of a high-level meeting at the UN General Assembly in 2019,⁴⁵ giving impetus to WHO's goal of expanding health coverage to an additional 1 billion people in 5 years.³⁷

Development Assistance for Health

This new world health era will be driven by DRM rather than DAH and that will affect the role played by governments, industry, and

international organizations.⁴⁶ Diluted by domestic growth, DAH today accounts for less than 20% of the total health spending even in Africa⁴⁷ and is shrinking in most recipient countries. It is already below 1% in middle-income countries like India. Donors are graduating successful countries from external assistance,⁴⁸ with the goal of concentrating DAH in the poorest nations by 2030.⁴⁰ These international donors also have a window of opportunity to support the transformation of health systems toward prioritizing prevention and primary care in UHC; most DAH programs are moving from service provision to capacity building and technical assistance.⁴⁸

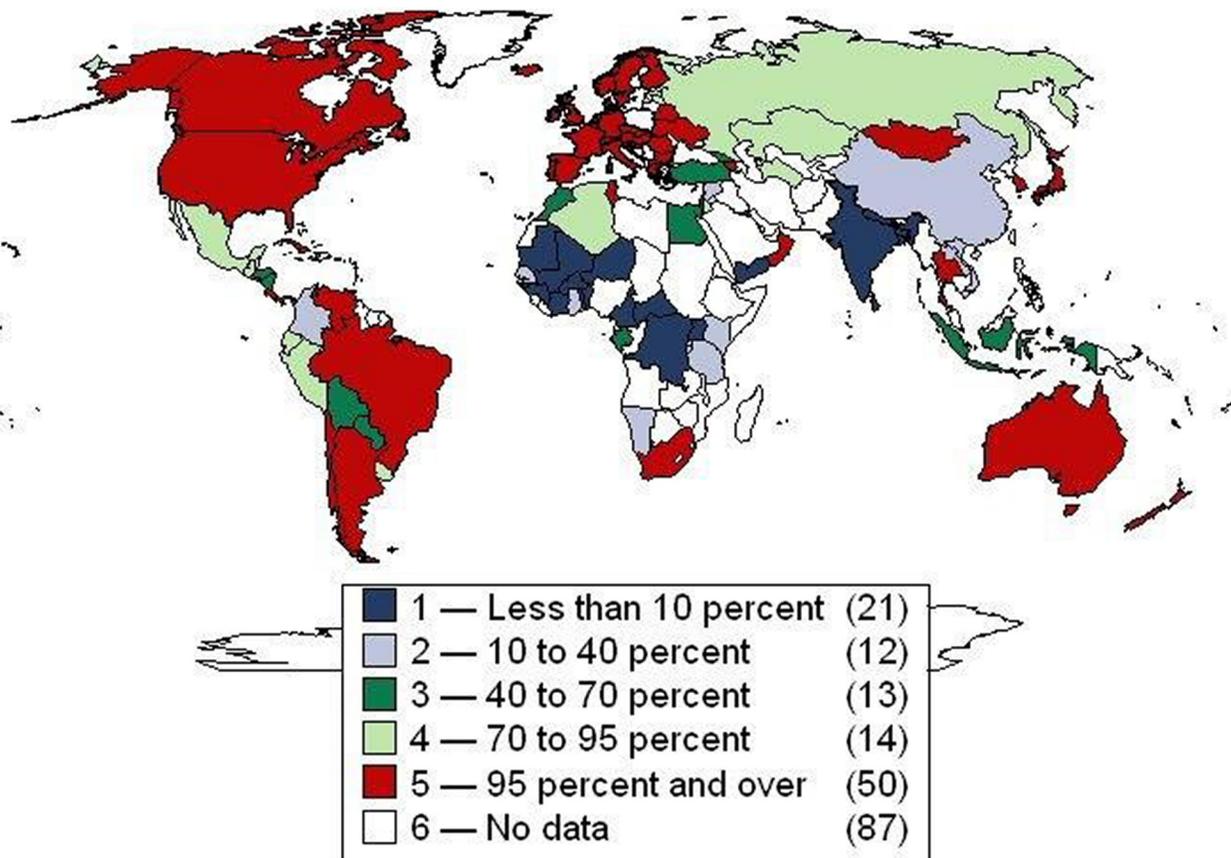
Global Public Goods

In this context, DAH should shift progressively to support global public goods⁴⁹ like global health

The new world health era will be driven by domestic resource mobilization rather than development assistance.

Development assistance should shift progressively to support global public goods.

FIGURE 3. Universal Health Coverage^a: The New Frontier for Global Health



^a The graph assesses the proportion of the population affiliated with national health insurance or social, private, or micro- insurance schemes.

Source: This graph was first published in Garret (2009)³⁹ and later updated in the International Labour Organization (2017).⁴¹

security, international norms, pooled procurement, and research and development (particularly on diseases of poverty). While the Ebola epidemic galvanized donors to improve global health security,⁵⁰⁻⁵² the other areas mentioned deserve equal and sustained attention. Funding global public goods makes sense as DAH dollars in countries decline or are diluted by DRM, and given their broader benefits including to the citizens of donor countries. Led by BRICS countries (Brazil, Russia, India, China, and South Africa), these and many other "emerging" economies are also contributing valuable research and development and other innovations in South-South collaboration.⁵³

The MDGs helped generate increased political support and funding against child and maternal mortality, HIV/AIDS, tuberculosis, and malaria. The end result was major reductions in mortality

and suffering from these conditions.² However, chronic noncommunicable diseases (NCDs) are a neglected area in global health that is ripe for creative action. NCDs are now the leading cause of death worldwide,⁵⁴ and the epidemiologic transition is proceeding rapidly in Africa.⁵⁵ Yet investments and effective solutions have lagged.^{1,56} UHC, backed by targeted DAH, offers an opportunity to tackle NCDs with multisectoral initiatives as predicated by the SDG framework.⁵⁷

The Private Sector and Civil Society

During the 1970s, the private sector was nearly absent from public health circles, though it was already playing a growing role in the provision of medicines and clinical services. At the turn of the millennium, many public-private partnerships

(PPPs), like Gavi or the Global Alliance for TB Drug Development, were created to address market failures in the development and supply of drugs and vaccines. The change brought energy, creativity, and progress for orphan drugs and the MDGs.

PPPs 2.0 will be less top-down and more engaged in local markets and political economy, where the private sector accounts for half of total health expenditures.¹ Private practitioners, formal or informal, already play a prominent role in service provision.⁵⁸ Governments will need stronger stewardship capacity to regulate mixed health systems⁵⁹ and shape markets to ensure quality and equity.³¹ As countries move toward UHC, governments will need to prioritize public financing for primary health care and population-based prevention, besides provision of curative services.⁶⁰

Civil society, uniting forces with public health officials and political leaders, dramatically changed the response to HIV/AIDS, making it a top priority at all levels and driving unprecedented growth of DAH for lifesaving interventions.⁶¹ Civil society organizations will continue to play a critical role even as some authoritarian governments try to close the space for their work. If anything, the moral and innovative voice of NGOs, community organizations, and other civil society actors is a public good that will further grow in importance to guide multisectoral policy for UHC and to hold politicians accountable to the citizenry.⁶²

While health is only one of 17 SDGs, the principle of partnership and new approaches to multisectoral collaboration will remain key in this new era. Interdependence requires closer cooperation and common aims among relevant UN agencies, development banks, professional organizations and, yes, the private sector. WHO governing bodies are exploring more inclusive engagement of non-state actors without compromising their ethics and neutrality.⁶³

The World Health Organization

As the premier UN agency for health, WHO figures prominently in historical analyses of international health.^{14,22} With greater emphasis on domestic resources, assertive member states, and the centrality of national health systems, this new era offers an opportunity to better define the role of intergovernmental organizations such as WHO and the World Bank.⁶⁴ That is a challenge for the recently elected WHO Director-General⁶⁵ given the complexity the international arena accrued in the previous era¹⁸ and the internal organizational

challenges posed by decentralized management and constrained budgets⁶⁶ relative to expectations. Tellingly, the new Director-General is from Africa and was elected for the first time by all member states, giving him, in principle, unprecedented political capital to forge ahead with his priorities, including UHC and global health security. Unlike previous eras, this new agenda has been forged and embraced by the World Bank Group as central to human capital and economic development.⁴⁴

To succeed in a new world health era and deliver on the SDG agenda, WHO will need to act on several fronts and focus on its comparative advantages. Firstly, while technical assistance to countries and strategic leadership may not be unique to WHO, ensuring their adequate and neutral provision to member states is key to its mission. WHO needs to be able to swiftly declare public health emergencies of international concern and help improve the world's capacity to detect and respond to pandemic threats, including adherence to international health regulations and new ideas like the Coalition for Epidemic Preparedness Innovations,⁶⁷ the Pandemic Emergency Financing Facility,⁵¹ and the Global Virome Project.⁶⁸ WHO will have a crucial role in rethinking and modernizing surveillance systems and data analytics platforms, as well as the standards, prequalification, and procurement of essential drugs and vaccines in collaboration with the private sector.

As with the Framework Convention on Tobacco Control and *The World Health Report* on UHC,³⁷ WHO will be expected to provide country guidance for future-oriented health systems and policies. Together with the World Bank and development partners, WHO should advocate for increasing DAH for the poorest countries while advising better-off members states to prepare for successful graduation from DAH through hybrid mechanisms like the Global Fund and the Global Financing Facility.³⁴ Finally, WHO should expand the reach and quality of its advocacy and strategic communication capacity to ensure that global guidelines are clearly understood by all relevant audiences.

Internally, WHO needs to address several challenges if it is to thrive in this new world health era. It needs to define better the roles and responsibilities of its headquarters, regional, and country offices. Instead of relying only on its staff, WHO could harness today's global brain trust of experts and centers of excellence, and it should streamline the appointment of senior staff based on high-level

PPPs 2.0 will be less top-down and more engaged in local markets and political economy.

WHO needs to address several internal challenges if it is to thrive in this new world health era.

expertise and competence rather than on geopolitical considerations. A major challenge compromising the effectiveness of WHO and threatening its independence is its budget,⁶⁶ which is lower than the revenues of any large hospital in New York City—and three-quarters of the WHO budget comes from voluntary contributions. Member states' decisions to cut or increase assessed contributions will be pivotal. Finally, WHO needs to work well with the World Bank and related institutions, which can play a constructive role in financing health and development.

CONCLUSIONS

The priorities and approaches used in international health have evolved with epidemiological transitions and technological innovations. But the field has also been shaped by unprecedented economic development and a historical pendulum in the role of government in social well-being. Like the Soviet Union collapse in 1991, the Great Recession of 2008 triggered one such shift in the political economy between government and market.

Global health is moving past its stage of development assistance to a new era of country ownership and global cooperation.⁶⁹ At the national level, the economic transition of health and growing political demands for social protection create conditions favorable for domestic resource mobilization and universal health coverage with new forms of private-sector engagement. At the global level, development assistance is refocused on fragile states, the poorest communities, and global public goods like health security, normativity, and innovation.

National health systems will be the center of gravity of a new world health era, and the evolving developments discussed in this article will call for adjustments in the fluid architecture of international actors and the relations within and between nation-states. This new era brings opportunities (e.g., UHC) and challenges (e.g., growing inequalities) and new ways of financing health. Leaders at all levels should understand and capitalize on this historical moment and avoid political miscalculations like those that undermined the visionary primary health care movement 40 years ago.^{15,70}

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PROGRAMMATIC REVIEW & ANALYSIS

Liftoff: The Blossoming of Contraceptive Implant Use in Africa

Roy Jacobstein^a

Contraceptive implant use is rising rapidly, substantially, and equitably in many sub-Saharan African countries, across almost all sociodemographic categories. Gains in implant use have exceeded combined gains for IUDs, pills, and injectables. Key contributing factors include sizeable reductions in commodity cost, much-increased commodity supply, greater government commitment to expanded method choice, and wider adoption of high-impact service delivery practices that broaden access and better reach underserved populations. Continued progress in meeting women's reproductive intentions with implants calls for further investment in quality services for both insertion and removal, and for addressing issues of financing and sustainability.

ABSTRACT

This article draws from national surveys of every sub-Saharan African country with at least 1 recent survey published between 2015 and 2017 and 2 prior surveys from 2003 to 2014. Twelve countries comprising over 60% of the region's population met these inclusion criteria. The analysis considers recent and longer-term changes in 3 key variables: modern contraceptive prevalence rate (mCPR), method-specific prevalence, and a method's share of the current modern method mix. As recently as 2011, implant CPR in sub-Saharan Africa was only 1.1%. Since then, sizeable price reductions, much-increased commodity supply, greater government commitment to rights-based family planning, broader WHO eligibility guidance, and wider adoption of high-impact service delivery practices have resulted in expanded client access and marked increases in implant prevalence and share of the method mix. Ten of the 12 countries now have an implant CPR around 6% or higher, with 3 countries above 11%. Increased implant use has been the main driver of the increased mCPR attained by 11 countries, with gains in implant use alone exceeding combined gains in use of injectables, pills, and intrauterine devices. In countries as diverse as Burkina Faso and Ethiopia, Democratic Republic of the Congo and Ghana, Kenya and Senegal, implant use now accounts for one-fourth to one-half of all modern method use. Implants have become the first or second most widely used method in 10 countries. In the 7 countries with multiple surveys conducted over a 2- to 3-year span between 2013–14 and 2016–17, average annual gains in implant prevalence range from 0.97 to 4.15 percentage points; this contrasts to historical annual gains in use of all modern methods of 0.70 percentage points in 42 sub-Saharan African countries from 1986 to 2008. Implant use has risen substantially and fairly equitably across almost all sociodemographic categories, including unmarried women, women of lower and higher parity, women in all 5 wealth quintiles, younger and older women, and women residing in rural areas. A notable exception is the category of nulliparous married women, whose implant use is mostly below 1%. These attainments represent a major success story not often seen in family planning programming. With continued program commitment and donor support, these trends in implant uptake and popularity are likely to continue for the next few years. This implies even greater need for the international family planning community to maintain its focus on rights-based programming, ensuring reliable access to implant removal as well as insertion services, and addressing issues of financing and sustainability.

INTRODUCTION

This programmatic review and analysis highlights the marked uptake of contraceptive implants that has been occurring in much of sub-Saharan Africa over the past several years. Although implants have many attractive features, including convenience, very high effectiveness, and long duration of action, they had been marginal methods for many years in family planning programs, largely because of high commodity cost—

once upwards of US\$20/set. As recently as 2011, the contraceptive prevalence rate (CPR) for implants in sub-Saharan Africa was only 1.1% among married women, including 0.6% in Western Africa, 0.3% in Middle Africa, and 0.1% in Southern Africa.¹ Use of implants among sexually active unmarried women was likely even lower. In the subsequent few years, however, the situation has been changing greatly for implants in terms of overall use; use by women in almost all sociodemographic categories; share of the method mix; and contribution to countries' gains in the modern contraceptive prevalence rate (mCPR) and achievement of Family Planning 2020 (FP2020) goals. This article

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As recently as 2011, prevalence of implant use was only 1.1% in sub-Saharan Africa.

analyzes these changes in 12 countries that comprise 61% of sub-Saharan Africa's population of 1.03 billion people,² noting important achievements and trends and assessing to what extent the "immense potential of wider implant availability"³ is being realized.

■ METHODS

Data Sources

This article draws from 2 sources of representative national population data: Demographic and Health Surveys (DHS) and Performance Monitoring and Accountability 2020 (PMA2020) surveys.^{4,5} It analyzes recent changes in contraceptive use and method mix among married women and sexually active unmarried women in every sub-Saharan African country meeting 3 inclusion criteria:

1. At least 1 DHS or PMA2020 survey was conducted in the country between 2015 and 2017
2. Information from this latest survey was available online in a DHS Final Report or PMA2020 Family Planning Brief (as of December 31, 2017)
3. At least 2 previous DHS surveys were conducted in the previous decade (between 2003 and 2014).

Twelve countries—Burkina Faso, Democratic Republic of the Congo (DRC), Ethiopia, Ghana, Kenya, Malawi, Niger, Nigeria, Senegal, Tanzania, Uganda, and Zimbabwe—met these inclusion criteria and are included in the analysis. The PMA2020 survey for DRC pertains only to its capital city, Kinshasa (although DRC/Kinshasa will be considered a "country" in terms of this article). Several countries with active family planning programs, including Madagascar, Mozambique, Rwanda, South Africa, and Zambia, did not meet inclusion criteria as their latest surveys were not conducted recently or often enough to reflect a rapidly evolving situation.

Assessment of comparability of DHS and PMA2020 data is beyond the scope of this article. However, in 3 of the 4 countries with DHS and PMA2020 surveys conducted the same year, Ghana (2014), DRC/Kinshasa (2014), and Ethiopia (2016), mCPR and implant CPR figures were comparable. In the fourth country, Kenya (2014), the figures were almost identical: mCPR, 53.2% (DHS) and 53.4% (PMA2020); implant

CPR, 9.9% (DHS) and 9.8% (PMA2020). For purposes of this analysis, the survey types are treated as comparable.

To further contextualize the dynamics of implant uptake in the 12 countries under review, approximately 75 additional DHS surveys conducted from 1986 onward in over 25 countries in all regions were examined for levels and rates of increase in overall mCPR and individual modern method CPR (pills, injectables, intrauterine devices [IUDs], female sterilization). The analysis also draws on service statistics supplied by 2 international NGOs active in family planning service delivery, Marie Stopes International (MSI) and Population Services International (PSI). These data include provision of implants in sub-Saharan Africa by MSI from 2008 to 2017, and provision of implants and IUDs by PSI from 2013 to 2017. Finally, the analysis cites data from the Reproductive Health Interchange maintained by the United Nations Population Fund (UNFPA; <https://www.unfpaprocedurement.org/rhi-home>) to quantify the number of implants procured and supplied to sub-Saharan African countries between 2013 and 2017.

Variables

Three key family planning variables are analyzed across the past decade-plus (2003–2017) among both married women of reproductive age (defined as both currently married women and women living in a consensual union) and unmarried sexually active women of reproductive age:

1. **mCPR:** The percentage of women currently using any modern method of contraception (male or female sterilization, IUDs, oral contraceptive pills, injectables, implants, male or female condoms, diaphragm/foam/jelly, the Lactational Amenorrhea Method, the Standard Days Method, or "other" modern methods such as the cervical cap or contraceptive sponge).
2. **Method-specific CPR:** The percentage of women currently using the specific method in question; for example, implant CPR refers to the percentage of women currently using the implant, and is sometimes referred to as "implant prevalence" or "prevalence of implant use" in this article.
3. **A method's share of the current modern contraceptive method mix:** The percentage of current modern method users who use

the particular method in question, providing a profile of the relative level of use of that particular method; for example, the implant's share of the current modern method mix provides a depiction of how widely used the implant is among modern method users. (Note the denominator for this variable is modern method users, whereas the denominator for the previous 2 variables is all women. As users of traditional methods and nonusers of contraception are removed from the denominator, the percentage share of the remaining methods rises in comparison with the method's CPR. In this article, "method mix" or "current method mix" refers to the current modern method mix.)

Unless otherwise indicated, prevalence figures for any of these 3 variables refer to those for married women.

Analysis

The analysis starts with consideration of changes over the past decade-plus (2003–2017) in the mCPR, implant CPR, and implant share of the method mix for both married and sexually active unmarried women across the 12 included countries. Three data points are considered for each country, from an "early," "middle," and latest available survey. Implant prevalence is then further analyzed according to the key sociodemographic categories of parity, age, residence, and wealth quintile for the 7 countries with recent/latest DHS surveys conducted between 2014 and 2016. (PMA2020 Family Planning Briefs afford more recent data, from 2016 to 2017, which is very useful in fast-changing situations as is the case with implant uptake. However, these briefs do not provide method-specific data disaggregated by sociodemographic categories other than marital status.) For this article, PMA2020 provided additional data on the implant's share of the method mix, disaggregated by age, parity, residence, and wealth.) Next, changes over the past decade-plus in implant prevalence and share of the current method mix in all 12 countries are compared with those for the other LARC method, the IUD, and the other commonly used hormonal methods, pills and injectables. Finally, longer-term (2008–2017) and very recent (2013–14 to 2016–17) trends in mCPR and method-specific CPR are analyzed in terms of total and annual percentage-point gains in prevalence.

FINDINGS

Substantial Uptake by Married Women High Implant CPR

Implant CPR was very low a decade ago or earlier in the 12 countries under review: 0.6% or lower in 8 countries (including those with data "not available"), and only 1.0% to 1.7% in the other 4 countries (Table 1, Column 3, lowermost rows). Now, among a larger population base of married women, 9 of these 12 countries have an implant CPR of almost 7% or higher (Figure 1). Three countries—Burkina Faso, Kenya, and Malawi—have an implant CPR above 11%. The only countries with an implant CPR below 5.9% are Nigeria (3.0%), whose Kaduna and Nasarawa states have implant CPRs above 6%, and Niger (1.7%), whose capital, Niamey, has an implant CPR of 8.0%. Low-mCPR countries of francophone West and Central Africa (Burkina Faso, DRC/Kinshasa, Senegal) as well as high-mCPR, anglophone countries of Eastern and Southern Africa (Kenya, Malawi, Zimbabwe) have attained high levels of implant use, as have Ethiopia, Ghana, Tanzania, and Uganda. Nearly 1 in every 5 married women in Kenya uses an implant, as does 1 in every 8 to 9 married women in Burkina Faso and Malawi. Kenya's 18.1% prevalence of implant use is the highest in the world.

High Share of the Method Mix

Implants' share of the current modern method mix is higher than implant CPR in numerical terms (as non-users of modern contraception drop out of the denominator). Implants now account for almost 20% or more of all current modern method use in 10 of the countries under review (Table 1, Column 4). In contrast, a decade ago the implant was little-used, constituting less than 6% of the method mix in all 12 countries except Burkina Faso (where it was 14%), and around 2% or less in 6 countries (including Niger and DRC/Kinshasa, where implant use was so low it was included only in the "other modern methods" category) (Figure 2). In both the high-prevalence milieu of Kenya and the lower-prevalence milieu of Senegal, almost 1 in every 3 married contraceptive users now relies on an implant, as do 1 in every 4 to 5 married contraceptive users in DRC/Kinshasa, Ethiopia, Ghana, Malawi, Nigeria, Tanzania, and Uganda. In Burkina Faso, implants are the most widely used method, accounting for nearly half (48.1%) of all modern method use. In 9 of the other 11 countries, implants have become the second most

Implant CPR among married women is now almost 7% or higher in 9 of 12 study countries.

Kenya has attained an implant CPR of 18.1%, the highest in the world.

Implants are the 1st or 2nd most widely used method by married women in 10 diverse sub-Saharan African countries.

TABLE 1. Trends in the mCPR, Implant CPR, and Implant Share of Current Method Mix Among Married Women and Sexually Active Unmarried Women, 2003–2017

| Column 1 | Married Women | | | Sexually Active Unmarried Women | | |
|---------------------------------|---------------|-----------------|-----------------------------|---------------------------------|-----------------|-----------------------------|
| | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 | Column 7 |
| Country and Data Source | mCPR | Implant CPR | Implant Share of Method Mix | mCPR | Implant CPR | Implant Share of Method Mix |
| Kenya PMA R5 2016 | 59.9 | 18.1 | 30.2 | 53.7 | 8.1 | 15.0 |
| Kenya DHS 2008-09 | 39.4 | 1.9 | 4.8 | 45.1 | 1.2 | 2.7 |
| Kenya DHS 2003 | 31.5 | 1.7 | 5.4 | 44.3 | 2.0 | 4.5 |
| Burkina Faso PMA R4 2016 | 24.6 | 11.8 | 48.1 | 38.8 | 7.1 | 18.3 |
| Burkina Faso DHS 2010 | 15.0 | 3.4 | 22.7 | 58.7 | 2.3 | 3.9 |
| Burkina Faso DHS 2003 | 8.6 | 1.2 | 14.0 | 55.7 | 0.9 | 1.6 |
| Malawi DHS 2015–16 | 58.1 | 11.5 | 19.8 | 43.2 | 5.8 | 13.4 |
| Malawi DHS 2010 | 42.2 | 1.3 | 3.1 | 46.3 | 0.9 | 1.9 |
| Malawi DHS 2004 | 28.1 | 0.5 | 1.8 | 24.3 | 0.0 | 0.0 |
| Zimbabwe DHS 2015 | 65.8 | 9.6 | 14.6 | 66.4 | 14.4 | 21.7 |
| Zimbabwe DHS 2010–11 | 57.3 | 2.7 | 4.7 | 61.5 | 2.7 | 4.4 |
| Zimbabwe DHS 2005-06 | 58.4 | 1.2 | 2.1 | 60.2 | 0.0 | 0.0 |
| Ethiopia PMA R5 2017 | 35.2 | 8.3 | 23.7 | 47.1 | 15.6 | 33.2 |
| Ethiopia DHS 2011 | 27.3 | 3.4 | 12.5 | 52.3 | 2.4 | 4.6 |
| Ethiopia DHS 2005 | 13.9 | 0.2 | 1.4 | 43.3 | 0.0 | 0.0 |
| Senegal DHS 2016 | 23.1 | 7.1 | 30.7 | 47.9 | 5.9 | 12.3 |
| Senegal DHS 2010–11 | 12.1 | 1.1 | 9.1 | 25.6 | 3.1 | 12.4 |
| Senegal DHS 2005 | 10.3 | 0.6 | 5.8 | 43.3 | 0.6 | 5.8 |
| Uganda PMA R5 2017 | 33.9 | 7.1 | 20.8 | 45.5 | 4.0 | 8.7 |
| Uganda DHS 2011 | 26.0 | 2.7 | 10.4 | 44.3 | 2.4 | 5.4 |
| Uganda DHS 2006 | 17.9 | 0.3 | 1.7 | 46.9 | 0.0 | 0.0 |
| DRC/K PMA R5 2016 | 23.4 | 6.7 | 28.6 | 41.8 | 3.5 | 8.3 |
| DRC/K DHS 2013–14 | 19.0 | 2.4 | 12.6 | NA ^b | NA ^b | NA |
| DRC/K DHS 2007 | 14.1 | NA ^a | NA ^a | NA ^b | NA ^b | NA |
| Tanzania DHS 2015–16 | 32.0 | 6.7 | 20.9 | 45.8 | 7.7 | 16.8 |
| Tanzania DHS 2010 | 27.4 | 2.3 | 8.4 | 44.7 | 2.8 | 6.3 |
| Tanzania DHS 2004–05 | 20.0 | 0.5 | 2.5 | 35.7 | 0.5 | 1.4 |
| Ghana PMA R5 2016 | 25.8 | 5.9 | 23.0 | 37.6 | 7.8 | 20.8 |
| Ghana DHS 2008 | 16.6 | 0.9 | 5.4 | 33.8 | 0.8 | 2.4 |
| Ghana DHS 2003 | 18.7 | 1.0 | 5.3 | 31.6 | 0.3 | 0.9 |
| Nigeria PMA R2 2017 | 16.1 | 3.0 | 18.8 | 34.9 | 0.8 | 2.2 |
| Nigeria DHS 2013 | 9.8 | 0.4 | 4.1 | 54.9 | 0.4 | 0.7 |
| Nigeria DHS 2008 | 9.7 | 0.0 | 0.0 | 42.4 | 0.1 | 0.2 |

Continued

TABLE 1. Continued

| Column 1 | Married Women | | | Sexually Active Unmarried Women | | |
|--------------------------|---------------|-----------------|-----------------------------|---------------------------------|-----------------------|-----------------------------|
| | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 | Column 7 |
| Country and Data Source | mCPR | Implant CPR | Implant Share of Method Mix | mCPR | Implant CPR | Implant Share of Method Mix |
| Niger PMA R1 2016 | 14.4 | 1.7 | 11.9 | NA^b | NA^b | NA^b |
| Niger DHS 2012 | 12.2 | 0.3 | 2.5 | 39.9 | 0.0 | 0.0 |
| Niger DHS 2006 | 5.0 | NA ^a | NA ^a | NA ^b | NA ^b | NA ^b |

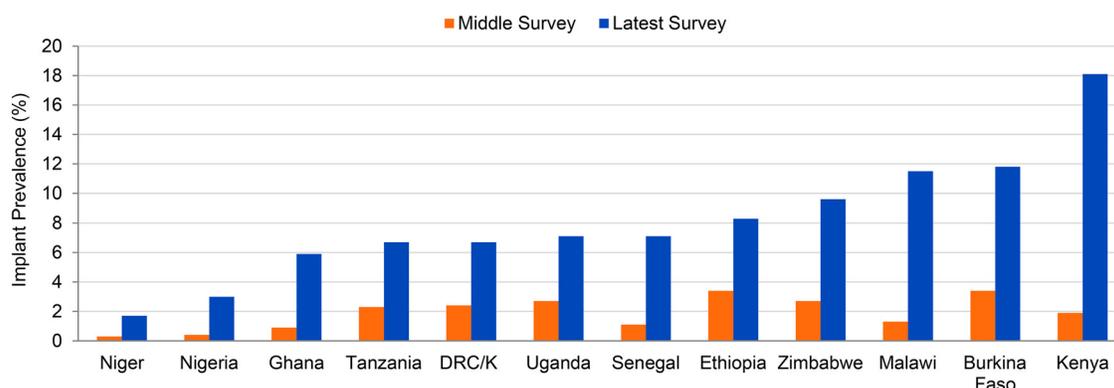
Abbreviations: CPR, contraceptive prevalence rate; DHS, Demographic and Health Survey; DRC/K, Democratic Republic of the Congo/Kinshasa only; mCPR, modern contraceptive prevalence rate; NA, not available; PMA, Performance Monitoring and Accountability 2020; R, round.

Notes: Uppermost entry for each country, shown in boldface, is the latest available DHS survey report or PMA2020 Family Planning Brief as of December 31, 2017. Table ordered according to implant CPR for married women (Column 3). All data reported as percentages.

^aImplants included in "other modern methods" category.

^bData not provided in survey report.

FIGURE 1. Marked Increases in Implant Use by Married Women, 2008–14 to 2015–17



Abbreviations: DHS, Demographic and Health Survey; DRC/K, Democratic Republic of the Congo/Kinshasa only; PMA2020, Performance Monitoring and Accountability 2020.

Data sources: For earlier year (middle survey), DHS surveys for each country; for later year (latest survey), most recent DHS or PMA2020 survey as of December 31, 2017, as indicated in Table 1. Left-hand and right-hand bars for each country correspond respectively to their middle- and upper-row values in Table 1, Column 3.

widely used of all modern methods by married women. (The exceptions are Niger and Nigeria, where implants are the third most widely used modern method.)

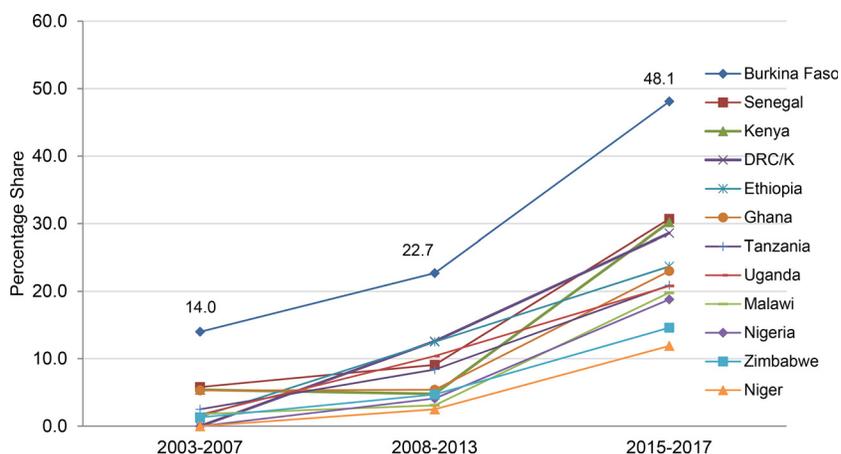
Comparably High Rates of Implant Use by Unmarried Women

Sexually active unmarried women are using contraceptive implants at comparably high levels as married women (Table 1, Columns 6 and 7). Implant prevalence among sexually active unmarried women ranges from around 6% to over 15% in 8 of the 11 countries providing data on

such use (Figure 3). This contrasts greatly to the situation of a decade earlier, when only 2 countries had an implant prevalence above 0.6%, and 6 countries either had an implant prevalence of 0.0% or did not even list implants as a specific method in their survey reports. The prevalence of implant use by sexually active unmarried women exceeds that of married women in Ethiopia, Ghana, Tanzania, and Zimbabwe. One in every 7 sexually active unmarried women in Ethiopia and Zimbabwe uses an implant, as does nearly 1 in every 12 in Ghana, Kenya, and Tanzania. In the socioculturally conservative contexts of francophone West Africa, sexually active

Sexually active unmarried women have comparably high levels of implant use.

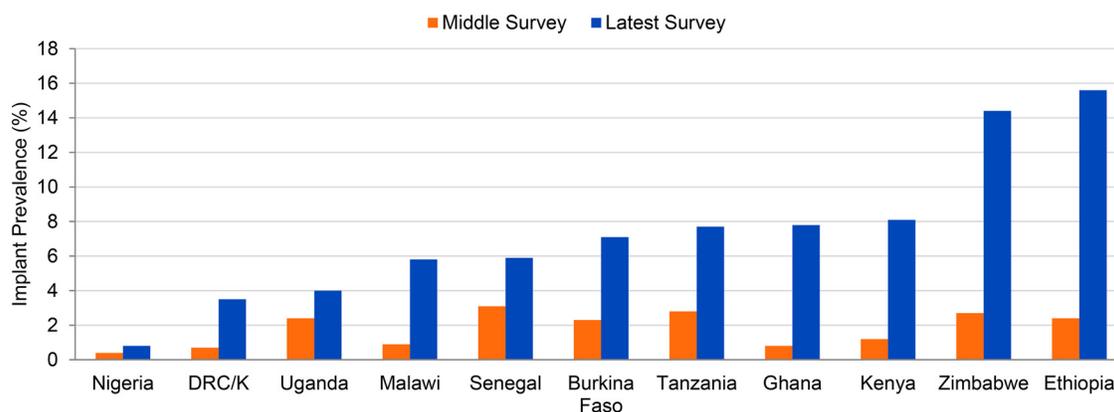
FIGURE 2. Implants Have Markedly Rising Share of Method Mix Among Married Women, 2003–2017



Abbreviations: DHS, Demographic and Health Survey; DRC/K, Democratic Republic of the Congo/Kinshasa only; PMA2020, Performance Monitoring and Accountability.

Data sources: For 2003–07 and 2008–13, DHS surveys for each country; for 2015–17, most recent DHS or PMA2020 survey as of December 31, 2017, as indicated in Table 1.

FIGURE 3. Comparable Increases in Implant Use by Sexually Active Unmarried Women, 2008–14 to 2015–17



Abbreviations: DHS, Demographic and Health Survey; DRC/K, Democratic Republic of the Congo/Kinshasa only; PMA2020, Performance Monitoring and Accountability 2020.

Note: Niger's survey reports did not include data on specific method use by unmarried women, and thus are not included in this figure.

Data sources: For earlier year (middle survey), DHS surveys for each country; for later year (latest survey), most recent DHS or PMA2020 survey as of December 31, 2017, as indicated in Table 1. Left-hand and right-hand bars for each country correspond to their middle- and upper-row values in Table 1, Column 6.

unmarried women have attained an implant prevalence of 5.9% in Senegal and 7.1% in Burkina Faso. Implant use accounts for one-third (33.2%) of all modern method use by

sexually active unmarried women in Ethiopia, and 15% to 22% of their use in Burkina Faso, Ghana, Kenya, Tanzania, and Zimbabwe. These attainments are especially noteworthy because

unmarried women generally encounter greater barriers to family planning access and use than do married women,^{6,7} particularly in accessing provider-dependent methods like implants.

Substantial Uptake in Almost All Sociodemographic Categories

Women in almost all sociodemographic categories are accessing implants in substantial and generally equitable proportions. This can be readily seen in Table 2, for married women in the 7 countries with a recent DHS survey between 2014 and 2016, in the sociodemographic categories of parity 1 or higher, age above 19, all 5 wealth quintiles, and place of residence. The

category of married women ages 15–19, which includes both parous and nulliparous women (women of parity 0, i.e., without children), has noticeably lower implant CPR levels, about half as high as levels for women in older age brackets in 6 of the 7 countries. The category of nulliparous married women (of any age) stands in further distinct contrast, as seen in Table 3. In 5 of the 7 countries (Kenya, Malawi, Senegal, Tanzania, and Zimbabwe), the implant CPRs of nulliparous married women range only from 0.3% to 0.7%, levels many orders of magnitude lower than implant CPRs of women at higher parities. In the other 2 countries, Ethiopia and Ghana, nulliparous women have higher levels of implant uptake, 4.7% and 4.4%, respectively,

Women in almost all sociodemographic categories are accessing implants in substantial and generally equitable proportions.

TABLE 2. Substantial and Generally Equitable Use of Implants in Almost All Sociodemographic Categories, Married Women, 7 Countries With Recent DHS Surveys

| Implant CPR | Ethiopia DHS 2016 | Ghana DHS 2014 | Kenya DHS 2014 | Malawi DHS 2015–16 | Senegal DHS 2016 | Tanzania DHS 2015–16 | Zimbabwe DHS 2015 |
|--------------------------|-------------------|----------------|----------------|--------------------|------------------|----------------------|-------------------|
| All married women | 7.9 | 5.2 | 9.9 | 11.5 | 7.1 | 6.7 | 9.6 |
| Parity | | | | | | | |
| 0 | 4.7 | 4.4 | 0.4 | 0.6 | 0.7 | 0.5 | 0.3 |
| 1–2 | 10.5 | 4.0 | 10.8 | 13.3 | 6.7 | 7.6 | 8.3 |
| 3–4 | 8.8 | 5.6 | 11.2 | 13.1 | 7.2 | 7.7 | 12.0 |
| 5+ | 5.6 | 6.6 | 8.9 | 9.7 | 10.8 | 6.5 | 12.6 |
| Age group, years | | | | | | | |
| 15–19 | 4.9 | 6.1 | 5.4 | 5.1 | 2.4 | 2.7 | 3.6 |
| 20–24 | 8.7 | 5.0 | 9.6 | 12.3 | 6.5 | 8.1 | 9.9 |
| 24–29 | 9.8 | 7.2 | 12.9 | 17.2 | 6.1 | 9.2 | 9.6 |
| 30–34 | 8.4 | 6.9 | 11.9 | 15.2 | 7.9 | 8.3 | 11.7 |
| 35–39 | 8.4 | 4.1 | 10.4 | 10.0 | 9.8 | 6.6 | 10.8 |
| Residence | | | | | | | |
| Urban | 11.0 | 4.6 | 12.0 | 12.8 | 9.1 | 6.4 | 12.0 |
| Rural | 7.3 | 5.8 | 8.6 | 11.3 | 5.7 | 6.9 | 8.4 |
| Wealth quintile | | | | | | | |
| Lowest | 5.0 | 4.3 | 5.7 | 10.4 | 6.2 | 4.5 | 7.3 |
| Second | 7.7 | 3.3 | 10.1 | 10.5 | 7.2 | 6.8 | 8.6 |
| Middle | 8.7 | 6.6 | 9.8 | 11.7 | 8.6 | 7.8 | 9.0 |
| Fourth | 7.9 | 5.4 | 11.1 | 11.4 | 6.7 | 8.7 | 10.7 |
| Highest | 9.9 | 3.8 | 11.7 | 13.5 | 7.1 | 6.1 | 12.2 |

Abbreviations: CPR, contraceptive prevalence rate; DHS, Demographic and Health Survey.
 Note: All data reported as percentages.

TABLE 3. Low Implant Use by Nulliparous Married Women, Substantial Use by Married Women With Children, 7 Countries With Recent DHS Surveys

| Country and Data Source | Implant CPR at Parity 0 | Range of Implant CPRs at Parity 1 and Higher |
|-------------------------|-------------------------|--|
| Zimbabwe DHS 2015 | 0.3 | 8.3–12.6 |
| Kenya DHS 2014 | 0.4 | 8.9–11.2 |
| Tanzania DHS 2015–16 | 0.5 | 6.5–7.7 |
| Malawi DHS 2015–16 | 0.6 | 9.7–13.3 |
| Senegal DHS 2016 | 0.7 | 6.7–10.8 |
| Ghana DHS 2014 | 4.4 | 4.0–6.6 |
| Ethiopia DHS 2016 | 4.7 | 5.6–10.5 |

Abbreviations: CPR, contraceptive prevalence rate; DHS, Demographic and Health Survey.
Notes: Table ordered from lowest to highest Implant CPR at parity 0. All data reported as percentages.

Use of injectables is still high, and rising, but their share of the method mix has declined in 9 of 12 countries.

although these levels are generally lower than for parous women in those countries.

In additional data provided by PMA2020 for this article (Sally Safi, written communication, February 2018), the marked differences in implant uptake between nulliparous married women and women of higher parity are also seen in the 5 countries that are not included in Table 3. The implant's share of the method mix (not implant CPR) among married women at parity 0 is 0.0% in all 5 countries. This contrasts to method-mix shares among higher parity women ranging from 44.0% to 48.4% in Burkina Faso, 7.1% to 15.8% in DRC/Kinshasa, 7.5% to 20.1% in Niger, 6.3% to 14.1% in Nigeria, and 13.0% to 19.9% in Uganda. The implant's share of the method mix in these countries also exhibits similar patterns across other sociodemographic categories as does implant CPR in the other 7 countries. For example, in Burkina Faso, the implant's share of the method mix ranges from 38.8% to 53.6% among women 20–39 and from 39.4% to 53.2% across wealth tertiles. In Nigeria, the implant's share of the method mix is 3.9% among women 15–19 compared with 8.2% to 15.6% among older women. Similarly, in Niger implants' share of method use among women aged 15–19 (most of whom are married) was 0.7%, whereas it ranged from 6.4% to 15.9% among women in higher age brackets.

With broadened program availability of LARCs, IUD use has risen modestly in 11 of the 12 study countries.

Trend in Use of Other Reversible Methods Use of Injectables Still Rising, but Share of Method Mix Declining

Injectables are widely used in sub-Saharan Africa,¹ and their use is still rising in 11 of the 12 countries under review (Table 4, Column 5). Injectables prevalence ranges from a low of 3.1% in DRC/Kinshasa to a high of 30.0% in Malawi. In 7 countries, injectables prevalence is around 10% or higher and in 9 countries injectables' share of the method mix is over 30% (Table 4, Column 6). With implants' rising—and faster-rising—CPRs, however, injectables' still-predominant share of the method mix, 28% to 66% in the 9 highest-use countries, has declined in 9 countries and plateaued in 2 others (Figure 4). Three of the 4 countries where injectables comprise over half the modern method mix, Kenya, Ethiopia, and Malawi, have experienced declines of 9 to 10 percentage points in the injectables' share of the method mix during the past 4 to 8 years as implant uptake has risen substantially there.

IUD Use Still Low, but Modest Gains in All 12 Countries

Prevalence patterns for the IUD are very different than for implants (Figure 5). In earlier surveys, 11 of the 12 countries under review had very low levels of IUD prevalence among married women, with most countries' prevalence figures at or below 0.5% and none above 1.6% (Table 4, Column 7). This is consistent with IUD prevalence patterns in sub-Saharan Africa more generally, where IUD CPR among married women is only 0.7%,¹ and use by sexually active unmarried women has been negligible. More recently, however, modest gains in IUD CPR have been generated in 11 of the 12 countries (Table 5). With only Nigeria's IUD prevalence declining, and by only 0.1 percentage point, gains have ranged from 0.3 percentage points in Ghana, Niger, and Tanzania to 1.9 percentage points in Kenya. Although IUD CPR is still relatively low—1.6% or less in all 12 countries except Kenya, where IUD CPR is 3.5%—it has quadrupled in Ethiopia, Malawi, and Niger, and doubled or tripled in Burkina Faso, Ghana, Kenya, Senegal, and Zimbabwe. IUD use comprises 6.9% of modern method use in Senegal, 6.5% in Nigeria, and almost 6% in Kenya, whose 3.5% IUD prevalence is the highest in Africa. As discussed below, IUDs and implants are often both part of the same LARC-oriented program efforts to broaden

TABLE 4. Method-Specific CPR and Share of Current Modern Method Mix for Implants, Injectables, IUDs, and Pills, Married Women, 2003–2017

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 | Column 7 | Column 8 |
|---------------------------------|-------------|-----------------|-----------------------------|-------------------------|---------------------------------|-----------------------------|------------------------------|
| Country and Data Source | mCPR | Implant CPR | Implant Share of Method Mix | Injectables CPR | Injectables Share of Method Mix | IUD CPR/Share of Method Mix | Pill CPR/Share of Method Mix |
| Kenya PMA R5 2016 | 59.9 | 18.1 | 30.2 | 27.6 | 46.0 | 3.5/5.9 | 5.1/8.5 |
| Kenya DHS 2008–09 | 39.4 | 1.9 | 4.8 | 21.6 | 54.8 | 1.6/4.1 | 7.2/18.3 |
| Kenya DHS 2003 | 31.5 | 1.7 | 5.4 | 14.3 | 45.4 | 2.4/7.6 | 7.5/23.8 |
| Burkina Faso PMA R4 2016 | 24.6 | 11.8 | 48.1 | 8.2^b | 33.4^b | 0.9/3.5 | 2.8/11.5 |
| Burkina Faso DHS 2010 | 15.0 | 3.4 | 22.7 | 6.2 | 41.3 | 0.3/2.0 | 3.2/21.3 |
| Burkina Faso DHS 2003 | 8.6 | 1.2 | 14.0 | 2.5 | 29.1 | 0.4/4.7 | 2.2/25.6 |
| Malawi DHS 2015–16 | 58.1 | 11.5 | 19.8 | 30.0 | 51.6 | 1.1/1.9 | 2.4/4.1 |
| Malawi DHS 2010 | 42.2 | 1.3 | 3.1 | 25.8 | 61.1 | 0.3/0.7 | 2.5/5.9 |
| Malawi DHS 2004 | 28.1 | 0.5 | 1.8 | 18.0 | 25.6 | 0.1/0.4 | 2.0/7.1 |
| Zimbabwe DHS 2015 | 65.8 | 9.6 | 14.6 | 9.6 | 14.6 | 0.6/1.0 | 41.1/62.5 |
| Zimbabwe DHS 2010–11 | 57.3 | 2.7 | 4.7 | 8.3 | 14.5 | 0.2/0.3 | 41.3/72.1 |
| Zimbabwe DHS 2005–06 | 58.4 | 1.2 | 2.1 | 9.9 | 17.0 | 0.3/0.5 | 43.0/73.6 |
| Ethiopia PMA R5 2017 | 35.2 | 8.3 | 23.7 | 24.1 | 66.3 | 1.2/3.3 | 1.8/5.2 |
| Ethiopia DHS 2011 | 27.3 | 3.4 | 12.5 | 20.8 | 76.2 | 0.3/1.1 | 2.1/7.7 |
| Ethiopia DHS 2005 | 13.9 | 0.2 | 1.4 | 9.9 | 71.2 | 0.2/1.4 | 3.1/22.3 |
| Senegal DHS 2016 | 23.1 | 7.1 | 30.7 | 8.2 | 35.5 | 1.6/6.9 | 4.6/20.0 |
| Senegal DHS 2010–11 | 12.1 | 1.1 | 9.1 | 5.2 | 43.0 | 0.6/5.0 | 4.1/33.9 |
| Senegal DHS 2005 | 10.3 | 0.6 | 5.8 | 3.2 | 31.1 | 0.5/4.9 | 3.6/35.0 |
| Uganda PMA R5 2017 | 33.9 | 7.1 | 20.8 | 17.6^b | 51.9^b | 0.9/2.6 | 2.7/8.1 |
| Uganda DHS 2011 | 26.0 | 2.7 | 10.4 | 14.1 | 54.2 | 0.5/1.9 | 2.9/11.2 |
| Uganda DHS 2006 | 17.9 | 0.3 | 1.7 | 10.2 | 57.0 | 0.2/1.1 | 2.9/16.2 |
| DRC/K PMA R5 2016 | 23.4 | 6.7 | 28.6 | 3.1^b | 13.3 | 1.0/4.2 | 3.7/15.6 |
| DRC/K DHS 2013–14 | 19.0 | 2.4 | 12.6 | 3.4 | 17.9 | 0.5/2.6 | 3.0/15.8 |
| DRC/K DHS 2007 | 14.1 | NA ^a | NA ^a | 1.1 | 7.8 | NA ^a | 2.2/15.6 |
| Tanzania DHS 2015-16 | 32.0 | 6.7 | 20.9 | 12.6 | 39.4 | 0.9/2.8 | 5.5/17.2 |
| Tanzania DHS 2010 | 27.4 | 2.3 | 8.4 | 10.6 | 38.7 | 0.6/2.2 | 6.7/24.5 |
| Tanzania DHS 2004-05 | 20.0 | 0.5 | 2.5 | 8.3 | 41.5 | 0.2/1.0 | 5.9/29.5 |
| Ghana PMA R5 2016 | 25.8 | 5.9 | 23.0 | 8.4 | 32.6 | 0.5/2.0 | 4.5/17.5 |
| Ghana DHS 2008 | 16.6 | 0.9 | 5.4 | 6.2 | 37.3 | 0.2/1.2 | 4.7/28.3 |
| Ghana DHS 2003 | 18.7 | 1.0 | 5.3 | 5.4 | 28.9 | 0.9/4.8 | 5.5/29.4 |
| Nigeria PMA R2 2017 | 16.1 | 3.0 | 18.8 | 4.5 | 28.1 | 1.0/6.5 | 2.5/15.4 |
| Nigeria DHS 2013 | 9.8 | 0.4 | 4.1 | 3.2 | 32.7 | 1.1/11.2 | 1.8/18.4 |
| Nigeria DHS 2008 | 9.7 | 0.0 | 0.0 | 2.6 | 26.8 | 1.0/10.3 | 1.7/17.5 |

Continued

TABLE 4. Continued

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 | Column 7 | Column 8 |
|-------------------------|----------|-----------------|-----------------------------|-----------------|---------------------------------|-----------------------------|------------------------------|
| Country and Data Source | mCPR | Implant CPR | Implant Share of Method Mix | Injectables CPR | Injectables Share of Method Mix | IUD CPR/Share of Method Mix | Pill CPR/Share of Method Mix |
| Niger PMA R1 2016 | 14.4 | 1.7 | 11.9 | 5.0 | 34.9 | 0.4/2.9 | 6.8/47.0 |
| Niger DHS 2012 | 12.2 | 0.3 | 2.5 | 2.1 | 17.2 | 0.1/0.8 | 5.6/45.9 |
| Niger DHS 2006 | 5.0 | NA ^a | NA ^a | 1.5 | 30.0 | 0.1/2.0 | 3.0/60.0 |

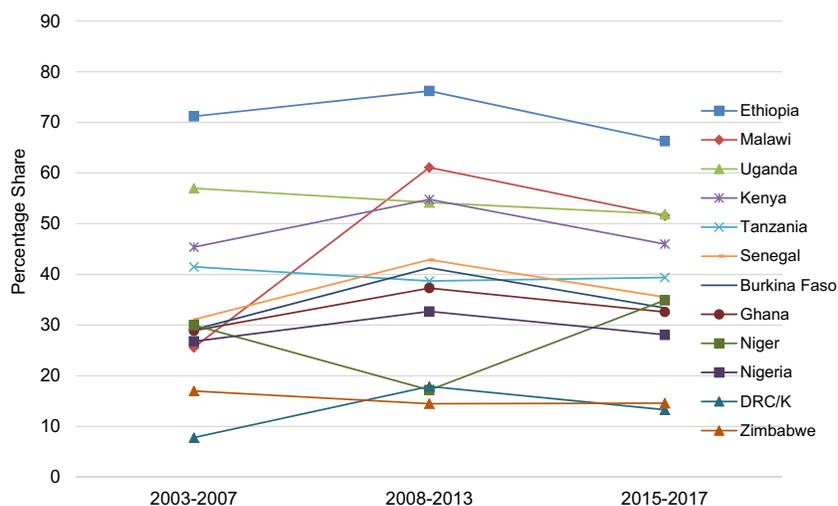
Abbreviations: CPR, contraceptive prevalence rate; DHS, Demographic and Health Survey; DRC/K, Democratic Republic of the Congo/Kinshasa only; DMPA, depot medroxyprogesterone acetate; IUD, intrauterine device; mCPR, modern contraceptive prevalence rate; NA, not available; PMA, Performance Monitoring and Accountability 2020; R, round.

Notes: Uppermost entry for each country is latest available DHS survey report or PMA2020 Family Planning Brief as of December 31, 2017. Table ordered according to implant CPR (Column 3). All data reported as percentages.

^aIncluded in "other modern methods" category.

^bSum of the intramuscular DMPA injectable and the subcutaneous injectable Sayana Press.

FIGURE 4. Injectables Share of Method Mix Plateauing or Falling Among Married Women, 2003–2017



Abbreviations: DHS, Demographic and Health Survey; DRC/K, Democratic Republic of the Congo/Kinshasa only; PMA2020, Performance Monitoring and Accountability.

Data sources: For 2003–07 and 2008–13, DHS surveys for each country; for 2015–17, most recent DHS or PMA2020 survey, as of December 31, 2017, as indicated in Table 4.

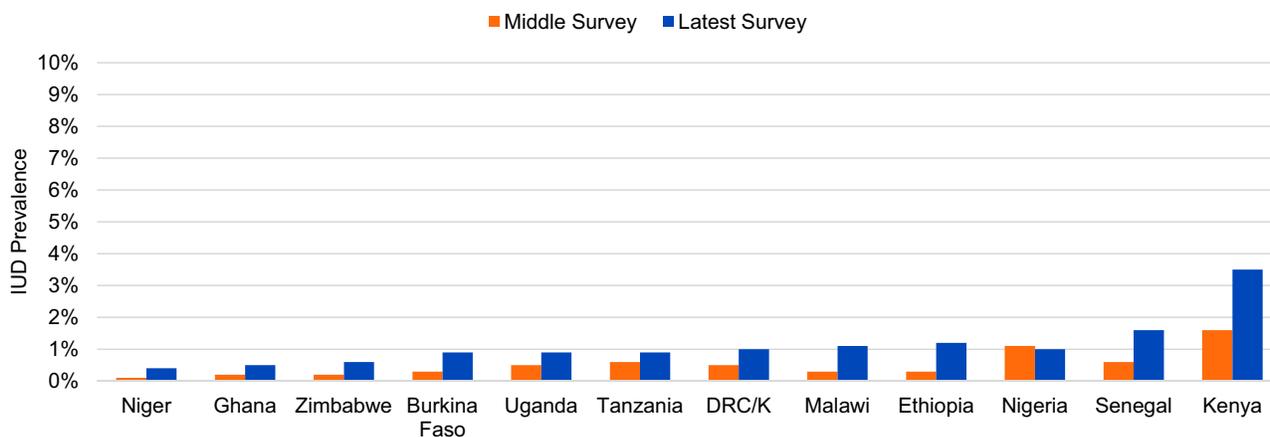
a woman's method options by expanding rights-based access to provider-dependent clinical methods.

Pill Use Below 7%, Share of Method Mix Declining

Pills are generally widely available from multiple private- and public-sector sources. Nonetheless, pill use by married women is low in 11 of the

12 countries under review, excepting Zimbabwe. Prevalence of pill use among married women ranges from 1.8% to 6.8% in the 11 countries, 5 of which have a pill CPR below 2.9% (Table 4, Column 8). Zimbabwe, long a "pill country," is the notable and striking exception, with a pill CPR of 40.9%. There too, however, implants use has risen 8-fold over the past decade, while pill use has plateaued, declining by several percentage

FIGURE 5. IUD Use Low in All 12 Countries, With Recent Modest Gains, 2008–2017



Abbreviations: DHS, Demographic and Health Survey; DRC/K, Democratic Republic of the Congo/Kinshasa only; PMA2020, Performance Monitoring and Accountability.

Data sources: For earlier year (middle survey), DHS surveys for each country; for later year (latest survey), most recent DHS or PMA2020 survey as of December 31, 2017. Left-hand and right-hand bars for each country correspond respectively to middle- and upper-row values in Table 4, Column 7. Data for married women only.

points. Pill CPR has also declined modestly over the past decade in 7 other countries; and gains in pill use in the other 4 countries range only from 0.5 to 0.7 percentage points (Table 5). Pill use by sexually active unmarried women is generally comparable with use by married women (i.e., not considerably higher, as might have been expected). For example, pill CPR among sexually active women is 1.9% in Malawi, 6.4% in Ghana, 6.6% in Kenya (DHS 2014), and 16.0% in Zimbabwe.

Rapid and Recent Uptake of Implants

The marked increases in implant use described in this analysis are of recent vintage. Although implants had been an approved family planning program method for over 25 years, implant use across these 12 countries between 2003 and 2008 averaged less than 0.7% among married women, and even less among sexually active unmarried women (Table 1, lowermost to middle rows). In the subsequent few years, modest gains arose, with implant CPR averaging 1.9% across the 12 countries. In the past 4 to 8 years, however, implant use has surged in all 12 countries (Table 5, Column 4; Figure 1). Kenya's implant CPR among married women, only 1.9% in 2008–09, quadrupled to 7.4% in 2014 and then more than

doubled over the next 2 years, to 18.1% in 2016. Similarly, between 2010 and 2015–16 implant use in Malawi rose 9-fold, from 1.3% to 11.5%, a 785% increase in less than 6 years. In a span of 4 to 8 years, implant use increased 6-fold in Ghana and Niger (from only 0.3%) and approximately 7-fold in Nigeria and Senegal. Comparably rapid and substantial gains in implant access and use have been achieved by sexually active unmarried women, with 6- to 9-fold increases in implant CPR registered in Ethiopia, Ghana, Kenya, Malawi, and Zimbabwe, and a tripling of implant use in Burkina Faso and Tanzania (Figure 3).

Further evidence of the rapidity, recency, scale, and ongoing pace of increased implant uptake is provided in data from the 7 countries with 3 or more serial surveys conducted in a 2- to 3-year span ending in 2016 or 2017 (Table 6). During this very short recent time interval, implant CPRs, which had already been increasing, rose an additional 44% to 145%, more than doubling in DRC/Kinshasa, Ghana, and Uganda. Total gains in implant CPR ranged from lows of 2.3 percentage points in Senegal from 2014 to 2016 to a high of 8.3 percentage points in Kenya from 2014 to 2016. Average annual gains in implant CPR in the 7 countries ranged from 0.97 percentage points (Ethiopia) to 5.35 percentage points (Kenya). In comparison,

Increases in implant use have been very rapid and very substantial.

TABLE 5. Comparison of Gains in mCPR and Method-Specific CPR for Implants, Injectables, IUDs, and Pills, Married Women, 2008–2017

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 | Column 7 | Column 8 | Column 9 | Column 10 | Column 11 |
|--------------------------|----------|-------------------------|-----------------|--------------------------------|--------------------|-----------------------------------|-------------|----------------------------|--------------|-----------------------------|
| Country and Data Source | mCPR (%) | Total Gain in mCPR (pp) | Implant CPR (%) | Total Gain in Implant CPR (pp) | Injectable CPR (%) | Total Gain in Injectable CPR (pp) | IUD CPR (%) | Total Gain in IUD CPR (pp) | Pill CPR (%) | Total Gain in Pill CPR (pp) |
| Kenya PMA R5 2016 | 59.9 | 20.5 | 18.1 | 16.2 | 27.6 | 6.0 | 3.5 | 1.9 | 5.1 | -2.1 |
| Kenya DHS 2008–09 | 39.4 | | 1.9 | | 21.6 | | 1.6 | | 7.2 | |
| Burkina Faso PMA R4 2016 | 24.6 | 9.6 | 11.8 | 8.4 | 8.2 ^a | 2.0 | 0.9 | 0.6 | 2.8 | -0.4 |
| Burkina Faso DHS 2010 | 15.0 | | 3.4 | | 6.2 | | 0.3 | | 3.2 | |
| Malawi DHS 2015-16 | 58.1 | 15.9 | 11.5 | 10.2 | 30.0 | 4.2 | 1.1 | 0.8 | 2.4 | -0.1 |
| Malawi DHS 2010 | 42.2 | | 1.3 | | 25.8 | | 0.3 | | 2.5 | |
| Zimbabwe DHS 2015 | 65.8 | 8.5 | 9.6 | 6.9 | 9.6 | 1.3 | 0.6 | 0.4 | 40.9 | -0.4 |
| Zimbabwe DHS 2010–11 | 57.3 | | 2.7 | | 8.3 | | 0.2 | | 41.3 | |
| Ethiopia PMA R5 2017 | 35.2 | 7.9 | 8.3 | 4.9 | 24.1 | 3.3 | 1.2 | 0.9 | 1.8 | -0.3 |
| Ethiopia DHS 2011 | 27.3 | | 3.4 | | 20.8 | | 0.3 | | 2.1 | |
| Senegal DHS 2016 | 23.1 | 11.0 | 7.1 | 6.0 | 8.2 | 3.0 | 1.6 | 1.0 | 4.6 | 0.5 |
| Senegal DHS 2010–11 | 12.1 | | 1.1 | | 5.2 | | 0.6 | | 4.1 | |
| Uganda PMA R5 2017 | 33.9 | 7.9 | 7.1 | 4.4 | 17.6 ^a | 3.5 | 0.9 | 0.4 | 2.7 | -0.2 |
| Uganda DHS 2011 | 26.0 | | 2.7 | | 14.1 | | 0.5 | | 2.9 | |
| DRC/K PMA R5 2016 | 23.4 | 4.4 | 6.7 | 4.3 | 3.1 ^a | -0.3 | 1.0 | 0.5 | 3.7 | 0.7 |
| DRC/K DHS 2013–14 | 19.0 | | 2.4 | | 3.4 | | 0.5 | | 3.0 | |
| Tanzania DHS 2015–16 | 32.0 | 4.6 | 6.7 | 4.4 | 12.6 | 2.0 | 0.9 | 0.3 | 5.5 | -1.2 |
| Tanzania DHS 2010 | 27.4 | | 2.3 | | 10.6 | | 0.6 | | 6.7 | |
| Ghana PMA R5 2016 | 25.8 | 9.2 | 5.9 | 5.0 | 8.4 | 2.2 | 0.5 | 0.3 | 4.5 | -0.2 |
| Ghana DHS 2008 | 16.6 | | 0.9 | | 6.2 | | 0.2 | | 4.7 | |
| Nigeria PMA R2 2017 | 16.1 | 6.3 | 3.0 | 2.6 | 4.5 | 1.3 | 1.0 | -0.1 | 2.5 | 0.7 |
| Nigeria DHS 2013 | 9.8 | | 0.4 | | 3.2 | | 1.1 | | 1.8 | |
| Niger PMA R1 2016 | 14.4 | 2.2 | 1.7 | 1.4 | 5.0 | 2.9 | 0.4 | 0.3 | 6.8 | 1.2 |
| Niger DHS 2012 | 12.2 | | 0.3 | | 2.1 | | 0.1 | | 5.6 | |

Abbreviations: CPR, contraceptive prevalence rate; DHS, Demographic and Health Survey; DMPA, depot medroxyprogesterone acetate; DRC/K, Democratic Republic of the Congo/Kinshasa only; IUD, intrauterine device; PMA, Performance Monitoring and Accountability 2020; pp, percentage point; R, round.

Note: Table ordered according to implant CPR (Column 4).

^a Sum of the intramuscular DMPA injectable and the subcutaneous injectable Sayana Press.

Gains in implant CPR have been the main contributor to mCPR gains in 11 of 12 countries.

the average annual gain in use of *all* modern methods (mCPR) in 42 sub-Saharan African countries was only 0.70 percentage points between 1986 and 2008.⁸ The extent and rapid pace of implant uptake is also reflected in the markedly upward slope between midpoint (2008–2013) and endpoint (2015–2017) for the

implant's share of the current modern method mix in the 12 countries (Figure 2).

Rising Implant Use the Main Driver of mCPR Gains in 11 of 12 Countries

Whether countries have high, medium, or low mCPR, gains in implant CPR are the predominant

TABLE 6. Total and Average Annual Gains in mCPR, Implant CPR, and Implant Share of Method Mix Among Married Women in the 7 Countries With at Least 3 Surveys Between 2013–14 and 2016–17

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 | Column 7 | Column 8 |
|---------------------------------|-------------|---|----------------------------------|-----------------|--|---|--|
| Country and Data Source | mCPR (%) | Total Gain in mCPR (pp), First to Latest Survey | Average Annual Gain in mCPR (pp) | Implant CPR (%) | Total Gain in implant CPR (pp), First to Latest Survey | Average Annual Gain in Implant CPR (pp) | Implant's Share of Current Modern Method Mix (%) |
| Kenya PMA R5 2016 | 59.9 | 6.5 | 3.25 | 18.1 | 8.3 | 4.15 | 30.2 |
| Kenya PMA R3 2015 | 58.8 | | | 13.8 | | | 23.4 |
| Kenya PMA R1 2014 | 53.4 | | | 9.8 | | | 18.3 |
| Burkina Faso PMA R4 2016 | 24.6 | 6.6 | 3.30 | 11.8 | 3.6 | 1.80 | 48.1 |
| Burkina Faso PMA R2 2015 | 20.1 | | | 7.9 | | | 39.5 |
| Burkina Faso PMA R1 2014 | 18.0 | | | 8.2 | | | 45.5 |
| DRC/K PMA R5 2016 | 23.4 | 4.9 | 1.63 | 6.7 | 5.1 | 1.70 | 28.6 |
| DRC/K PMA R3 2015 | 20.4 | | | 3.7 | | | 18.2 |
| DRC/K PMA R1 2013 | 18.5 | | | 1.6 | | | 8.6 |
| Uganda PMA R5 2017 | 33.9 | 8.3 | 2.77 | 7.1 | 3.8 | 1.27 | 20.8 |
| Uganda PMA R3 2015 | 30.0 | | | 4.9 | | | 16.4 |
| Uganda PMA R1 2014 | 25.6 | | | 3.3 | | | 12.8 |
| Senegal DHS 2016 | 23.1 | 2.8 | 1.40 | 7.1 | 2.3 | 1.15 | 30.7 |
| Senegal DHS 2015 | 21.2 | | | 5.2 | | | 24.5 |
| Senegal DHS 2014 | 20.3 | | | 4.8 | | | 23.6 |
| Ghana PMA R5 2016 | 25.8 | 7.4 | 2.47 | 5.9 | 3.0 | 1.00 | 22.9 |
| Ghana PMA R3 2014 | 21.4 | | | 3.7 | | | 17.4 |
| Ghana PMA R1 2013 | 18.4 | | | 2.9 | | | 15.8 |
| Ethiopia PMA R5 2017 | 35.2 | 1.4 | 0.47 | 8.3 | 2.9 | 0.97 | 23.7 |
| Ethiopia PMA R3 2015 | 35.8 | | | 7.5 | | | 20.9 |
| Ethiopia PMA R1 2014 | 33.8 | | | 5.4 | | | 16.0 |

Abbreviations: CPR, contraceptive prevalence rate; DHS, Demographic and Health Survey; DRC/K, Democratic Republic of the Congo/Kinshasa only; mCPR, modern contraceptive prevalence rate; PMA, Performance Monitoring and Accountability 2020; pp, percentage point; R, round.

Notes: Upper entries are latest surveys available online as of December 31, 2017. Table ordered according to average annual gain in implant CPR (Column 7).

driver of the total mCPR gains they have generated over the past 4 to 8 years, in every country except Niger (Table 5). This finding holds for countries that have achieved large average annual gains in mCPR of over 2 percentage points per year (Kenya, Malawi, Senegal, Zimbabwe), as well as countries that have achieved lower but still substantial gains, ranging from 1.15 to 1.76 percentage points per year (Burkina Faso, DRC/Kinshasa, Ethiopia, Ghana, Nigeria, Uganda). Total gains in implant use exceed combined total

gains in use of injectables, pills, and IUDs in every country except Niger. Average annual gains in implant CPR in the 7 countries with 3 or more very recent surveys amounted to 44% to 206% of their average annual gains in mCPR (Table 6). Ethiopia's average annual gain in implant CPR from 2014 to 2017 was twice its (modest) mCPR gain (0.97 percentage points vs. 0.47 percentage points, respectively). Kenya's remarkably high average annual gain in implant CPR of 4.15 percentage points also exceeded its substantial

Large, method-specific gains in use have been uncommon in family planning programming.

average annual gain in mCPR (of 3.25 percentage points). The other 5 countries registered recent average annual gains in implant prevalence that ranged from 1.0 to 1.8 percentage points.

Method-Specific Gain in Use Having Marked Effect on mCPR Uncommon

Large, rapid method-specific gains with substantial effects on mCPR have not often been seen for other modern methods during the past decade of family planning programming. When this phenomenon did occur in earlier years, the method was rapidly becoming or had already become the country's predominant method. In the Latin America and the Caribbean region, increases in female sterilization prevalence constituted sizeable proportions of mCPR gains in Colombia and the Dominican Republic. In Colombia (2000 to 2010), average annual gains in female sterilization CPR and mCPR were 0.78 and 0.89 percentage points, respectively. In the Dominican Republic (1986 to 2007), average annual gains were 0.69 percentage points for female sterilization and 0.95 percentage points for mCPR.

Several different methods predominate and increased rapidly in Asia. In India, female sterilization CPR gained 0.62 percentage points, and mCPR 0.98 percentage points, annually from 1992–93 to 2005–06. Annual pill use and mCPR in Bangladesh gained 0.75 and 1.06 percentage points, respectively (1993 to 2000). More recently (2000–2014), pill use has also driven increased mCPR in Cambodia, with average annual gains of 0.94 and 1.45 percentage points, respectively. Injectables had similar gains in Indonesia and Nepal. In Indonesia, the average gain in injectables prevalence was 1.27 percentage points (1994–2007); however, the mCPR rose only 2.7 percentage points during that time, implying that the method-specific gain from injectables largely represents substitution effects. Nepal gained 3.5 percentage points in mCPR per year between 1996 and 2001, with injectables and female sterilization each increasing about 1 percentage point per year; however, all 3 measures declined over the subsequent 15 years.

Sizeable gains in injectables use, comparable with those for implants, have also driven sizeable mCPR gains in Africa in the past. In post-genocide Rwanda, mCPR rose from 10.3% in 2005 to 45.1% in 2010, a total gain of 34.8 percentage points and an average annual gain of 7.0 percentage points—the largest such gains ever generated over such a short time in family

planning programs. Contributing substantially to those gains, injectables use rose by 21.6 percentage points, an average annual gain of 4.3 percentage points. Injectables use and mCPR also rose substantially in Zambia, by 1.66 and 1.88 percentage points per year from 2007 to 2013–14. Similar gains have occurred in the 12 countries under review. For example, average annual gains in mCPR and injectables prevalence in Ethiopia (2005 to 2011) were 2.23 and 1.67 percentage points, respectively, and in Kenya (2003 to 2008–09), 1.44 and 1.33 percentage points, respectively. Increased injectables use in Malawi (2004 to 2010) accounted for 55% of its sizeable average annual gain in mCPR of 2.35 percentage points. Smaller gains in injectables prevalence during the earlier periods equaled or exceeded mCPR gains in Nigeria and Senegal.

DISCUSSION

Why Has Uptake of Implants Been So Rapid and Substantial?

A number of factors have contributed to the increases in implant use documented in this article. Among the most salient are: (1) implants' many positive method characteristics; (2) revised expert guidance supportive of wider client eligibility to receive an implant; (3) greater country commitment to ensuring broad access to a wider choice of methods, including implants; (4) donor and manufacturer action to ensure much-lowered commodity cost and greater commodity availability; and (5) continued and wider reliance on high-impact service delivery practices that expand access and reach underserved populations. These factors are considered in turn.

1. Implants Have Many Positive Method Characteristics

Implants have many positive characteristics that contribute to their rapidly rising popularity:

- **Ease of provision:** Implants can be quickly, safely, and easily inserted in 2–3 minutes by trained providers, including frontline and community workers.⁹
- **Convenience and duration of action:** Whichever implant a client chooses, she can be assured with one action of highly effective contraception for up to 5 years, according to the latest recommendations and studies from the World Health Organization (WHO).¹⁰
- **Effectiveness:** Implants have the highest effectiveness of all methods, with 1-year failure

Implants have many positive method characteristics, including convenience, long duration of action, very high effectiveness, ease of provision, and prompt return to fertility upon removal.

rates well below 1% in typical use; in comparison, typical-use failure rates of the injectable and pill are 6% and 9%, respectively.¹¹

- **Uncomplicated provision:** Implants do not entail pelvic examination or abdominal surgery (like IUDs and female sterilization), generally a positive feature for clients.
- **Ready reversibility:** No further routine action is needed until the client wants the implant removed. (Removal is usually a quick and uncomplicated procedure taking 3–7 minutes; however some removals can be difficult, possibly requiring referral.)
- **Prompt return to fertility:** Prompt return to (former levels of) fertility is a welcome characteristic for women wanting to delay a first birth or space a next birth.
- **Suitable for all reproductive intentions:** In addition to being appropriate for delaying a first birth or spacing a next birth, implants are also appropriate for limiting further births.
- **High client satisfaction/high continuation:** Because of the aforementioned features, implants generally have high client satisfaction, as implied in their high continuation rates, ranging from 78% to 96% at 1 year to 50% to 86% at 3 years.¹²
- **Less demanding on health system infrastructure:** From a programmatic standpoint, implants provision requires less health system infrastructure and less-highly trained staff than other provider-dependent clinical methods.

2. Revised Service Delivery Guidance Has Widened Client Eligibility

Guidance from international normative bodies has recently been broadened regarding who can use implants and when use can be initiated. According to WHO almost all women are eligible to use an implant, at any time.¹³ Women can now use implants immediately postpartum, whether or not they are breastfeeding. Nulliparous women can also use implants, as can adolescents and young women, irrespective of age or marital status. In support of this guidance and to further its incorporation into national guidelines and standards of practice, 53 organizations involved in international family planning/reproductive health policy, training, and/or service delivery—including the International Confederation of

Midwives (ICM), the International Federation of Gynecology and Obstetrics (FIGO), and the International Planned Parenthood Federation (IPPF)—endorsed a 2015 Global Consensus Statement on the importance of expanding contraceptive choice for adolescents and youth to include long-acting reversible contraception.¹⁴ In 2016, the American College of Obstetricians and Gynecologists (also a consensus statement endorsee) reconfirmed its 2012 recommendation that its members "encourage adolescents age 15–19 to consider implants and IUDs as the best reversible methods for preventing unintended pregnancy, rapid repeat pregnancy, and abortion."¹⁵

3. Greater Country Commitments Have Been Made to Ensure Wider Family Planning Access and Method Choice

The landmark July 2012 London Summit on Family Planning, which led to establishment of the global FP2020 development partnership, revitalized national and international attention to family planning.¹⁶ At that time, 20 national governments as well as donor, civil society, and implementing partner organizations reaffirmed the important socioeconomic, health, and human rights rationales for supporting universal access to family planning. They committed to addressing policy, financing, and service delivery barriers, in order to enable an additional 120 million women and girls to select the contraceptive method of their choice from a broadened range of modern methods, including implants. According to the latest FP2020 annual report, as of July 2017, 41 national governments have made explicit FP2020 commitments to increase funding and prioritization for family planning, and more than 38 million additional clients have accessed family planning services in poor countries, including 16 million women and girls in sub-Saharan Africa.¹⁷

Countries have also focused on implants and/or LARCs in promulgating and following their Costed Implementation Plans (CIPs), projecting and planning for markedly increased implant uptake. For example, Ethiopia's 2015–2020 CIP plans for the number of implant users to rise from 1.7 million women (of 6.7 million family planning users) in 2015 to 3.2 million women (of 9.9 million family planning users) in 2020.¹⁸ This projected service increase, well on its way to happening (see point number 5 below), constitutes around 25% of Ethiopia's overall FP2020 goal of

Implants are suitable for all reproductive intentions.

Greater commitment for family planning and widened method choice, including implants, has been galvanized via the FP2020 global partnership.

Almost all women can use implants at almost all times, including adolescents, nulliparous women, unmarried women, and breastfeeding women.

Almost 26 million implants have been supplied to sub-Saharan African countries between 2013 and 2017, at a savings of over \$230 million.

serving an additional 6.2 million women and girls by 2020. The Ethiopia CIP also commits to "working to identify alternative and sustainable domestic sources for financing healthcare," while also recognizing that "heavy reliance on out-of-pocket payments is undesirable, as it can make healthcare inaccessible to vulnerable households." Similarly, Uganda's 2015–2020 CIP projects and plans for more than a tripling of clients who will be relying on implants, from around 230,000 women in 2015 to over 830,000 in 2020.¹⁹

4. Substantial Reductions in Commodity Cost and Increases in Commodity Availability Have Occurred

Marked reductions in commodity cost have been a key factor in expanding availability of implants. For several decades after their programmatic introduction in the 1980s, implants' commodity cost was around \$20 or more per set. (An IUD, in comparison, costs only about \$0.40 in the public sector.²⁰) Consequently, as recently as 2011 implant CPR was only 0.5% in all developing regions of the world.¹ In 2007, however, the Bill & Melinda Gates Foundation supported the introduction into the global market of Sino-implant (II), whose commodity cost was around one-third the prevailing cost of other implants. Subsequently, a major outcome that emerged from the 2012 London Summit was the large-scale collaborative agreement between multiple donors, including the Bill & Melinda Gates Foundation, Norwegian Agency for Development Cooperation, Swedish International Development Cooperation Agency, and Children's Investment Fund Foundation, and the implant manufacturers, Bayer (maker of the 2-rod implant, Jadelle) and Merck (maker of the 1-rod implant, Implanon, and its successor, Implanon NXT).²¹ This led to the launch of the Implant Access Program (IAP) in 2012-13, with halving of implant commodity cost to around \$8.50 per set and assurance of much greater production, funding, and availability of implants for the world's poorest countries.²² As part of their IAP and FP2020 commitments, Bayer and Merck subsequently committed to maintaining their implant access pricing through 2023.^{23,24} Ethiopia's 2015–2020 CIP projects an implant commodity cost of \$8.93 plus \$1.85 for "consumables," which includes allocation of salaries. Sino-implant (II), now marketed as Levoplant, was prequalified by WHO in June 2017 and has

Public-private partnerships have led to marked reductions in commodity cost, the *sine qua non* of increased implant availability, access, and use.

been being supplied to sub-Saharan African and other family planning programs at \$7.50 to \$8.00 per set.²⁵ In February 2018, DKT and Dahua Pharmaceutical announced a partnership to provide Levoplant at \$6.90 per set in the 69 FP2020 countries.²⁶

Between 2013 and 2017, sub-Saharan Africa was supplied with more than 25.7 million implants from donors, mainly UNFPA and the United States Agency for International Development (USAID).²⁷ At a halved commodity cost, this represents a cost savings to donors of upwards of \$230 million. Over 72% of this total procurement (some still in the pipeline)—more than 18 million implants—was supplied to the 12 countries under review. This includes 4.1 million implants to Tanzania, 4.0 million to Ethiopia, 2.2 million to Nigeria, 1.8 million to Kenya, 1.5 million to DRC, and 1.3 million to Burkina Faso. Without this substantial commodity supply, these countries would not have been able to attain their considerable gains in implant CPR and mCPR as they progress toward achieving their FP2020 goals to serve more women and provide a broader range of method options, including LARC methods.

5. High Impact Service Delivery Practices Have Led to Increased Implant Provision

Besides ensuring commodity cost reduction and greater availability, IAP partners and closely collaborating organizations made other investments also fundamentally necessary for quality, rights-based family planning service delivery. These include support for all-method counseling, training in proper implant insertion and removal technique, smooth functioning of supply chains, supportive supervision, local demand generation, and reliable client follow-up. In addition, a number of relevant high-impact service delivery practices (HIPs) being implemented more widely in family planning programs have helped increase equitable access to implant services. These include task shifting, community-based service provision, deployment of family planning-dedicated providers, and provision of family planning to hard-to-reach rural and peri-urban clients via mobile outreach services.²⁸

Task shifting (or task sharing) of implants provision to lower-level cadres and frontline and community workers has been endorsed by WHO²⁹ and proven to be effective in increasing implant access and use in various clinical and non-clinical settings. This has included provision of

implants by community health extension workers (CHEWs) on a pilot basis in Nigeria³⁰ and on a large scale in Ethiopia. In Ethiopia, more than 8,000 CHEWs were trained and subsequently provided implant services in the public sector to over 1.1 million women between 2009 and 2015.³¹ Use of vouchers to address inequities in access by poor and underserved groups including youth is also an emerging HIP that has led to increased implants provision and uptake.³² Use of vouchers in a social franchising program in Uganda in 2013-14 resulted in uptake of 165,000 implants (and 76,000 IUDs) in 24 months.³³

Aggregated service statistics further convey the extent, rapidity, and acceleration of recent rises in implant uptake. Between 2008 and 2012, MSI provided over 1.4 million implants to women in 10 of the 12 sub-Saharan African countries under review, with implant uptake rising almost 9-fold, from 73,000 in 2008 to over 600,000 in 2012.³⁴ More than two-thirds of this service provision was delivered via mobile outreach and family planning-dedicated providers, mostly free of charge to clients. Subsequently, as implants have become more widely available, the number of women choosing an implant in MSI's 15 sub-Saharan African family planning programs has increased each year, from around 1 million in 2013, to 1.4 million in 2014, 1.7 million in 2015, 2.1 million in 2016, and 2.7 million in 2017, a 5-year total of almost 9 million implants provided to women during this time (Kathryn Church, written communication, January 2018). Of these clients, more than 50% were first-time or "lapsed" users of family planning (no use for the past 3 or more months), 38% were living in poverty (under \$1.25/day), and around 12% were ages 15–19. Rapidly increasing uptake of implants has also occurred within the private provider networks affiliated with PSI, with more than 2.6 million implants provided in PSI's sub-Saharan African programs between 2013 and 2017, an increase of approximately 400% over the preceding 4 years (Pierre Moon, written communication, January 2018).

Is the Uptake of Implants Likely to Continue?

The rapid uptake of implants highlighted in this article seems very likely to continue and perhaps even to accelerate in sub-Saharan Africa, as has been most notably the case in Kenya. Certainly the first order of sustainability—sustainability of client knowledge about, interest in, and

experience with a method—is well on its way toward the tipping point of being firmly established in most of the 12 countries. Observations and factors that support this speculative prediction are categorized next, according to demand-side or supply-side considerations.

Demand-Side Considerations

1. Global megatrends such as high rates of urban growth, greater women's education and participation in the formal workforce, and the spread of mass communication and social media will increasingly be driving normative change toward smaller desired family size and greater demand for contraception in every region of sub-Saharan Africa,² as they have in other regions of the world.
2. The high current use of implants by women in most sociodemographic categories and high implant continuation rates imply likely activation of interpersonal and intra-community diffusion networks regarding women's (and men's) positive perceptions about implants. In turn, this may increase interest and use further, including more method-switching from shorter-acting methods that are discontinued more frequently, more demanding of user compliance, and may be less congruent with reproductive intentions.
3. Although married women without children generally have very low current use of implants—a reflection of low LARC demand and sociocultural pressures to have a first child and/or provider bias against offering the method to this category of women—they may well choose implants in the future, after giving birth. This is implied in the high current use of implants by married women of low parities (1–2 children) and by sexually active unmarried women.
4. Implants' suitability for women who wish to limit further childbearing is also important. As recently noted in this journal, the demand to limit is a widespread and rising reproductive intention in sub-Saharan Africa, even among younger women, and 37% of all demand for family planning among married women in sub-Saharan Africa is for limiting.³⁵
5. Rising demand for implants has almost certainly also been occurring in other sub-Saharan African countries beyond the 12 countries included in this review. If more

Over 1 million women in Ethiopia have been provided an implant by a public-sector community health extension worker.

For many demand-side and supply-side reasons, the rapid uptake of implants is likely to continue, and even to accelerate.

Lowered implant commodity cost, of \$6.90–\$8.00 per set, is assured through at least 2023.

Cities are in the forefront of rising implant use, and sub-Saharan Africa is urbanizing rapidly.

recent surveys in these other countries had been available, this likely could have been seen to be the case. In 2013–14 (DHS), Zambia already had attained an implant CPR of 5.5% and in 2014–15 (DHS) Rwanda had an implant CPR of 7.7%.

6. Although implant CPR has risen markedly, implant use is still well below that of injectables in 11 of the 12 countries. This too may imply greater future uptake of implants, as women currently using a progestin-only method of relatively short duration and higher circulating progestin levels (i.e., injectables) switch to a longer-acting progestin-only method that conveys lower circulating progestin levels and requires fewer routine interactions with the health system (i.e., implants).
7. Unmet need for family planning in sub-Saharan Africa, i.e., actual or latent demand, is currently the highest of any region of the world (21%).³⁶ This could possibly get even larger in the future, given the health system challenges of meeting the needs of the burgeoning cohorts of youth entering their reproductive years,¹⁶ for whom implants are an appropriate option and likely to be appealing one when made more widely available to them.
8. The higher use of implants (and family planning) generated in urban settings suggests wider and greater uptake of implants nationally in future years, as cities are early-adopter harbingers of overall societal change. If this proves to be generally so in West Africa and Central Africa, examples from Niger and DRC hold promise. Whereas Niger's mCPR is only 14.4% and implant CPR is 1.7%, mCPR is 31.5% and implant CPR is 8.0% in its capital, Niamey (PMA2020 R3 2016). Similarly, mCPR in DRC several years ago was only 7.8% and implant CPR only 0.7%, whereas in Kinshasa mCPR was 19.0% and implant CPR was 2.4% (2013–14 DHS). These rose to 28.6% and 6.7% respectively by 2016 (PMA 2020 R5 2016). Increased uptake in parts of Nigeria has also prompted optimism about wider prospects for LARCs there.³⁷

Consistent with the above considerations, the Reproductive Health Supplies Coalition predicts demand for implants in the 69 IAP countries will rise steadily, from 13 million sets in 2016 to 25 million sets in 2022, totaling 125 million implant sets in the 7-year period from 2016 to 2022.³⁸

Supply-Side, Service Policy, and Health System Considerations

1. Very importantly, as noted above, the IAP assurance of wide and substantial availability of Jadelle and Implanon NXT at the reduced price point has been extended until 2023. Levoplant is also being supplied more widely in sub-Saharan Africa at its comparable (slightly lower) commodity price point.
2. Diffusion of knowledge within provider and health system networks about the positive characteristics of implants is likely to increase, particularly as provider experience with implants' popularity and ease of insertion and removal increases, and as health systems increasingly recognize and seek to address the growing client demand. This likely will lead to more service providers, including frontline and community workers, offering implants as a method option more frequently and routinely, at more sites.
3. High-impact service delivery practices that enable wider access to implants, e.g., task shifting to frontline workers, are increasingly being endorsed by policy makers, even in regions where the practice has been limited previously, such as francophone West Africa.³⁹ Interest in vouchers, social franchising, and private-sector provision of services is also growing, and these modalities are well suited to provision of implant (and other family planning) services, including to youth and other underserved groups with high unmet need and likely interest in implants.
4. Considerable time is required for internationally promulgated guidance to be adapted to national guidelines and local contexts, and then to diffuse into common health care practice, preservice professional education, and in-service training. This process is under way for implants and will undoubtedly occur increasingly over the next few years, including with respect to new and important guidance regarding suitability of implants for breastfeeding women, as well as for adolescents and young women, whether or not they have children.

What Challenges Need to Be Addressed?

In addition to the positive trends and opportunities discussed earlier, important health system,

implant service, and cost/financing challenges need to be addressed now and increasingly in the future, to enable implant uptake to continue to rise.

Health System and Implant Service Considerations

Health system capacity to produce, train, employ, and deploy the large complements of health workers needed to make universal access to family planning a reality needs to be ensured. Implant removal services as well as insertion services must also be routinely and regularly available, accessible, and affordable.^{40,41} This can be daunting given the high volumes and principal modalities of service provision, e.g., mobile service provision in poor peri-urban and far-flung rural settings, especially when long intervals may have elapsed since the time of implant insertion. Capable management of the likely but unpredictable minor bleeding changes that implants cause must also be ensured, beginning with good counseling to explore how such changes might affect the client. New expert guidance that increases eligibility to use implants and new national guidelines based on this guidance do not automatically translate into new practices by providers comfortable with the status quo and perhaps uncomfortable providing contraception to young, unmarried, or nulliparous women. Rather, effecting such changes in provider practices requires time, knowledge transfer, and repeated program effort. Prompt availability of frequently conducted serial surveys has been valuable in documenting rapidly occurring changes in implant uptake and enabling the international family planning community to maintain focus on key program issues like implant removal and provision of equitable, rights-based services. Such surveys need to continue and to be undertaken in more countries.

Cost and Financing Considerations

Although detailed analysis of cost and financing is beyond the purposes and scope of this article, it is clear these are aspects of paramount importance in ensuring sustainable implant service delivery programs. Even at the reduced access price point, the aggregate program cost of implant provision in sub-Saharan Africa over the next few years could easily exceed \$500 million, especially if implant uptake in other countries approaches the arc of uptake seen in Kenya. Commodity cost alone in only the 12 countries included in this review exceeded \$150 million. Furthermore, large,

populous, and politically and economically important countries and regions like the DRC, francophone West Africa and Nigeria, currently with very low mCPR levels around 20% or lower, have only recent (and welcome) signs suggesting that more robust uptake of modern contraception including implants lies ahead there (and elsewhere). This will require even greater commitment and mobilization of resources from national and local governments, as well as from donors and service-providing partners, in order to meet growing demand and provide implant and other family planning services even more widely and equitably. Health insurance schemes and alternative funding models must also ensure that family planning is a universally covered, adequately reimbursed service.

There are also individual client-level cost considerations to be borne in mind. A very substantial proportion of the provision of implants documented in this article was delivered free of charge or at heavily subsidized rates to poor and disadvantaged clients by international NGOs. This almost certainly would not have happened without donor funding, which extended well beyond funding for commodity procurement. Reports from Senegal and elsewhere in West Africa attest to the disproportionately large lines of clients waiting for contraceptive services on "special free family planning days,"⁴² because services are not free on other days. Implant and other family planning services would undoubtedly drop off markedly if such approaches and funding were no longer available.

What About the Prospects for the Other Reversible Modern Methods?

Injectables and Pills

For many African women, injectable contraceptives have been and remain the longest-acting and most effective modern method they can easily access. Injectables are also more convenient for many women than shorter-acting resupply methods, requiring "only" 4 routine client actions per year rather than, say, the pill's 365-plus. Injectables are also relatively easy for health systems to provide. These factors likely contribute to the injectable's substantial market share in most of the countries under review and elsewhere, and perhaps to the pill's substantially lower use. Injectables could be embarked on a similar trajectory as pills, however, upon greater availability and accessibility of a longer-acting, more "user-friendly" method (the implant), one with

Implant removal services must be routinely and regularly available, accessible, and affordable, on a wide scale.

Free or highly subsidized services for disadvantaged and poor clients must be assured and/or expanded.

Rapid serial surveys with prompt availability of findings have been very important to document progress and should be undertaken even more widely.

The high prevalence of injectable use in sub-Saharan Africa is likely to decline as implant access and use continue to rise.

immediate rather than delayed return to fertility. If so, the proportionate declines in injectable use that have occurred in 9 of the countries could become absolute declines more widely. A countervailing dynamic toward greater injectable use, however, is likely to be the widening programmatic availability of the subcutaneous injectable, Sayana Press, with its prospects of enabling wider community-based provision as well as home-based provision and self-injection.⁴³

IUDs

Although use of the (copper-containing) IUD has been very low in almost all sub-Saharan African countries for many years, and it has been beset by myths and rumors among providers and clients alike, this might not necessarily be the case in the future. Hopeful signs are the modest increases in IUD use registered in 11 of the 12 countries. If investments in expanded LARC availability and service delivery continue, IUD use may continue to rise. In such efforts between 2013 and mid-2017, provider networks affiliated with PSI provided over 2 million IUDs in 12 sub-Saharan African countries (Pierre Moon, written communication, January 2018), 7 of which are included in this report's analysis. There is also increasing interest in the hormonal IUD (the levonorgestrel-releasing intrauterine system) in the international family planning community. Hormonal IUD use is rising in many industrialized countries including the United States, where IUD prevalence has risen to 6%.⁴⁴ The hormonal IUD is in a similar situation to that of the implant several years ago: many positive method characteristics but too costly for routine and widespread programmatic use. Recent calls have been made for increased donor and program attention to this method's potential prospects,^{45,46} if commodity cost can be reduced.⁴⁷

CONCLUSION

Implant availability, access, and use have risen substantially, very rapidly, and fairly equitably, at rates not often seen in family planning programs. This is a major, ongoing family planning success story. A hitherto largely unavailable contraceptive method is now being accessed widely by women across almost all sociodemographic categories in many sub-Saharan African countries. In a range of culturally varied, geographically widespread, economically disparate, and programmatically diverse country contexts, use of implants now

accounts for one-fourth to one-half of all use of modern contraception. Method choice has been expanded, with implants becoming the most widely used method in Burkina Faso and the second most widely used method in 9 other countries. Increased implant use has been the main driver of the increased contraceptive use attained the past several years by 11 of the 12 sub-Saharan African countries analyzed in this article. With continued government and program commitment, mobilization of domestic resources, donor support, and private-sector engagement, these trends are likely to continue for at least the next few years. Important cost and service system challenges loom, however, if implant access is to be maintained and enlarged, in keeping with projected increases in demand.

ADDENDUM: After the December 31, 2017, cutoff for inclusion in this study, the trends of rapid and substantial increase in implant use, share of method mix, and contribution to overall gains in mCPR have continued, as shown in the [Appendix Table](#) for the 3 PMA2020 Family Planning Briefs posted online in January 2018. Niger's implant prevalence increased from 1.7% in 2016 to 3.1% in 2017. This annual gain of 1.4 percentage points exceeds the high recent annual gains of 4 of the 7 countries shown in [Table 4](#). Implant prevalence in DRC/Kinshasa is now 10.1%, higher than 9 countries included in this article and representing 37.9% of the current modern method mix. This substantial annual gain of 3.4 percentage points in implant prevalence exceeds DRC/Kinshasa's noteworthy annual gain in mCPR of 3.3 percentage points. Use of implants by sexually active unmarried women in DRC/Kinshasa also rose, from an implant CPR of 3.5% to 5.2%—13% of all their modern method use. The leapfrogging pattern is also seen in Ghana, where implant prevalence is now 8.4%, representing 30.7% of the current modern method mix—a level higher than 8 of the countries included in the analysis. Ghana's annual gain in implant CPR of 2.5 percentage points is 56% higher than its solid annual gain in mCPR of 1.6 percentage points. Implants have now become the most widely used modern method in DRC/Kinshasa and Ghana.

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Modest gains in IUD use may continue.

The rapid, substantial, and generally equitable increases in implant access and use represent a major, ongoing family planning success story.

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APPENDIX TABLE. Rapid and Substantial Gains in Implant Use, Share of Method Mix, and Contribution to mCPR Gains, Married Women, All Countries With PMA2020 Family Planning Briefs Posted Online in January and February 2018

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 | Column 7 | Column 8 |
|-------------------------|----------|-----------------|---------------------------------|--------------------|------------------------------------|-------------------------------------|--|
| Country and Data Source | mCPR (%) | Implant CPR (%) | Implant Share of Method Mix (%) | Injectable CPR (%) | Injectable Share of Method Mix (%) | mCPR Annual Gain, 2016 to 2017 (pp) | Implant CPR Annual Gain, 2016 to 2017 (pp) |
| DRC/K PMA R6 2017 | 26.7 | 10.1 | 37.9 | 5.2 ^a | 19.5 ^a | 3.3 | 3.4 |
| DRC/K PMA R5 2016 | 23.4 | 6.7 | 28.6 | 3.1 ^a | 13.3 ^a | | |
| Ghana PMA R6 2017 | 27.4 | 8.4 | 30.7 | 7.8 | 28.5 | 1.6 | 2.5 |
| Ghana PMA R5 2016 | 25.8 | 5.9 | 23.0 | 8.4 | 32.6 | | |
| Niger PMA R2 2017 | 18.1 | 3.1 | 17.1 | 7.3 | 40.3 ^a | 3.7 | 1.4 |
| Niger PMA R1 2016 | 14.4 | 1.7 | 11.9 | 5.0 | 34.9 | | |

Abbreviations: CPR, contraceptive prevalence rate; DMPA, depot medroxyprogesterone acetate; DRC/K, Democratic Republic of the Congo/Kinshasa only; mCPR, modern contraceptive prevalence rate; PMA, Performance Monitoring and Accountability 2020; pp, percentage point; R, round.

^a Sum of the intramuscular DMPA injectable and the subcutaneous injectable Sayana Press.

PROGRAMMATIC REVIEW & ANALYSIS

Family Planning in the Democratic Republic of the Congo: Encouraging Momentum, Formidable Challenges

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Formidable challenges: uncertain political situation, cultural norms favoring high fertility, a thin patchwork of service delivery institutions, logistical issues in a vast country with weak infrastructure, and low capacity of the population to pay for contraceptive services. **Encouraging progress:** increasing government and donor support, openness to progressive service delivery policies, innovative programming including robust social marketing and initiatives with nursing schools and the military, strong collaboration among stakeholders, high unmet need suggesting strong latent demand for family planning, and an increasingly balanced method mix including long-acting methods.

➔ See also the [French version of this article](#).

■ ABSTRACT

Momentum for family planning in the Democratic Republic of the Congo (DRC) is evident in multiple ways: strong political will, increasing donor support, a growing number of implementing organizations, innovative family planning programming, and a cohesive family planning stakeholder group. Between 2013 and 2017, the modern contraceptive prevalence rate (mCPR) in the capital city of Kinshasa increased from 18.5% to 26.7% among married women, but as of 2013–14, it was only 7.8% at the national level. The *National Multisectoral Strategic Plan for Family Planning: 2014–2020* calls for achieving an mCPR of 19.0% by 2020, an ambitious goal in light of formidable challenges to family planning in the DRC. Of the 16,465 health facilities reporting to the national health information system in 2017, only 40% offer family planning services. Key challenges include uncertainty over the political situation, difficulties of ensuring access to family planning services in a vast country with a weak transportation infrastructure, funding shortfalls for procuring adequate quantities of contraceptives, weak contraceptive logistics and supply chain management, strong cultural norms that favor large families, and low capacity of the population to pay for contraceptive services. This article describes promising initiatives designed to address these barriers, consistent with the World Health Organization's framework for health systems strengthening. For example, the national family planning coordinating mechanism is being replicated at the provincial level to oversee the expansion of family planning service delivery. Promising initiatives are being implemented to improve the supply and quality of services and generate demand for family planning, including social marketing of subsidized contraceptives at both traditional and non-traditional channels and strengthening of services in military health facilities. To expand contraceptive access, family planning is being institutionalized in nursing schools, allowing students to operate as community-based distributors. While major challenges remain, significant progress in family planning has been made in the DRC, which should be judged not in comparison with sub-Saharan African countries with high mCPR and mature programs, but rather with those starting from much further behind.

■ BACKGROUND

The Democratic Republic of the Congo (DRC), with a population of 79,723,000 in 2016,¹ is the third largest country in sub-Saharan Africa and the largest francophone country in the region. The total fertility rate increased slightly between the 2007 and 2013–14 Demographic and Health Surveys (DHS), from 6.3 to 6.6 children per woman.^{2,3} The increase in the modern contraceptive prevalence rate (mCPR) for married women between these surveys was minimal: 5.8% to 7.8%. Similar to the majority of sub-Saharan

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African countries, cultural norms favor large families, with fertility rates higher in rural than urban areas.

Although the country had a promising, fledgling family planning program in the 1980s (*Projet des Services des Naissances Desirables*) supported by the United States Agency for International Development (USAID), the political turmoil and economic devastation that gripped the country for over a decade starting in 1991 and the subsequent all-African War in 1998 virtually obliterated this earlier progress. The donor community withdrew technical and financial support for family planning, which did not resume until the mid-2000s. Problems related to fiscal mismanagement in governance led to minimal investment of less than 1% of gross domestic product (GDP) in health,⁴ of which little went to family planning. Development programs in general and family planning programs in particular were paralyzed until international donors, including USAID, the United Nations Population Fund (UNFPA), and the Department for International Development (DFID), cautiously returned to the DRC to fund the health sector in the mid-2000s. As the DRC began a slow return to normalcy after the 2006 elections, the donors were reluctant to invest in a country with weak program leadership, poor managerial systems, and little political support for family planning.

A few stakeholders in family planning organizations, such as Population Services International (PSI), Association pour le Bien-Etre Familial–Naissances Désirables (ABEF-ND) (a member association of the International Planned Parenthood Federation), and SANRU (Santé Rurale), were able to maintain a presence in the DRC during the lost decade of the 1990s, despite geographically limited and uncoordinated interventions; however, the current configuration of family planning actors and organizations is relatively new. Two government entities—the National Program for Reproductive Health (Programme National de Santé de la Reproduction, or PNSR) and the National Program for Adolescent Health (Programme National de Santé de l'Adolescent, or PNSA)—have the mandate to guide policy and establish norms for family planning and sexual/reproductive health (SRH), respectively, but they do not have the human or financial resources to deliver family planning services on a national scale. Moreover, no single international donor has the resources or inclination to support the rebuilding of a national family planning program that would extend family

planning coverage to all 516 health zones in this vast country. The country's health policy is based on primary health care, of which family planning is one of the components. Donors who work alongside the Government of the DRC support primary health care activities in the health zones.

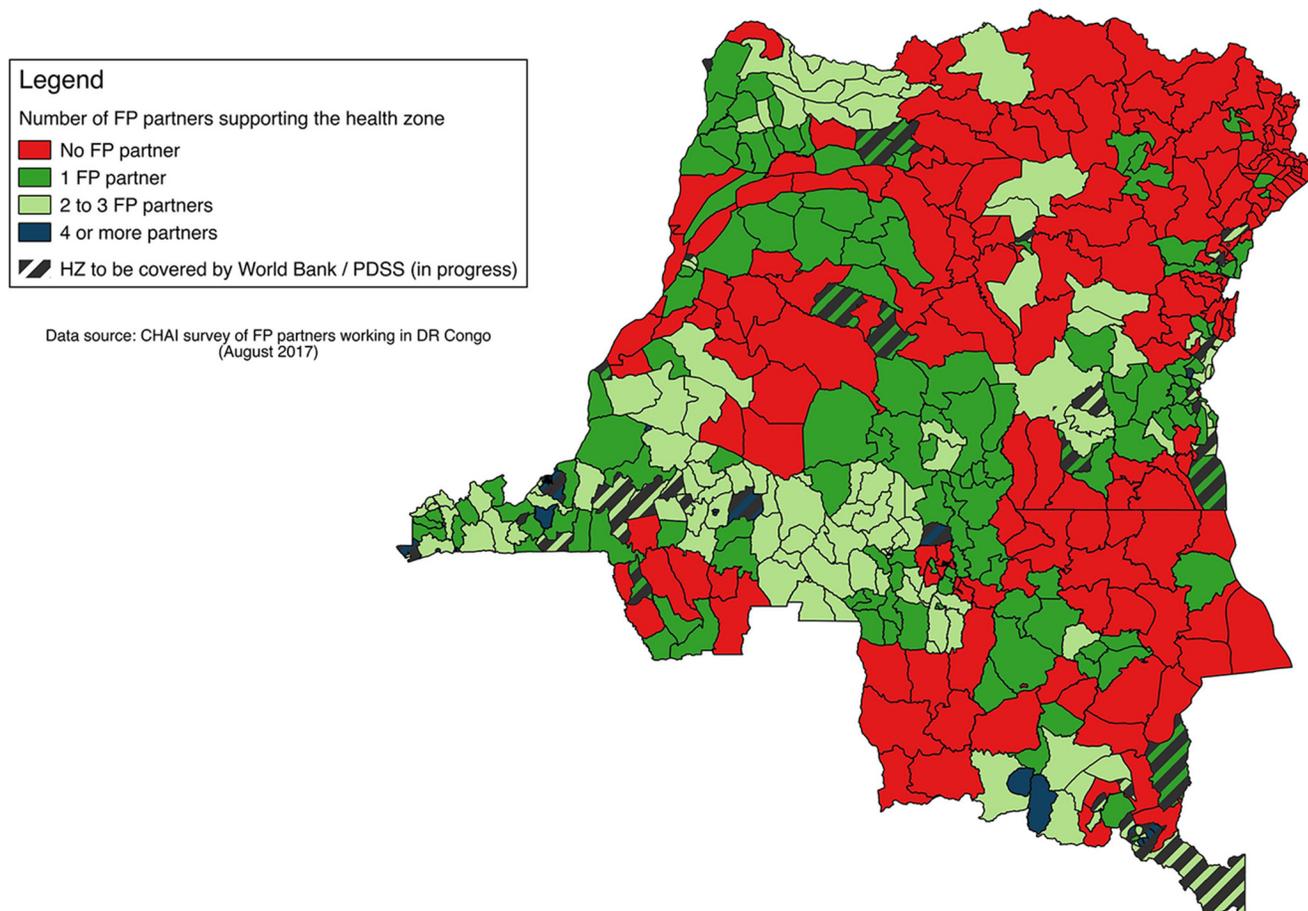
As the large international donors returned to the DRC in the mid-2000s, USAID, the World Bank, and DFID opted to support integrated health services delivery in a subset of the country's 516 health zones, largely in rural areas. Currently the USAID-funded Integrated Health Project (Project de Santé Intégré, or PROSANI) operates in 126 health zones; the DFID-funded Access to Primary Health Care Project (Projet d'Accès aux Soins de Santé Primaire, or ASSP) supports service delivery in 52 health zones. UNFPA's main role is to procure contraceptives for government programs and international NGOs; to a lesser degree, it funds specific family planning service delivery interventions in selected locations. Since 2013, UNFPA has directly supplied 63 health zones with family planning commodities and indirectly supported 150 additional health zones through its contraceptive procurement for at least 6 implementing organizations. The World Bank also supports integrated health service delivery through a pay-for-performance mechanism; its current project—which became operational in May 2016—will eventually cover an additional 169 health zones, of which 105 have no other external support for family planning. By contrast, the Bill & Melinda Gates Foundation and the David and Lucile Packard Foundation opted to invest in family planning services in the capital city of Kinshasa, and began support in 2011 and 2013, respectively. The map in the [Figure](#) shows health zones that receive assistance for family planning from 1 or more external partners.

As a result, the approach to family planning service delivery in the DRC is best described as piecemeal. Health zones that benefit from the support of one or more external donors are far more likely to have a range of modern contraception and trained personnel available than others; a study in Kinshasa demonstrated that health facilities receiving external family planning support had higher levels of output than those that did not.⁶ Moreover, each health zone is subdivided into *aires de santé* (health areas). Even the large-scale donor-funded integrated health projects may cover only a portion of the *aires de santé* in a given health zone. As of mid-2017, only two-thirds (66.4%) of the 516 health zones in the

No single international donor has the resources or inclination to support the rebuilding of a national family planning program in DRC.

As of mid-2017, only two-thirds of the 516 health zones in the DRC received any external assistance for family planning.

FIGURE. Map of Health Zones in the DRC Receiving Family Planning Assistance



Data source: CHAI survey of FP partners working in DR Congo (August 2017)

Abbreviations: CHAI, Clinton Health Access Initiative; DRC, Democratic Republic of the Congo; FP, family planning; HZ, health zone; PDSS, Health System Strengthening for Better Maternal and Child Health Results Project.

Source: Clinton Health Access Initiative.⁵ Map prepared by Dr. Julie Hernandez.

Use of traditional methods (12.6%) is higher than use of modern methods (7.8%) among married women in the DRC.

DRC received any external assistance for family planning.⁵ (The health zones that the World Bank project is expected to cover are shown separately in the Figure, because as of mid-year 2017 contraceptive commodities and services were not yet available in all World Bank-supported health zones. Once realized, the percentage of health zones receiving external assistance for family planning will increase to 75.9%.)

The mechanisms for family planning service delivery differ by province and by health zone, largely influenced by support from an external donor. The provinces of Kinshasa and Nord Kivu have the greatest concentration of family

planning services: the former because it is the capital city that represents 14% of the population of the country; the latter because of intense investment by humanitarian organizations. By contrast, largely rural provinces with little or no external family planning support (shown in red in the Figure) may lack family planning services, even in the hospitals and health centers of the major towns. According to a study conducted in 2014, only 33% of health facilities in the DRC have family planning available, and of these only 20% provide quality services according to criteria specific to the study.⁷

The use of contraception in the DRC is characterized by 2 relatively unusual trends.

First, as of the 2013–14 DHS, the use of traditional methods (rhythm, withdrawal, other) was higher (12.6%) than the use of modern methods (7.8%) among married women.³ Second, as a percentage share among all married users of modern contraception, the male condom (43.6%) was by far the leading method, followed by injectables (15.4%) and female sterilization, pills, and implants (each at 9.0%).³ The only other country in sub-Saharan Africa in which traditional method use is higher than modern method use is Congo-Brazzaville (just across the Congo River from Kinshasa).⁸ The male condom is the leading modern contraceptive method in only 18% of sub-Saharan African countries.⁹ Several factors may explain the high reliance on traditional methods: the years of political turmoil that led to a scarcity of all material goods, the deeply ingrained fear of side effects—particularly sterility—from modern methods, and the promotion of natural methods by faith-based organizations that run more than half of the health facilities in the country. The high use of male condoms may reflect their availability—free or at very low cost—thanks to widespread distribution by HIV prevention programs.

The commercial private sector (pharmacies and drug shops) represents the leading source of contraception among users in all recent surveys (DHS, Performance Monitoring and Accountability 2020 [PMA2020]), in large part because condoms have been the most widely used modern method. By contrast, users of female sterilization, implants, and injectables look to fixed facilities: government or private hospitals or health centers.³ Two large social marketing groups, PSI and DKT International, provide pills, condoms, emergency contraception, and the subcutaneous depot medroxyprogesterone acetate (DMPA-SC) injectable, known locally under the brand name Sayana Press, through commercial outlets at subsidized prices, primarily in urban areas. Contraceptives are available through a very limited number of pharmacies in major urban areas at the full non-subsidized price, but few users can afford to purchase methods through these outlets, and pharmacies make little profit from these sales. Also, no contraceptives are manufactured in the DRC; all are imported, either through international mechanisms (e.g., USAID, UNFPA, and the International Planned Parenthood Federation) or purchased directly from manufacturers (e.g., in Germany, India, Malaysia, and Thailand). "The category of 'contraception' is underdeveloped or non-existent in

pharmacies in the DRC," according to one marketing specialist (personal communication, Jacques-Antoine Martin, 2018). "Products are hidden behind counters, except for condoms, and clients 'whisper' about contraception if they come to purchase it."

Community-based distribution takes 2 forms. In the large-scale rural health programs (PROSANI, ASSP), community health workers known as *relais communautaires*, provide pills and condoms at the community level. In Kinshasa and Kongo Central, the AcQual II project has established a network of more than 1,000 community-based distribution workers with a nonmedical profile to provide pills, condoms, and CycleBeads (a tool that helps a woman identify and count her fertile days using the Standard Days Method of family planning).

From 2000 to 2012, the DRC worked without a clear achievable family planning objective. The DRC government began to express interest in family planning around the time of the 2012 London Summit on Family Planning. Members of the government and other family planning stakeholders channeled this interest into the *National Multisectoral Strategic Plan for Family Planning: 2014–2020*, which established the objective of increasing mCPR for all women of reproductive age from 6.5% (in 2013) to 19.0% by 2020.¹⁰ Can this be done in a vast country that does not have a national program with the necessary financial and human resources to ensure contraceptive access in both urban and rural areas? Several strategies show promise despite the seemingly insurmountable barriers.

■ ENCOURAGING DEVELOPMENTS

Political Will for Family Planning

During the first decade of the 2000s, several organizations offered family planning services, especially in Kinshasa, but they did so in the absence of strong leadership or a clear vision for family planning. The first sign of renewed interest in this topic emerged in 2009 with the Second National Conference on Repositioning Family Planning, which was held under the auspices of the First Lady. An important recommendation of the conference was to establish a key stakeholder group—the Technical Multisectoral Permanent Committee (Comité Technique Multisectoriel Permanent, or CTMP)—to guide future family planning initiatives in the country. Due to a lack

of resources and organizational mechanisms, this committee existed but remained relatively inactive for several years.

As previously published in this journal,¹¹ the government of the DRC gave little priority to the issue of family planning prior to 2012. However, a series of positive events began in 2012 that have resulted in strong political support for family planning on the part of the government, emanating from the office of the Prime Minister. At a local conference held in June 2012 as a call to action for increased family planning funding, the Ministry of Health pledged to mobilize government funding for family planning. Consistent with growing support for family planning, the Prime Minister signed an official letter to the Minister of Planning in 2013, mandating greater engagement in family planning. The second *Growth and Poverty Reduction Strategy Paper 2011–2015*¹² highlights development strategies, including the need for access to reproductive health and family planning services.

In 2013, the DRC government publicly pledged commitment to family planning at the Third International Conference on Family Planning in Addis Ababa, Ethiopia.¹³ Shortly thereafter, the government launched the *National Multisectoral Strategic Plan for Family Planning: 2014–2020*.¹⁰ For the first time ever, in 2014 the government paid \$300,000 for contraceptive procurement. In December 2014, it also pledged an additional \$2.5 million during the round table at the Third National Conference on Repositioning Family Planning. In December 2015, the National Assembly approved a line item of \$3.5 million in the national budget. In December 2016, the DRC government disbursed \$1 million for the purchase of contraceptives. The DRC was the only country to send 3 ministers (Health, Education, and Plan) to the Fourth International Conference on Family Planning in Nusa Dua, Indonesia, where they presided over several panels. In addition, the Prime Minister of the DRC delivered a speech via video at the closing plenary session of this conference.

PNSA has also emerged as an important force in the DRC. In 2015, it organized a round table on the sexual and reproductive health of adolescents and youth, which gave more visibility and cohesion to partners working in this field. The following year, PNSA brought together donors and implementing partners to develop and publish the *National Strategic Plan for the Health and Well-Being of Adolescents and Youth: 2016–2020*,¹⁴ one

of the first of its kind in a sub-Saharan African country.

Increased Donor Investment

Encouraged by these clear signs of political will in the DRC, the number of donors investing in family planning in the DRC has increased markedly over the last 5 years, as has the dollar amount of their investments. Whereas several major donors (e.g., USAID, DFID, the World Bank) continue to focus their support on large-scale integrated health delivery projects in rural areas, more recently donors have tended to support new approaches to service delivery, test innovative strategies, and fund adolescent/youth programs with an emphasis on urban areas.

Examples of major new investments include two 5-year programs that will extend coverage and reduce the financing gap for contraceptive procurement: the Global Financing Facility (GFF) under World Bank leadership and the Central Africa Forest Initiative (CAFI)/Reducing Emissions from Deforestation and Forest Degradation (REDD+) through the Norwegian Agency for Development Cooperation (Norad). In 2015 the DRC was selected among the focus countries for the GFF, a new initiative launched in 2015 to advance reproductive, maternal, newborn, child, and adolescent health.¹⁵ The country investment case developed under the GFF lists family planning among the priority interventions that will be implemented in 14 selected provinces showing the poorest track records in maternal, newborn, child, and adolescent health. CAFI/REDD+ is an environmental project that includes a family planning component in recognition of the role that population growth plays as one of the drivers of rapid deforestation in the Congo basin. In addition, 2 anonymous donors have begun to invest in both service delivery and demand creation activities in the DRC in recent years. Starting in 2016, the government of the Netherlands joined the list of international family planning donors, with support to youth programming in the 2 Kivu provinces under the title *Jeunes S3 (Sécurité, Santé et Sexualité)* and contraceptive supply chain management (2016–2020).

Climate of Innovation

The DRC has often lagged behind other countries in the region in terms of innovation and experimentation in other areas of public health, in part for the reasons cited above of limited financial and human resources. Yet in family planning, the

Encouraged by clear signs of political will in the DRC, the number of donors investing in family planning in the country has increased markedly over the last 5 years.

DRC has been a hub for innovation. In 2012 the website, www.familyplanning-drc.net (also available in French at www.planificationfamiliale-rdc.net), was the first of its kind to provide information on a large range of family planning topics in the DRC. In 2013, the DRC was the second country selected to participate in the PMA2020 survey program, an innovative mechanism for collecting population and facility-based data: interviewers who reside in the "enumeration area" collect data via smartphones that can be transmitted directly to a server for timely analysis.¹⁶ In 2015, a pilot study on the introduction of DMPA-SC demonstrated the acceptability and feasibility of having medical/nursing students provide this method (among others) at the community level.¹⁷ Efforts are underway to expand the use of the DHIS 2 platform as a routine health information system to analyze contraceptive availability throughout this immense country, incorporate geographic information system (GIS) data that will preclude the need for separate mapping exercises, and use the DHIS 2 as a complementary logistics management information system.

As of 2014, little programming focused on the sexual and reproductive health problems of adolescents and young people. Only 20 of the 516 health zones offered SRH services to adolescents and youth of all types. Yet the climate for youth programming changed shortly after the Third National Conference on Repositioning Family Planning in December 2014. PNSA worked with its technical partners to develop a package of SRH services, including both a clinical and outreach component. A round table on sexual and reproductive health among adolescents and young people, held in December 2015, showcased the fledgling but growing project activity in this area. In 2016, PNSA spearheaded the development of a strategic plan for this population.¹⁴ The Bill & Melinda Gates Foundation, the David and Lucile Packard Foundation, and the governments of Sweden and the Netherlands are investing in programs that focus on adolescents and youth. UNFPA provided contraceptives to these programs. In 2017, PNSA with support from the United Nations Children's Fund (UNICEF) developed a listing of all SRH services for youth and adolescents in the DRC, which indicated 120 health zones receiving support for this type of service. In short, support for SRH programming for adolescents and young people in the DRC—though still in its infancy—has risen steadily in a period of 24 months.

Unifying Mechanism for the Family Planning Community: The CTMP

Following the 2009 recommendation resulting from the Second National Conference on Repositioning Family Planning, the CTMP began functioning as a coordinating entity in 2012. Its organizational members included several ministries (Health, Plan, and Gender), donors, and international and local NGOs. Representatives from different donor organizations and international NGOs realized the benefits of this mechanism in planning for the local family planning conference in 2012. As family planning activity accelerated in 2013 with the prospect of the DRC publicly pledging at the Addis Ababa International Conference on Family Planning and the development of a national strategic plan, the CTMP took on new relevance. The monthly meetings focus on an array of issues, often depending on current issues (e.g., the Reproductive Health Law, participation in international conferences). They provide a forum for new implementing partners to quickly integrate into the larger community and for visiting donors to meet with family planning stakeholders in a single location. Although this type of coordination mechanism is by no means unique to the DRC, it has given an identity to members of the family planning community, which is then able to "speak as one" on given issues. The Prime Minister's office recognized the value of this group and issued a decree in March 2015, conferring official status to this entity.

Evidence of Change in Modern Contraceptive Prevalence in Kinshasa

Two DHS surveys conducted in 2007² and 2013–14³ showed very little increase in mCPR (from 5.8% to 7.8% among married women of reproductive age) at the national level. The PMA2020 surveys, limited to the capital city of Kinshasa (with the addition of Kongo Central since July 2016), showed an increase in mCPR since July 2016, showed an increase in mCPR from 18.5% in 2013 to 26.7% in mid-2017 among women who were married/in union, and from 31.0% to 39.6% among sexually active unmarried women in Kinshasa.^{18,19} During this same period, the share of long-acting reversible methods among married women using modern methods increased from 10.8% to 40.0% (due almost entirely to use of implants).^{18,19} As of 2017, unmet need for family planning ranged from 22% to 25% for these 2 groups of women, suggesting strong latent demand for modern contraception. Compared with mCPR in some other

In the capital city of Kinshasa, mCPR among married women increased from 18.5% in 2013 to 26.7% in 2017.

Support for sexual and reproductive health programming for adolescents and young people in the DRC has risen steadily over a period of 24 months.

sub-Saharan African countries, mCPR remains low. However, the steady increase in contraceptive use and the shift toward long-acting methods in Kinshasa in recent years is promising.

■ FORMIDABLE CHALLENGES

Much has been written about the generally weak public-sector health systems in many sub-Saharan African countries: poor infrastructure, lack of basic equipment and supplies, low wages, insufficient training and supervision of personnel, weak information systems, frequent stock-outs of medications, and rude or culturally insensitive treatment of clients by providers, among others.^{20,21} To this list, we add specific challenges that relate to the political situation, as well as supply and demand for contraception in the DRC.

The Issue of Political Stability

The current president Joseph Kabila came into power in 2001 (after the murder of his father, President Laurent-Désiré Kabila). His constitutionally mandated 2 terms of office ended in December 2016. The absence of elections in November 2016 provoked political tensions and intermittent demonstrations that made headlines in the global press.

In February 2018, new elections were announced to take place on December 23, 2018, with the new president to take office in January 2019. However, the opposition continues to make strident demands that President Kabila step down now, rather than wait until the elections. As such, the announcement of elections has yet to bring political stability to the country. Most international observers have taken a wait-and-see attitude.

Current and potential donors are keenly aware of the political situation in the DRC as they consider future investments in family planning and other sectors. The challenge is to maintain the confidence of donors, pending a return to conditions of political stability expected to follow successful general elections. Most current family planning donors remain strongly committed to the work already underway, but they remain vigilant of the political volatility in the country.

The Logistics and Management of Service Delivery

The DRC is the largest country in sub-Saharan Africa in terms of land mass, yet the transportation infrastructure is extremely weak. No highway

or train system connects East to West; the 1,736 miles of paved road for the entire country consist of 2-lane highways. Several national airline carriers service the major cities throughout the country, but their safety record is poor. (International agencies depend heavily on the United Nations Humanitarian Air Service for domestic flights.) Less than 7% of the population has access to the Internet,²² although mobile SIM penetration has now reached 39.5%.²³

In addition to logistical challenges, the general shortcomings of the public health system hinder the delivery of family planning services. Inadequate human and financial resources to properly train and supervise health care providers and lack of equipment and the deterioration of physical infrastructure, some of which dates from the colonial era (before 1960), are all difficulties encountered by those working in family planning. Management systems are also inadequate, leading to a situation where health care providers set the prices of their services as they wish, rather than at established standardized prices. Contraceptives provided free of charge in the public sector are often leaked to the private sector, where they are sold for a profit by people whose knowledge of their proper use may be limited.

And as if this were not enough, starting in late 2016, sporadic social and political unrest in areas with heightened security risks endanger personnel trying to conduct activities and re-supply health facilities.

Contraceptive Security and Supply Chain Management

Contraceptive security (having the right contraceptives in the right place at the right time at the right cost) requires astute management and sufficient financial resources to complete a complex series of tasks: quantifying (forecasting) contraceptive needs of a given population, estimating the costs of purchase and transport of the commodities, identifying procurement mechanisms, placing orders, clearing merchandise through customs, ensuring delivery to a central warehouse or directly to regional warehouses, ensuring transport to the facilities where clients will obtain the contraception, tracking the continuous flow of commodities through the system, accounting for all expenses, and financing this entire process.

Multiple factors contribute to the challenges of ensuring contraceptive security in the DRC. Different donors and family planning implementing organizations manage contraceptive

procurement and distribution through parallel channels in the national system. Ideally, the supply chain used for essential drugs in the country could integrate contraceptive procurement to improve efficiency and reduce transaction costs. Although discussions are underway to explore this approach, contraceptive procurement and distribution occur outside the government supply chain for essential medicines.

In terms of purchasing contraceptive supplies, the government has used its own funds but is only able to cover a fraction of the costs for a population the size of that in the DRC. Donors are also unable to fill this gap. The logistics of contraceptive distribution—including purchasing, transportation, distribution, and storage—is a major challenge, especially in terms of delivering it to the "last mile" (the client).

The Influence of Sociocultural Norms That Favor Large Families

Demand for family planning services results from the desire to prevent pregnancy in the short term and to space/limit number of births in the long term. All else being equal, societies that favor large families will have less demand for contraception, although such norms evolve over time and in response to macrolevel economic changes (e.g., improved opportunities for women's education, increased urbanization). In the DRC, the total fertility rate is 6.6 children (5.4 in urban areas and 7.3 in rural areas).³ As Romaniuk has noted, couples tend not to be deterred from having a large family by their inability to provide for their children in material terms; nor do women limit fertility to participate in the labor force.²⁴

Recent qualitative research highlights many factors that contribute to the persistence of high fertility rates.^{25,26} Having many children is a sign of social status for both men and women. Moreover, Congolese law makes women subordinate to their husbands from the day of their marriage, which gives them less power in their relationship. The husband's family may believe that his wife owes them many children in exchange for the dowry that the husband's family paid for her. If she does not give birth to these children, her husband's family can encourage him to marry another woman. To the extent that parents depend on their children when they become elderly, having many children is a way to ensure that they are taken care of later in life. Finally,

children are an important source of labor for families, particularly in rural areas.

Cultural norms can change in response to the economic pressures experienced by families because of their size, particularly in urban areas. However, even women in the highest quintiles for economic well-being in the urban areas of the DRC wish to have an average of 4.9 children, and a higher level of education in the DRC has a minimal effect on the desired family size.²

Fees for Family Planning Services

Per capita GDP in the DRC is \$405.²⁷ The country ranks 176 of 188 countries on the Human Development Index.²⁸ In terms of the percentage of the population living below \$1.90 per day, the DRC at 77.1% is one of the most impoverished nations.²⁷ In the DRC, 70% of the public health system is financed by user fees, with only 13% covered by the government and 14% by external donors.²⁹ This method of direct payment by households constitutes an important financial obstacle to access to care by the poorest segments of the population.

In this climate of grueling poverty, cost can represent a prohibitive barrier to contraceptive use. Programs serving rural areas (e.g., PROSANI, ASSP) provide contraception free of charge. However, registered pharmacies in urban areas charge either market rates or subsidized rates (if they receive commodities from development programs). Hospitals and health centers in urban areas often provide contraception subsidized by the major donors; yet even if the product is low cost or free of charge, the facility may charge for the consultation and supplies required to administer the contraceptive method (e.g., syringes, cotton and alcohol for injections or implant insertions). Social marketing programs, including PSI and DKT International, sell a range of contraceptives at subsidized prices. In addition, PSI, through the Association de Santé Familiale (ASF), instituted a dual system of *payant et gratuité* (paying and free), whereby once a month they supply contraception free of charge, thus affording access to those otherwise unable to pay for the service.

According to FPwatch, an outlet survey conducted in 2015 in Kinshasa and Katanga provinces, the median price per couple-year of protection (CYP) in Kinshasa was \$1.75 (and was slightly higher in Katanga).³⁰ The cost per CYP was \$4.95 for implants and \$0.55 for intrauterine devices. Some health facilities in Kinshasa

The government has used its own funds to procure contraceptives but is only able to cover a fraction of the costs required to meet the needs of the large population.

charge between \$10 and \$20 for the highly popular implant, and a client must pay the full amount of the method on the day of service, even if the cost per year over the multiple years of protection is far lower.

Compounding client inability to pay, prices for contraception are not standardized. PNSR established a list of prices for all contraceptives sold in the public health system, but there is no enforcement of these prices. Moreover, rarely are the prices posted for the benefit of clients. In 2017, only 23% of service delivery points in Kinshasa that charge fees for family planning posted the prices of contraceptives.¹⁹

■ PROSPECTS FOR IMPROVING NATIONAL FAMILY PLANNING COVERAGE

The *National Multisectoral Strategic Plan for Family Planning: 2014–2020* calls for an increase in modern contraceptive prevalence to 19.0% by 2020.¹⁰ Although PNSR and PNSA serve a normative role and coordinate specific activities, neither has sufficient financial support from government or donors to ensure the provision of family planning services at the national level. Nor is there any prospect on the horizon that either the government or an international donor will come forward with sufficient resources to support a national program that aspires to ensure contraceptive access across this large nation.

Several key initiatives are underway that, if effective, will contribute significantly to improving access to contraception. They align with the 6 pillars of the World Health Organization (WHO) framework for health systems strengthening: governance and leadership, service delivery, personnel, commodities, information, and financing.³¹ The initiatives outlined below are illustrative (not exhaustive) of ongoing work in support of these 6 pillars.

Governance and Leadership: Transforming the Provincial CTMP Network Into a National Family Planning Alliance

Given the effectiveness of the national CTMP as a coordinating mechanism that provides structure to the family planning community, efforts began in 2016 to establish CTMPs at the provincial level. Of the 26 provinces in the DRC, 12 currently have a provincial CTMP (Kinshasa, Bas Uele, Kasai Central, Katanga, Kongo Central, Lualaba, Nord Kivu, Sankuru, Sud Kivu, Tshopo, Ituri, and

Lomani). The Ouagadougou Partnership—a group of 9 francophone West African countries that work together toward a single family planning objective—serves as a useful model for this partnership in the DRC.³²

A key criterion for establishing a provincial CTMP is the presence of an international NGO that provides family planning services in the province and is willing to play a coordinating role and provide financial support for the organization of CTMP meetings. PNSR remains highly engaged in this initiative. As currently structured, government representatives on the provincial CTMPs include the provincial representative of PNSR, the Provincial Division of Health (Division Provinciale de Santé, or DPS), representatives of at least 3 ministries (Health, Plan, and Gender), and in some cases the ministers of Environment and of Social Affairs, as well as other international and local NGOs.

In the absence of a national program able to provide financial resources for family planning operations at the provincial level, the CTMP constitutes a voluntary grouping of family planning stakeholders interested in advancing family planning at the provincial level. Provincial CTMPs are not operational units; they do not have a budget for program activities. However, these groups of provincial stakeholders will be able to oversee the evolution of family planning service delivery in multiple ways. They are already involved in quantifying contraceptive needs in their provinces. They will have access to rapidly improving service statistics through the adoption of the DHIS2 system in the DRC. These data will allow provinces to track the percentage of health zones (and within them, health areas) that provide family planning services. This type of evidence-based programming is likely to encourage existing funders to fill some program gaps and to attract new investment. Improving the advocacy skills of provincial staff will help secure these gains.

Three key activities in 2017 gave direction to this new initiative. In March, members of the provincial CTMPs met in Kinshasa for the first time, creating solidarity for this type of coordinated approach to promoting family planning in the DRC. In September, PATH organized a 3-day training, attended by 2 persons per province, to strengthen their skills in facilitation techniques using Advance Family Planning (AFP) SMART advocacy tools.³³ In October, a series of 3 week-long workshops were held (to cover all 12 provincial CTMPs), in which 4 members per province participated in training on the fundamentals of

family planning programming, autonomous functioning of the provincial CTMP, improvement of the quantity and quality of family planning coverage, and monitoring progress using service statistics.

Although the provincial CTMPs operate relatively autonomously, the national CTMP will continue to play an important role as a coordinator and catalyst. It will organize annual meetings in which each province will present its achievements and identify areas for improvement, coordinate skills training/workshops at the provincial level, and create a communication platform via a new website (www.ctmp-pf.org).

Service Delivery: Initiatives to Improve Supply and Demand

The structure of service delivery in the DRC resembles that of most developing countries. Services are available through fixed health facilities (e.g., hospitals, health centers, health posts), pharmacies, and community-based distribution workers. Services are financed through the public sector, private commercial sector, and private not-for-profit (NGO) sector including faith-based organizations. "Hybrid" facilities also exist whereby the government owns the structure and pays the personnel, but an NGO is responsible for training personnel and providing contraceptive commodities.⁶ In addition to registered pharmacies, many informal pharmacies (drug shops) also provide one or more contraceptive methods, such as condoms.

We cite 3 illustrative initiatives designed to increase supply, improve quality, and generate demand. By no means unique to the DRC or innovative on the world stage, they nonetheless represent promising attempts to improve service delivery in the DRC.

Social Marketing Programs

Both PSI and DKT International implement social marketing programs in the DRC, which consist of promoting the sale of subsidized contraceptives through multiple channels, both traditional (pharmacies and drug shops) and non-traditional (bars, hotels, gas stations).

The work of DKT International illustrates some of the innovation occurring in the DRC context. The Protected Pleasure Intervention Brigade (*Brigade Intervention de Plaisir Protégé*) operates on the model of a security squad with its "agents" riding in the back of a marked pick-up truck. As the truck pulls up to a bar, the agents (attractive

young women and men) dash in and mingle with the customers, promoting the sale of condoms as their "weapon." In addition to creating brand awareness and destigmatizing contraception, the strategy has demonstrated a willingness for clients to pay. A second strategy involves a network of "bees": trained nurses, primarily female, who travel to different communities to provide oral contraceptive pills, condoms, and DMPA-SC, targeting low-income women for whom a clinic visit represents a financial barrier. Clients choosing to use DMPA-SC receive a card with the date of their next injection and can opt to receive SMS reminders via cell phone. If a client wants a clinical method, the nurses provide a referral voucher to a facility known to have trained personnel. The nurses receive 50% of the sale of the product, which amounts to \$0.50 per DMPA-SC injection. During a 6-month period in 2017, they sold 90,000 units of DMPA-SC.

DKT International is also known as a youth-friendly organization in DRC in approaching young people aged 15 to 24. The NGO has used a human-centered design approach to create a sexual and reproductive health millennial youth program called *Batela Lobi Na Yo* ("Protect Your Future") to increase uptake of quality family planning products and services among young women in the DRC.

Strengthening Family Planning Services Through the Military

Military officials in Kinshasa approached PNSR and others to obtain support for introducing and strengthening family planning service delivery within health facilities run by the military. They also requested a population-based survey to better understand how contraceptive use within the populations living in military camps in Kinshasa differed from the civilian population. The study showed as of 2016, the mCPR of married women living in military camps was much lower (16.0%) than the total population (23.4%).³⁴ Because military camps are often considered a "difficult location" to work, previous programs had avoided them. Instead, they are currently partners in programming that trains personnel in fixed facilities, establishes community-based distribution outlets, and features military personnel in billboards promoting family planning in Kinshasa and the adjacent province of Kongo Central. Given the mobility of military personnel in the DRC, it is likely that behavior change within this population will bring benefits to other parts of the country.

Generating Demand for Services

Prior to 2015, demand generation consisted primarily of social marketing in major cities and periodic distribution of limited quantities of print materials. Since 2015, several organizations working in behavior change communication (including PNSR), with support from the Johns Hopkins Center for Communication Programs, formed a task force that produced multiple materials: a single, improved logo for use by all family planning organizations; a booklet for low-literacy audiences on the range of available contraceptive methods; and billboards encouraging spousal communication on family planning. This group worked with local TV stations to make family planning a major focus of a "newlyweds" show, and it inserted family planning messages as spots in a popular radio program on health issues. A telephone hotline provides youth and others with a confidential means of obtaining accurate information about contraception. The group also developed and tested a methodology for community-level activities. Such programming is intended to influence behavior at the individual level as well as social norms at the community level.

Family planning has been institutionalized in 11 nursing schools in Kinshasa and 6 nursing schools in Kongo Central, with students operating as community-based distributors.

Personnel: Institutionalizing Family Planning Through a National Network of Nursing Schools

In 2015 a research pilot on the acceptability and feasibility of having medical and nursing students deliver contraceptives including DMPA-SC at the community level created new awareness for the potential of this cadre as family planning service providers in the DRC.³² While the pilot research had set out to test the acceptability of distributing DMPA-SC at the community level, the greatest "discovery" of the study was the potential of using students to expand access to contraception. They are dynamic, well educated, eager to gain experience with service delivery at the community level, and young (thus approachable to young people seeking contraceptives). In addition, they represent tomorrow's leaders of the DRC health care system.³⁵

The 6th Directorate (*6ème Direction*, or D6) of the Ministry of Health oversees the 477 schools of nursing and midwifery in the country. (Medical schools operate more autonomously under a different directorate.) In 2016, efforts began within the D6 to institutionalize family planning within nursing schools; specifically, to establish a family planning curriculum that every

nursing student will take as the first module of the third academic year; to train instructors from these schools to teach this subject matter; and to incorporate a community-based practicum into the curriculum in which students would provide 5 contraceptive methods (Implanon NXT, DMPA-SC, pills, condoms, and CycleBeads) at the community level. Because of the growing popularity of implants through the DRC, the use of this cadre of provider to administer Implanon NXT outside a clinical setting further enhances the potential effectiveness of this strategy.

To date, D6, PNSR, and other stakeholders have instituted this program in 11 nursing schools in Kinshasa and 6 nursing schools in the adjacent province of Kongo Central. Students are operating as community-based distributors. The National Health Information System (Système National d'Information Sanitaire, or SNIS) is modifying its family planning data collection forms to reflect the contribution of this new cadre of personnel.

This innovative mechanism represents a first step in expanding and strengthening the delivery of family planning services in the DRC. It is by no means the total solution to this enormous challenge. Yet it has emerged as one of the potentially most effective means of jump-starting service delivery, especially where it can expand to provinces beyond Kinshasa.

Commodities: Ensuring Contraceptive Security Through Improved Supply Chain Management

It is hard to overstate the enormity of the challenge of ensuring contraceptive security in a country that is physically immense, has weak transportation systems, is extremely underfunded for contraceptive procurement, and lacks a unified procurement/distribution system. The DRC can boast little "innovation" in this area. Rather, it must focus on establishing the basic elements of a functional contraceptive logistics system, which is itself an ambitious objective but fundamental to achieving increased mCPR. The enormity of the logistical challenge has caused some to ask if the DRC should be a testing ground for using drones to deliver contraceptive commodities.

Several positive steps in this domain include the following:

- Establishing a multiagency contraceptive logistics task force, including government, international NGOs, and donors

- Quantifying contraceptive needs for the country, by province, from 2016–2020
- Estimating the cost for contraceptive procurement and family planning service delivery, as well as the financial gap that exists to meet these needs
- Establishing an early-warning system for contraceptive stock-outs at the health zone level, with mechanisms to trigger resupply
- Lobbying the country's health donors to allocate a budget for contraceptives

Key activities are either underway or in the planning stage that will contribute to improving the effectiveness of contraceptive logistics:

- Implementing a national strategic plan for the supply chain to improve the alignment and effectiveness of government, donors, and partners (recently signed by the Minister of Health)
- Developing greater cohesion and coordinated action among members of the multiagency contraceptive logistics task force
- Developing an accurate, comprehensive, and transparent information system on contraceptive procurement and distribution of contraceptives flowing into the country for use in the public and private, nonprofit sector
- Maintaining a strong advocacy initiative to mobilize funding among international donors to cover the contraceptive financing gap

In 2016, an initiative began to review the possibility of incorporating contraceptives into a larger government-supported system for procuring and distributing essential commodities. At the heart of the system is a quasigovernmental organization responsible for the procurement of health commodities in the DRC called FEDECAME (Fédération des Centrales d'Approvisionnement en Médicaments Essentiels). FEDECAME is a network composed of a Kinshasa-based procurement and supply chain coordination unit linked to 19 regional distribution centers or *centrales de distribution régionale* (CDR) for medication throughout the country, whose mandate is to ensure the supply of health commodities through the health system down to the community level. FEDECAME has successfully procured many essential medicines but lacks experience in procuring commodities for family planning, HIV/AIDS, and tuberculosis among other programs, primarily due to historical arrangements

whereby vertical donor such as the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), The Global Fund to Fight AIDS, Tuberculosis and Malaria, and the President's Malaria Initiative (PMI) ensured procurement of specific commodities.

Yet should the latter continue to be the long-term objective? A reasonable long-term strategy (for example, 10 years) could perhaps rely on a state-owned and publicly owned supply chain, with major intermediate steps to be accomplished, while continuing to receive meaningful help from donors.

Information: Strengthening Information Systems to Monitor Progress

The significant progress in this area should be judged not in comparison with sub-Saharan African countries with high mCPR and mature programs, but rather with those starting from much further behind. Three types of information useful to monitoring ongoing programs and advancing family planning programming include the routine health information system, population- and facility-based surveys, and special studies.

Routine Health Information Systems

The national health information system (SNIS) has made remarkable progress in the collection of service statistics, including for family planning. Starting in 2013, with strong support from the DFID-funded ASSP project, the 5th Directorate (*5ème Direction*, or D5) of the Ministry of Health began to install the DHIS 2 platform in all (then) 11 provinces of the country. As of late 2017, the system reported data from all (now) 26 provinces of the country, with 95% of health zones reporting on family planning activity. (Each health zone is subdivided into health areas, which include one or more health facilities that report to the system. Whereas 95% of health zones report on family planning services, only 71% of health areas and only 40% of the 16,465 health facilities report some level of family planning activity.) The D5 has worked with the national CTMP in revising the family planning data collected by the SNIS. The system yields the data needed to calculate CYP (a widely used indicator of family planning output). Members of the provincial CTMPs are now trained to access these data from the system and interpret them as a means of monitoring progress at the provincial level. Also, the system can be used to identify health zones (and within

them, health areas) that do not have functioning family planning services. Work is underway to obtain GPS coordinates for all health facilities in the system, which will allow for additional analysis of access to contraception.

Population- and Facility-Based Surveys

Population-based representative surveys provide a snapshot in time of contraceptive use dynamics, including modern contraceptive prevalence, unmet need, method mix, determinants of use, and other factors. Facility-based surveys describe the family planning supply environment available to clients in a given geography. The DRC was the second (of 11) countries to conduct the PMA2020 survey,¹⁶ which has yielded 6 rounds of data for Kinshasa and 3 for Kongo Central. The results track the 8 percentage-point increase in mCPR and the steady increase in implant use in Kinshasa over a 5-year period. A second facility-based study, FPwatch, conducted in Kinshasa and Katanga in 2015, provided further in-depth information on the supply environment in these 2 provinces. The next DHS, anticipated in 2019 or 2020, will indicate progress in other provinces and nationally.

Special Studies

A series of research pilots conducted by Tulane University in collaboration with local partners have tested the acceptability and feasibility of new strategies for increasing access to contraception at the community level. The first pilot in 2015 tested the use of medical/nursing students to administer DMPA-SC (along with pills, condoms, and CycleBeads).^{35,36} The positive results led to 3 additional pilots in Kinshasa. The first two, conducted in Kinshasa, tested the acceptability and feasibility of using this same cadre of student to provide Implanon NXT and to teach women in the community to self-inject DMPA-SC. The third, in the rural province of Lualaba, trained *relais communautaires* (non-medical community health workers) to inject DMPA-SC at the community level. In addition, focus group and mystery client studies have indicated the generally favorable attitudes toward emergency contraception and the willingness of pharmacists in official pharmacies to provide emergency contraception to young women.^{37,38} The use of special studies to continually test new approaches and ideas further contributes to a dynamic family planning environment.

Financing: Developing the Funding Streams to Cover a Highly Under-Resourced Program

Financing remains a major challenge in a country with few resources and a very small percentage of the national budget allocated to health. Family planning programming in the DRC remains highly donor-dependent, despite the politically important but relatively small contribution of the DRC government to contraceptive procurement. The increased donor investment over the past 5 years shows no signs of slowdown.

At the international level, the GFF is poised to leverage funds from the International Development Association in support of family planning as a priority within the reproductive, maternal, newborn, child, and adolescent health and nutrition continuum. At the national level, several provincial CTMPs—Lualaba, Nord Kivu, and Sud Kivu—have successfully created a line item for contraceptive procurement in the provincial budget.

Efforts to involve the private sector may further contribute to financing family planning service delivery, for example, in the mining sector. Yet if the DRC aspires to universal coverage in family planning by 2030, much work remains to be done to achieve this ambitious goal.

CONCLUSION

Some have questioned if the norms that favor high fertility in the DRC are likely to change.²⁶ Prior to 2012, the government attached little importance to family planning and donors were reticent to invest in family planning in the DRC, given the formidable challenges facing family planning programming. This article provides in-depth analysis of these challenges while highlighting the significant progress made since 2012 in government support and programming of family planning activities in the DRC. It presents promising initiatives expected to contribute to the objective of 19% mCPR by 2020, consistent with the pillars of health systems strengthening. The challenge of procuring sufficient contraceptive supplies to meet the growing demand for contraception is significant, as is the need for improvement in supply chain management to deliver services to the "last mile." While major challenges remain, this article reflects growing confidence in the ability of government, donors, and implementing partners to influence mCPR, and with it the future of this country.

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ORIGINAL ARTICLE

Expanding Access to Injectable Contraception: Results From Pilot Introduction of Subcutaneous Depot Medroxyprogesterone Acetate (DMPA-SC) in 4 African Countries

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Nearly half a million doses of DMPA-SC were administered over 2 years in Burkina Faso, Niger, Senegal, and Uganda, with 29% of doses provided to first-time family planning users and 44% (in 3 countries) to adolescent girls and young women under age 25. Switching from intramuscular DMPA (DMPA-IM) was not widespread and generally decreased over time. Community health workers provided a higher proportion of DMPA-SC than DMPA-IM injections. Stock-outs in 2 countries hindered product uptake, highlighting the need to strengthen logistics systems when introducing a new method.

ABSTRACT

PATH partnered with the United Nations Population Fund (UNFPA) and country ministries of health (MOHs) to coordinate pilot introductions of subcutaneous depot medroxyprogesterone acetate (subcutaneous DMPA or DMPA-SC, brand name Sayana Press) in Burkina Faso, Niger, Senegal, and Uganda from July 2014 through June 2016 in order to expand the range of methods available to women, particularly in remote locations. The pilot introductions aimed to answer key questions that would inform decisions about future investments in DMPA-SC and scaling up product availability and service-delivery innovations nationally. These questions included the extent to which DMPA-SC would appeal to first-time users of modern contraception, as well as adolescent girls and young women; whether DMPA-SC would add value to family planning programs or simply replace DMPA-IM or other modern methods; and the trends in injectables use when introducing DMPA-SC (or any injectable) at the community level for the first time. We implemented a multicountry monitoring system to track key indicators, including the number of doses administered by category of user (e.g., new users, by client age group) or delivery channel. Providers generally collected these data using their national programs' standard family planning registers. Data were analyzed for cumulative information and to examine trends over time using Microsoft Power Query for Excel and Tableau. Across the 4 countries, nearly half a million DMPA-SC doses were administered and approximately 135,000 first-time users of modern contraception were reached. Furthermore, 44% of the doses administered in 3 of the countries with data were to adolescent girls and young women under age 25. Switching from DMPA-IM to DMPA-SC was not widespread, ranging from 7% in Burkina Faso to 16% in Uganda. Results from these pilot introductions demonstrate that DMPA-SC has the potential to expand community-level access to injectables, maximize task-sharing strategies, and reach young women and new acceptors of family planning. Considered within the context of each country's setting, training approach, and introduction strategy, these results can help stakeholders in other countries make informed decisions about whether and how to include this contraceptive option in their family planning programs.

INTRODUCTION

Worldwide, 214 million women would like to delay or stop childbearing but are not using any method of contraception.¹ Sub-Saharan Africa has the lowest

levels of contraceptive prevalence globally, with only 60% of demand for family planning satisfied.² Evidence suggests that the addition of a new contraceptive method to the mix, or expanding geographic access to existing methods, attracts new contraceptive users and increases contraceptive prevalence.^{3,4}

Injectable contraceptives are the most widely used modern method in sub-Saharan Africa, where their prevalence among married or in-union women is 10.7%—more than double that of oral contraceptive pills.⁵ In many African countries, however, injectables have not been made widely available outside of clinic

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The new subcutaneous DMPA injectable allows for easier administration than intramuscular DMPA and offers the potential to overcome barriers to CHWs providing injectables.

settings due to restrictions on the cadres of providers that are authorized to administer injections. Community health workers (CHWs) often are not allowed to administer injections because of safety concerns. However, evidence from multiple countries shows that autonomous community-based distribution of injectable contraceptives by appropriately trained CHWs is safe, effective, and acceptable.^{6,7} The World Health Organization has called for such services to be part of comprehensive family planning programs,⁷ but despite this guidance, as of early 2017 only 11 countries in sub-Saharan Africa had enacted policies authorizing distribution of injectable contraceptives by CHWs.⁸ A new injectable contraceptive—subcutaneous depot medroxyprogesterone acetate (subcutaneous DMPA or DMPA-SC)—allows for easier administration than the traditional intramuscular DMPA (DMPA-IM) and offers the potential to overcome barriers to CHWs providing injectables.

DMPA-SC is a 3-month, progestin-only injectable contraceptive administered into the fat below the skin. The most widely available DMPA-SC product, Sayana Press, is manufactured by Pfizer Inc. (Sayana Press is a registered trademark of Pfizer Inc.). As a lower-dose formulation and presentation of intramuscular DMPA, Sayana Press combines the drug and needle in the prefilled Uniject injection system. (Uniject is a trademark of Becton, Dickinson and Company.) Due to its simple presentation in a single device, DMPA-SC in Uniject requires less training for use than

traditional intramuscular injections, making it especially suitable for task-sharing strategies—including administration by lay health workers in peripheral facilities and through community-based distribution.

To date, all research studies of DMPA-SC in Africa have used the branded product, Sayana Press. Acceptability studies in Senegal and Uganda found that clients and providers alike preferred DMPA-SC to DMPA-IM due to quicker and easier administration, less pain with injection, and fewer side effects.^{9,10} Given the product's safety, acceptability, and ease of subcutaneous administration, ministries of health (MOHs) may be more likely to authorize community-based distribution of injectable contraception by CHWs and other community-level workers.¹¹ DMPA-SC also offers the potential for self-administration.

At the 2012 London Summit on Family Planning, the governments of Burkina Faso, Niger, Senegal, and Uganda, among others, set ambitious objectives to increase contraceptive prevalence rates by 2020. Burkina Faso, Niger, and Senegal made commitments to support innovation in family planning service delivery by introducing DMPA-SC. Senegal and Uganda pledged to scale up community-based distribution, and Niger stated its intention to include injectables (DMPA-SC) in the range of methods offered by CHWs.^{12–15}

In response to these commitments, PATH partnered with the United Nations Population Fund (UNFPA) and MOHs to coordinate pilot introduction of DMPA-SC in Burkina Faso, Niger, Senegal, and Uganda from July 2014 through June 2016. The MOHs leading these initiatives aimed to expand the range of methods available to women—particularly in remote locations—through informed choice counseling in order to reach additional users of modern contraception and to increase contraceptive prevalence rates. The pilot introductions offered injectable contraception to many communities for the first time, closer to where women live.

Global and national stakeholders had key questions about these pilot introductions to inform future investments in the product and decisions about scaling up product availability and service-delivery innovations nationally. These questions included the number of DMPA-SC doses that would be administered to clients during the pilot; the extent to which DMPA-SC would appeal to first-time users of modern contraception, as well as adolescent girls and young



Sayana Press is a 3-month injectable contraceptive that is administered into the fat below the skin. © 2016 Gabe Bienczycki/PATH.

women; whether DMPA-SC would add value to family planning programs or simply replace DMPA-IM or other modern methods; and the trends in injectables use when introducing DMPA-SC (or any injectable) at the community level for the first time. To answer these questions, assess the reach of the pilot introductions, and inform mid-project course corrections, we developed a multicountry monitoring system across the 4 pilot countries. A set of global outcome indicators was established across country settings to allow collection and analysis of data in relation to different introduction strategies. A detailed report on design and implementation of this monitoring system, including lessons learned, is presented elsewhere.¹⁶ Results from the pilot introductions are described below and can help stakeholders in other countries make informed decisions on whether and how to include this contraceptive option in their family planning programs.

PROJECT DESCRIPTION

Planning

PATH engaged country governments early in the process of planning the pilot introductions in order to understand family planning goals and priorities and to assess interest in introducing the new contraceptive product, DMPA-SC. Key champions and supporters within the MOH were identified to provide leadership in designing the product introduction strategy and to provide technical and administrative oversight throughout the introduction process. Together, we drafted country-specific DMPA-SC introduction plans, validated the plans with a broader set of national family planning stakeholders, and established processes for MOH and NGO implementing partner engagement and coordination. Each country's introduction plan included an overview of the country's family planning landscape and goals and a description of the introduction strategy, including service-delivery channels (e.g., public or private sector, facility- and community-based delivery, and pharmacies or social marketing organizations); geographic areas for introduction; partners and their roles; product registration status, procurement, and distribution; provider training plans and communication and demand generation plans; and any monitoring, research, and evaluation activities.

During the introduction planning process, MOH leadership in all 4 countries elected to introduce the product first at limited geographic scale.

Burkina Faso and Senegal introduced DMPA-SC through delivery points at all levels of the health system, alongside DMPA-IM. They also implemented the pilots in 4 regions with the greatest population and highest rates of intention to use family planning, based on data from national Demographic and Health Surveys (DHS). In Senegal, a policy shift to allow community-based distribution of injectables at the outset of DMPA-SC introduction enabled CHWs to offer both DMPA-SC and DMPA-IM. Wanting to reach new users of family planning and expand geographic access for women living in remote areas, the Niger MOH elected to introduce DMPA-SC as the first offering of injectable contraception at the most peripheral facilities (health huts) in 2 districts, and through community-based distribution of the socially marketed product at the village level in 2 additional districts. In order to expand task sharing through community-based distribution, the Uganda MOH chose to introduce DMPA-SC alongside DMPA-IM in 28 districts where CHWs existed but were not consistently offering injectables. Table 1 presents a summary of the DMPA-SC pilot introductions in each of 4 African countries. The introduction period overall ran from July 2014 through June 2016, but each country had a different launch date. Burkina Faso launched in July 2014, Niger and Uganda in September 2014, and Senegal in January 2015; thus, some countries had shorter data collection periods.

Coordination

PATH hired a national coordinator in each country to help guide country governments through essential steps in the project start-up phase, including tracking product registration, guiding the product introduction plans through the review and approval processes, and working with local experts to complete a quantification exercise, which informs the decision of how much product to order. The coordinators engaged in all aspects of project implementation including adapting training curricula, ensuring high-quality provider training, conducting field supervision, collecting and reporting monitoring data, and playing an active role in project steering committee meetings.

The MOH and all implementing partners in each country held routine coordination meetings to track DMPA-SC introduction progress, identify and respond to emerging challenges, and make decisions about program

Each country developed a country-specific subcutaneous DMPA introduction plan.

TABLE 1. Overview of DMPA-SC Introduction and Provider Training Strategies by Country

| | Burkina Faso | Niger | Senegal | Uganda |
|--|---|---|--|---|
| Product launch | July 2014 | September 2014 | January 2015 | September 2014 |
| Geographic scope | Over 680 public-sector facilities across the 4 most populous regions (23 rural, peri-urban, and urban districts) | 211 public-sector community health huts in 2 rural districts; 50 CBD sites in 2 rural districts (4 districts total) | 268 facilities and 637 health huts across the 4 most populous regions (31 rural, peri-urban, and urban districts) | CHWs linked to 336 public-sector health facilities across 28 rural and peri-urban districts |
| Service delivery channels | All levels of the health system, including public-sector mobile outreach from peripheral health and social promotion centers. Static NGO clinics and mobile outreach by NGO partners (MSI, ABBEF) | CHWs via public-sector health huts and private NGO CBD (ANIMAS-Sutura) | All levels of the health system, including by CHWs via health huts; NGO static clinics (MSI) | Public-sector CHWs; static NGO clinic and outreach in 1 site (Reproductive Health Uganda) |
| Community-based access to injectables | First offering of injectables through community outreach | First offering of injectables by CHWs at health huts and through CBD | Injectable provision previously authorized at health huts, though not widely available prior to DMPA-SC introduction | CBD of injectables previously authorized, though not widely available prior to DMPA-SC introduction |
| DMPA-SC and DMPA-IM offered side by side | Yes | No | Yes | Yes |
| Number of providers trained | ~1,900 | ~300 | ~2,000 | ~2,100 |
| Training approach | Rapid, cascade approach | Gradual, district-by-district approach | Rapid, cascade approach | Gradual, district-by-district approach |

Abbreviations: ABBEF, Association Burkinabè pour le bien-être familiale; CBD, community-based distribution; CHW, community health worker; DMPA-IM, intramuscular depot medroxyprogesterone acetate; DMPA-SC, subcutaneous depot medroxyprogesterone acetate; MSI, Marie Stopes International.

implementation. Some countries leveraged existing technical working groups for this purpose, while others convened a pilot project steering committee.

Provider Training

Providers in each country were trained using DMPA-SC training materials developed by PATH.¹⁷ In a process led by the country coordinators, MOHs and implementing partners adapted this curriculum to fit their individual country context and providers' skill levels. Where relevant, countries also updated visual materials used by providers during client counseling sessions to include DMPA-SC.

An assessment of training needs was conducted to inform training plans in each country, including information on the number of providers to be trained, their cadres, and prior experience providing family planning counseling and injections or injectable contraception. The content and

length of provider trainings varied by setting depending on the findings. For example, skilled providers needed training only in DMPA-SC and an injectable contraception refresher since they were already familiar with and offering other injectable contraceptives. Lower cadres of providers—such as CHWs—generally needed more complete training on administration of injectable contraception, and in some cases, training on the full range of available contraceptive methods.

In all countries, training content included theory and practice related to the provision of DMPA-SC. Providers were trained on the differences between DMPA-SC and DMPA-IM and how to counsel clients on both methods in the context of informed choice. Injection technique was first practiced on prosthetic models—the standard model being a condom filled with salt and tied off at the end—and was evaluated using an observational checklist included in the curriculum. Injection practice on the model was followed by a

practicum where trainees administered injectable contraception—under the supervision of a qualified provider—to clients who had selected that method through informed choice counseling. Participants' injection technique was again evaluated using the same observational checklist with supervisors guiding them to master their technique.

Burkina Faso and Senegal implemented a rapid, cascade approach to training that worked well for introducing DMPA-SC at all levels of the health system in relatively large geographies. The MOHs and training partners in these countries organized centralized trainings for national master trainers, then regional trainings-of-trainers, followed by a cascade of trainings for district-level providers held simultaneously in each pilot introduction region. While implemented by partner NGOs, key staff from PATH or UNFPA and the MOH supervised all trainings. Unlike Burkina Faso and Senegal, introduction in Niger and Uganda was exclusively through CHWs and these countries followed a more gradual, district-by-district approach to training. In Niger, the MOH led the training, while in Uganda NGOs (PATH, Pathfinder International, FHI 360 and WellShare International) led the trainings, which were conducted in less centralized locations, closer to where CHWs live.

Product Distribution

During the pilot introductions, DMPA-SC was distributed through the most appropriate mechanisms in each country, which involved one of 3 distinct approaches:

1. Integration of DMPA-SC into the existing public-sector national distribution systems from the outset (Burkina Faso and Niger)
2. Integration of DMPA-SC into a donor-funded initiative to improve distribution of contraceptive supplies and reduce stock-outs, called the Informed Push Model (Senegal)
3. Establishment of a parallel distribution system with donor funding, using a private distributor approved by the MOH as an alternative to the public-sector system (Uganda)

In the case of Uganda, the National Medical Stores (NMS) could not distribute the product only to the pilot districts before it was on the national Essential Medicines List, so PATH worked with subcontractor Uganda Health Marketing Group to establish a distribution approach for the pilot.



CHWs in Uganda received comprehensive training on all available family planning methods, including DMPA-SC. © 2014 Will Boase/PATH.

METHODS

Monitoring System Design

In collaboration with stakeholders from each country, we employed a 4-phase approach to monitoring DMPA-SC pilot introduction¹⁶:

1. Develop and define global indicators
2. Integrate global indicators into country data collection tools
3. Facilitate consistent reporting and data management
4. Analyze and interpret data and share results

We selected global outcome indicators based on key areas of interest to country stakeholders and donors—for example, the potential for DMPA-SC to expand family planning access for women who had never used family planning, the potential to reach young women, and the extent to which current users of other modern contraceptive methods switched to DMPA-SC. Monitoring indicators represent high-level data on family planning service delivery, counting the number of doses administered by category of user (e.g., new users, client age group) or delivery channel (e.g., community-based distribution). Global indicators were vetted with MOHs and local implementing partner organizations and refined accordingly. Table 2 lists the global pilot project indicators and the purpose of each indicator. Other indicators were also monitored but are not reported here, as they do not bear as directly on our objectives—for example, the types of providers trained and the number of DMPA-SC doses distributed to health facilities. More detailed

Burkina Faso and Senegal implemented a rapid, cascade training approach to introduce DMPA-SC, while Niger and Uganda followed a more gradual district-by-district training approach.

TABLE 2. Global Monitoring Indicators for Pilot Introduction of DMPA-SC

| Global Monitoring Indicator | Purpose |
|--|--|
| Number of DMPA-SC doses administered to clients | <ul style="list-style-type: none"> • Documents the number of DMPA-SC doses administered to clients, independent from other injectable products • Provides the denominator for indicators on new users, switching from DMPA-IM, and switching from other modern methods |
| Number and percentage of DMPA-SC doses administered to first-time users of modern contraception ("new users") ^a | <ul style="list-style-type: none"> • Indicates the total number of new users of modern contraception reached with DMPA-SC and the share of total DMPA-SC doses administered to first-time users, by health system level where relevant • Helps determine the extent to which the product is reaching new users, as opposed to users who had previously used another modern method • The denominator for the percentage indicator is the number of DMPA-SC doses administered to clients |
| Number and percentage of DMPA-SC doses administered to clients under age 20, to those ages 20 to 24, and those ages 25 and older (Niger, Senegal, and Uganda only) | <ul style="list-style-type: none"> • Documents the extent to which providers administer DMPA-SC doses to adolescent girls and young women • May indicate whether DMPA-SC is an attractive method choice for adolescents and younger women • May highlight areas where additional training on provision of family planning methods (and/or injectables) to youth could be needed • The denominator for the percentage indicator is the sum of doses administered to clients in each age category |
| Number and percentage of DMPA-SC doses administered to clients who switched from DMPA-IM (Burkina Faso, Senegal, and Uganda only) | <ul style="list-style-type: none"> • Documents the number and proportion of DMPA-SC doses administered to clients switching from DMPA-IM, in order to track an early concern of stakeholders that DMPA-SC—a more expensive product at the time—would potentially replace DMPA-IM • May indicate whether women and/or providers prefer DMPA-SC to DMPA-IM • May indicate the need to follow up with providers during supervision to ensure DMPA-SC is not promoted as a replacement for DMPA-IM • The denominator for the percentage indicator is the number of DMPA-SC doses administered to clients |
| Number and percentage of DMPA-SC doses administered to clients who switched from modern methods other than DMPA-IM (Burkina Faso and Senegal only) | <ul style="list-style-type: none"> • Documents the number of DMPA-SC doses administered to clients switching from modern methods other than DMPA-IM • The denominator for the percentage indicator is the number of DMPA-SC doses administered to clients |
| Number of DMPA-IM doses administered to clients | <ul style="list-style-type: none"> • Documents the volume of DMPA-IM doses administered to clients, independent from other injectable products • Provides input for the numerator and denominator for the indicator on relative proportions of DMPA-SC and DMPA-IM administered, by level |
| Relative proportions of DMPA-SC and DMPA-IM administered, by level (where both methods are available) | <ul style="list-style-type: none"> • Documents the relative share of the market comprised of DMPA-SC and of DMPA-IM, by level, where providers offer both methods; may indicate the preference of women and/or providers for each method, though factors such as provider skill level and potential bias should also be considered • Numerators include the number of doses of DMPA-SC and DMPA-IM administered to clients; the denominator is the sum of the number of doses of DMPA-SC and DMPA-IM administered to clients |
| Number and percentage of facilities with a stock-out of DMPA-SC | <ul style="list-style-type: none"> • Documents the extent of DMPA-SC stock-outs and contextualizes trends in DMPA-SC consumption and in the overall method mix • Helps identify locations where the distribution system and/or facility stock management practices may require reinforcement • The denominator for the percentage indicator is the number of facilities active in the provision of DMPA-SC that reported during the same period |

Continued

TABLE 2. Continued

| Global Monitoring Indicator | Purpose |
|---|---|
| Number of facilities active in the provision of DMPA-SC that reported this period | <ul style="list-style-type: none"> • Documents the number of facilities that reported on DMPA-SC in a given period • Provides input on data completeness • Provides the denominator for the percentage of facilities with a stock-out of DMPA-SC |

Abbreviation: DMPA-SC, subcutaneous depot medroxyprogesterone acetate.

° A first-time user of modern contraception—also referred to as "new user"—is defined as a client who has elected to use a modern method of contraception for the first time in her life.

information about the global indicator definitions, data requirements, and measurement levels is available elsewhere.¹⁸

Data Collection and Analysis

Providers generally collected service delivery data using their national programs' standard family planning registers. New registers were developed where injectables were previously not available or where service delivery data were not tracked, such as community-based distribution by CHWs in Uganda. To ensure that data were comparable within and across country settings, providers were trained on the correct and consistent application of indicator definitions. This approach ensured existing country data collection systems were leveraged for pilot project data collection, with one exception. In Senegal, it was not possible to track all of the global indicators through routine data collection and reporting practices, so we established a "sentinel site" system. Under this system, data for new users, age, and method switching were collected from anon-representative sample of 35 health facilities selected from the country's pilot regions.

National health information systems (HIS) data generally reach the central level every 6 months or less often and do not disaggregate injectables by type (e.g., DMPA-IM vs. DMPA-SC). Because stakeholders desired quarterly disaggregated data to track progress and inform programmatic course corrections, relying on HIS data was not feasible for this project. Instead, monitoring focal persons for the pilot project collected data each quarter directly from the district or facility level—including sentinel sites—using tools specifically developed for the project. Some NGO implementing partners were already reporting their service delivery data to the



A CHW in Uganda enters service delivery data into a family planning register. © 2014 Will Boase/PATH.

MOH at the district level, which supported a smooth flow of data under the pilot introduction. Others reported data directly to designated monitoring focal points. Service delivery data related to this project were also reported to each country's existing HIS under national standard operating procedures.

We cleaned and analyzed the service delivery data from all 4 countries using Microsoft Power Query for Excel and Tableau. Indicator data were analyzed for cumulative information and to examine trends over time. The impact of some indicators on others was assessed, such as the impact of stock-outs on product consumption and doses administered to first-time users of modern contraception. As a secondary analysis, monitoring data on DMPA-SC use by client age group were compared with data on injectable use by age group from the DHS in selected countries in order to evaluate adolescent access to DMPA-SC via pilot delivery channels. Monitoring data do not include personal identifiers and thus cannot

track individual users over time. Indicators on age, new users, and method switching refer to a proportion of doses administered to users in each category. "Total DMPA-SC doses administered" is the denominator for several calculated monitoring indicators (e.g., new users, age, method switching). Data visualizations were validated by project country teams, who provided further contextual information to help interpret the data prior to disseminating results to donors and more broadly to global and national stakeholders.

■ RESULTS

Product Consumption and Stock-Outs

From July 2014 through June 2016, nearly half a million doses of DMPA-SC were administered across the 4 pilot introduction countries, with 2 countries experiencing periods of heavy DMPA-SC stock-outs. Overall, providers in Burkina Faso administered the highest number of DMPA-SC doses—194,965—during the introduction period, from July 2014 through June 2016 (Table 3). In Burkina Faso, consumption increased rapidly during the first 2 quarters of introduction but was substantially hampered by stock-outs from the second quarter through the fourth quarter of 2015. Stock-outs peaked in September 2015, when 67% of facilities reported a stock-out of DMPA-SC. Two primary factors—large quantities of product expiring and poor weekly stock surveillance—contributed to stock-outs. Consumption increased only modestly in 2016 as stock-outs slowly began to resolve (Figure 1). Family planning clients procured 94% of DMPA-SC doses from public-sector facilities and 6% through private NGO delivery.

In Senegal, providers administered 120,861 doses of DMPA-SC from January 2015 through June 2016. As in Burkina Faso, consumption increased rapidly during the first 2 quarters of introduction. Providers in Senegal administered the highest number of doses (31,799) of all countries during the final reporting period (i.e., second quarter of 2016) (Figure 1). Stock-outs in Senegal were insignificant, with less than 2% of facilities reporting a stock-out at any point under the privately funded distribution system—the Informed Push Model. The public sector was the primary source of DMPA-SC, where 97% of all reported administered doses were procured.

In Uganda, where DMPA-SC was available only through community-based distribution, CHWs administered 130,673 doses of DMPA-SC from September 2014 through June 2016, with steady growth in consumption over the duration of pilot introduction. Stock-outs in Uganda were negligible, with 3% or less of facilities reporting a stock-out under the privately funded distribution system managed by Uganda Health Marketing Group (UHMG)—except in the final month of pilot introduction, when 9% of facilities experienced a stock-out due to delays in the arrival of a new product order.

CHWs in Niger administered 43,801 total doses—39,957 at public-sector health huts in 2 districts and 3,844 through NGO-led community-based distribution in 2 additional districts—from September 2014 through June 2016. The public sector was the primary driver of consumption, with 91% of doses administered via health huts. Consumption increased steadily during the first 2 quarters of introduction before plateauing and ultimately declining due to stock-outs, which peaked in November 2015 when 70% of facilities reported a stock-out of DMPA-SC (Figure 1). Modest gains in consumption were experienced during the first and second quarters of 2016 as stocks in health hut were replenished.

Reaching New Users of Modern Contraception Overall

Across the 4 countries, DMPA-SC was administered to an estimated 135,000 women using modern contraception for the very first time (29% of all doses administered were to new users). The share of DMPA-SC administered to new users was greatest in Niger, where it constituted 42% of all doses administered. In Uganda, where DMPA-SC was available only through community-based distribution, 29% of all doses administered were to new users. Approximately one-quarter of doses administered in both Burkina Faso and Senegal went to new users (Table 3). DMPA-SC was available at all levels of the health system in these 2 countries compared with Niger and Uganda, where it was available exclusively from CHWs at remote health huts and through community-based distribution. Data on new users in Senegal were derived from the sentinel sites, which represented 7.5% of overall product consumption in Senegal. While the sentinel site data cannot be generalized to the entire introduction initiative,

29% of all subcutaneous DMPA doses administered across the 4 countries were to new contraceptive users.

Over 2 years, nearly half a million doses of subcutaneous DMPA were administered across the 4 countries.

TABLE 3. Cumulative Results From Pilot Introduction of DMPA-SC Across 4 Countries, 2014–2016

| | Burkina Faso | Niger | Senegal | Uganda |
|--|------------------------------|--------|-----------------|---------|
| No. of DMPA-SC doses administered | 194,965 | 43,801 | 120,861 | 130,673 |
| % of DMPA-SC doses administered to new users | 25 | 42 | 24 ^a | 29 |
| % of DMPA-SC doses administered to adolescent girls and young women | | | | |
| <20 years old | - | 16 | 8 ^a | 12 |
| 20–24 years old | - | 34 | 26 ^a | 32 |
| <25 years old | - | 50 | 34 ^a | 44 |
| % of DMPA-SC doses administered to clients switching from: | | | | |
| DMPA-IM | 7 (8 public; 2 NGO) | - | 13 ^a | 16 |
| Other modern methods besides DMPA-IM | 17 (18 public; 9 NGO) | - | 12 ^a | - |
| Any modern method | 24 (26 public; 11 NGO) | - | 25 ^a | - |
| Proportion of DMPA-SC relative to DMPA-IM where offered in parallel | | | | |
| At the community level ^b | - | - | 72 | 75 |
| At all levels | 16 | - | 30 | - |
| % of health facilities reporting a stock-out of DMPA-SC (highest reported) | 67 | 70 | <2 | 9 |

Abbreviations: DMPA-IM, intramuscular depot medroxyprogesterone acetate; DMPA-SC, subcutaneous depot medroxyprogesterone acetate.

- Data not available.

^a Senegal data derived from the sentinel sites.

^b DMPA-SC available only at the community level in Niger and Uganda.

they provide valuable insights into pilot introduction in Senegal.

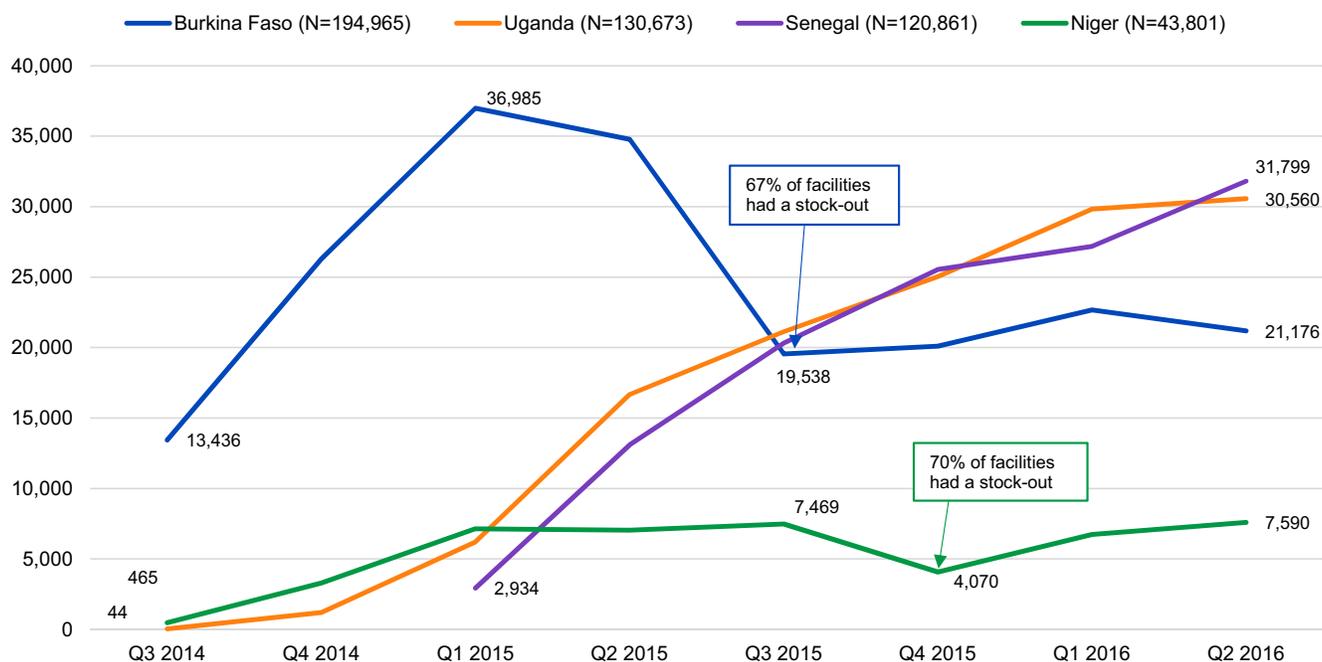
Trends

The proportion of doses administered to new users ranged between 30% (Senegal, sentinel sites) and 70% (Niger) across the 4 countries during the first full quarter of pilot introduction and declined gradually over time as women returned for reinjections (and the denominator—total doses administered—increased) (Figure 2). The main exception to this trend was Burkina Faso, where stock-outs resulted in a smaller proportion of doses administered to new users during the third quarter of 2015. During times of low or no stock, providers in Burkina Faso reserved DMPA-SC units for continuing injectable users, as they were reluctant to start new users on a method that might not be available at the client's next appointment. The proportion of new users began to

return toward previous levels beginning in the fourth quarter of 2015 as stock-outs began to resolve.

As noted, doses administered to women returning for reinjections of DMPA-SC contributed to the "total doses administered" denominator, and thus to the declining proportions of doses administered to new users (and those switching from other methods) over time. Reinjections of DMPA-SC were not selected as a global indicator as this data is generally challenging to collect; however, data on doses administered to repeat users of DMPA-SC were collected at sentinel sites in Senegal and were calculated from Burkina Faso data. In these 2 countries, we observed similar trends of doses administered to returning clients. By the third quarter of pilot introduction, half of all DMPA-SC doses administered were to clients receiving repeat injections, and this proportion increased to two-thirds in the final 2 quarters of the pilot.

FIGURE 1. Number of DMPA-SC Doses Administered by Quarter and Country, 2014–2016



Abbreviations: DMPA-SC, subcutaneous depot medroxyprogesterone acetate; Q, quarter.

44% of DMPA-SC doses administered across Niger, Senegal, and Uganda were to adolescent girls and young women under age 25.

Overall, in both Burkina Faso and Senegal, half of all doses administered were to clients receiving repeat injections of DMPA-SC.

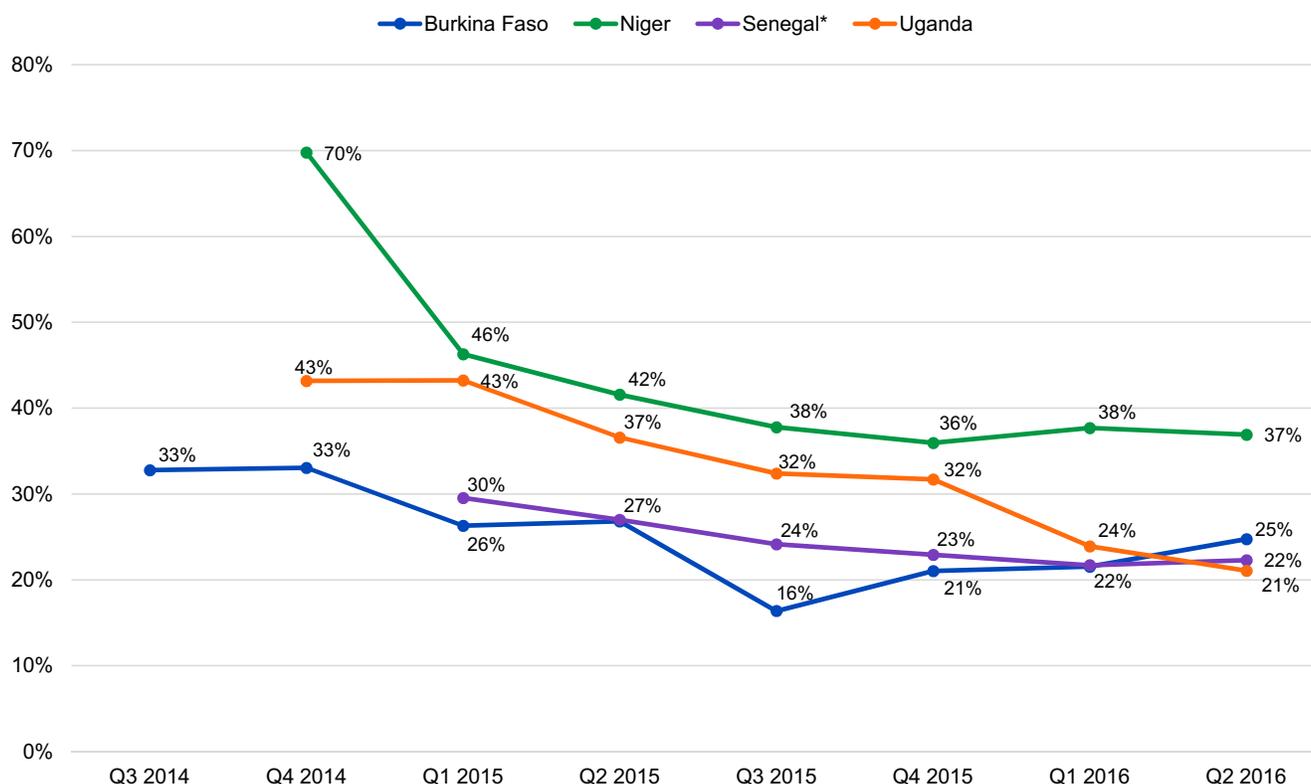
Access to Injectable Contraception for Adolescent Girls and Young Women

In aggregate across Niger, Senegal (sentinel sites), and Uganda, 44% of DMPA-SC doses administered were to adolescent girls and young women under age 25. Approximately 12% of doses administered were to adolescent girls and young women under age 20, and 32% were to those ages 20 to 24. Comparing across countries, the proportion of doses administered to women under age 25 was higher in Niger (50%) and Uganda (44%) compared with Senegal (34%) (Table 3). The distribution of doses administered by client age group remained relatively constant in each country over the course of introduction. Data on doses administered by client age group were not collected in Burkina Faso.

We also compared pilot data on DMPA-SC use by client age group with data on any injectable use by age group from the DHS in Niger and Uganda.

We observed that a higher proportion of women under age 25 accessed DMPA-SC in the pilot compared with any injectable in the DHS. In Uganda, of the women who reported using any injectable in the DHS (primarily DMPA-IM), 29% were under age 25 (6% were under age 20 while 23% were ages 20 to 24).¹⁹ By comparison, of the doses administered to women using DMPA-SC in the pilot, 44% were to women under age 25 (12% were under age 20 and 32% were ages 20 to 24). A similar trend was observed in Niger, where of the women who reported using any injectable in the 2012 DHS, 16% were under age 25 (1% were under 20 while 15% were ages 20 to 24).²⁰ By comparison, of the DMPA-SC doses administered to women in the pilot, 50% were to women under age 25 (16% were under 20 and 34% were ages 20 to 24) (Figure 3). DHS data are from a representative, population-based sample whereas pilot data are solely from the regions and delivery channels relevant to each country's introduction strategy—in this case, community-based distribution of injectables by CHWs in Uganda and CHW delivery of DMPA-SC through rural health huts in Niger.

FIGURE 2. Proportion of DMPA-SC Doses Administered to New Users by Quarter and Country, 2014–2016



Abbreviations: DMPA-SC, subcutaneous depot medroxyprogesterone acetate; Q, quarter.

* Senegal data derived from the sentinel sites.

Method Switching

Cumulative

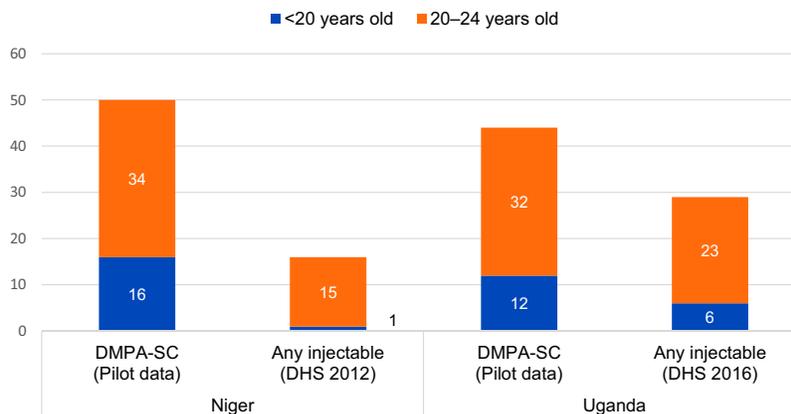
Over the course of pilot introduction in the 4 countries, the number of DMPA-SC doses administered to clients switching from DMPA-IM and from other modern methods was tracked. Cumulatively, switching from DMPA-IM to DMPA-SC was highest in Uganda, where 16% of all DMPA-SC doses administered were to women switching from DMPA-IM (Table 3). Switching from DMPA-IM made up 13% of doses administered in Senegal (sentinel sites) and 7% in Burkina Faso, where switching was higher in the public sector (8%) compared with the NGO sector (2%). Data on method switching were not collected in Niger, where switching from DMPA-IM would theoretically be low, as DMPA-IM was not offered in parallel with DMPA-SC during pilot introduction.

Of the countries with relevant data, the proportion of DMPA-SC administered to women switching from modern methods other than DMPA-IM was 12% in Senegal (all levels, sentinel sites) and 17% in Burkina Faso, where switching was again higher in the public sector (18%) than the NGO sector (9%).

Trends

In general, the proportion of doses administered to women switching to DMPA-SC from DMPA-IM and other modern methods declined over time across country settings. In Burkina Faso, the proportion of DMPA-SC administered to women switching from DMPA-IM fell from 16% during the third quarter of 2014 to 4% during the second quarter of 2016, but rose briefly during the third quarter of 2015 due to switching related to stock-outs (Figure 4). When DMPA-SC was unavailable,

FIGURE 3. Percentage of Clients in Niger and Uganda Accessing DMPA-SC During the Pilot Compared With Women Reporting Use of Any Injectable in the DHS, by Age Group



Abbreviations: DHS, Demographic and Health Survey; DMPA-SC, subcutaneous depot medroxyprogesterone acetate.

DMPA-SC clients were switched temporarily to DMPA-IM and then switched back to DMPA-SC as stock-outs resolved, resulting in a spike in switching. In Senegal, switching to DMPA-SC from DMPA-IM fell from 40% during the second quarter of 2015 to less than 2% during the second quarter of 2016 (sentinel sites). In Uganda, switching to DMPA-SC from DMPA-IM declined gradually over time, from 32% during the fourth quarter of 2014 to 13% during the second quarter of 2016. In certain regions of Burkina Faso and Senegal, switching was higher early on in introduction due to a misconception among providers that DMPA-SC was intended to replace DMPA-IM.

In Burkina Faso, switching from modern methods other than DMPA-IM fell from 44% during the third quarter in 2014 to 5% during the second quarter of 2016. In Senegal, switching from other modern methods decreased from 19% during the second quarter in 2015 to 7% during the second quarter of 2016 (sentinel sites).

DMPA-SC's Share of the DMPA Market Cumulative

Data on the relative proportions of DMPA-SC and DMPA-IM are not available from Niger or from the community level in Burkina Faso, where DMPA-IM was not offered alongside DMPA-SC. Where the 2 methods were offered in parallel, DMPA-SC comprised approximately three-quarters of all injectables administered at the community level (i.e., in Senegal and Uganda). By comparison,

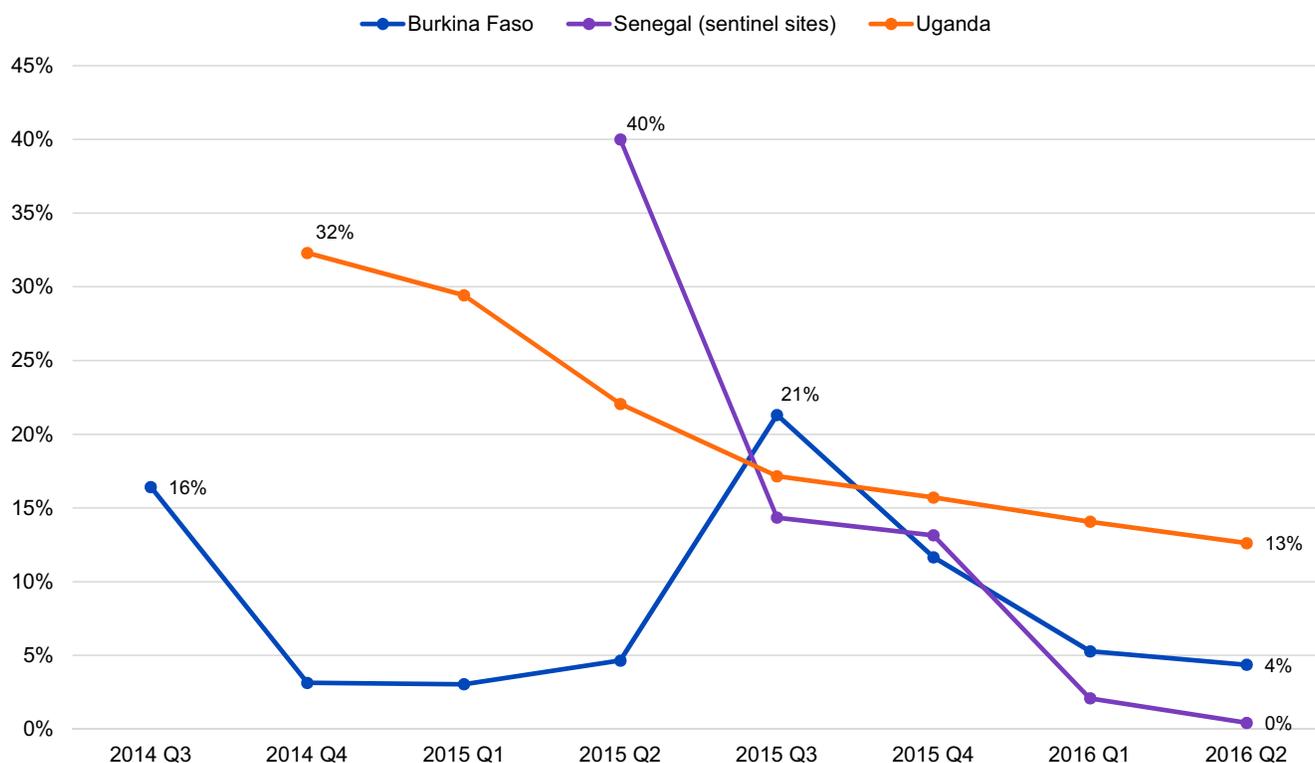
DMPA-SC made up only 16% and 30% of injectables when administered across all levels of the health systems in Senegal and Burkina Faso, respectively (Figure 5, Table 3). In Burkina Faso, the relative share of DMPA-SC was higher in the NGO sector—which had a greater focus on outreach—at 46%, compared with the public sector, at 29% (data not pictured).

Trends

The proportion of DMPA-SC relative to DMPA-IM typically increased gradually over time as introduction advanced in each country. In Senegal, the share of DMPA-SC increased from 2% during the first quarter of 2015 to 21% during the second quarter of 2016 at the facility level, and from 21% during the first quarter of 2015 to 74% during the second quarter of 2016 at community-level health huts. In Uganda, the share of DMPA-SC increased steadily from 53% during the fourth quarter of 2014 to 79% during the fourth quarter of 2015, where it held constant through the remainder of the pilot (through the second quarter of 2016).

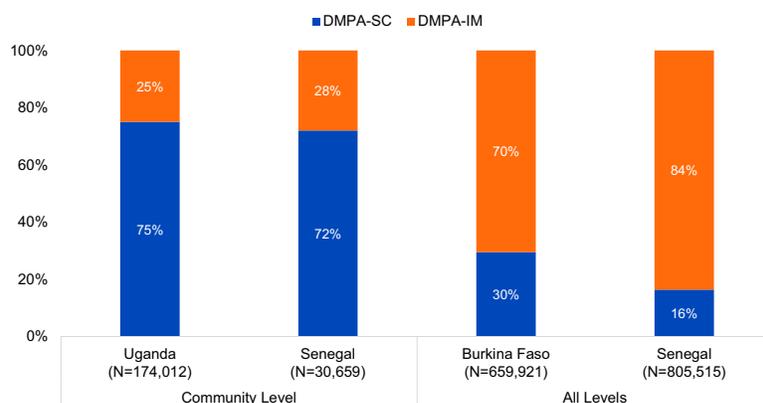
In Burkina Faso, the share of DMPA-SC relative to DMPA-IM fluctuated considerably across all levels of the health system over the course of the 2-year pilot due to intermittent stock-outs of DMPA-SC. The share of DMPA-SC increased from 29% of injectables during the third quarter of 2014 to 38% during the first quarter of 2015, yet decreased to only 20% during the fourth quarter of 2015 when stock-outs neared their

FIGURE 4. Proportion of DMPA-SC Doses Administered to Clients Switching From DMPA-IM, by Quarter and Country, 2014–2016



Abbreviations: DMPA-IM, intramuscular depot medroxyprogesterone acetate; DMPA-SC, subcutaneous depot medroxyprogesterone acetate; Q, quarter.

FIGURE 5. Relative Proportions of DMPA-SC and DMPA-IM Administered by Level of the Health System and Country,^a 2014–2016



Abbreviations: DMPA-IM, intramuscular depot medroxyprogesterone acetate; DMPA-SC, subcutaneous depot medroxyprogesterone acetate.

^aNo data available from the community level in Burkina Faso. No data available for Niger.

peak. In Burkina Faso's NGO sector, the relative share of DMPA-SC increased steadily from 34% during the third quarter of 2014 to 60% during the second quarter of 2015, before decreasing due to stock-outs.

■ DISCUSSION

Data from 2 years of pilot introduction indicate that DMPA-SC has the potential to add value to national family planning programs by expanding the range of methods available through community-based distribution in order to reach new acceptors of family planning, as well as to reach adolescent girls and young women. Switching to DMPA-SC from DMPA-IM and other modern methods was not widespread, further underscoring the potential appeal of DMPA-SC to new users. The negative impact of stock-outs on product consumption and addition of new users highlights the need to strengthen existing commodity distribution systems when introducing a new method. Considered within the context of each country's setting, training approach, and pilot introduction strategy, these monitoring results can offer guidance for other settings on whether and how to introduce DMPA-SC or other new contraceptive methods into national family planning programs.

Results from the 4 pilot introductions are best understood in the context of each country's unique introduction strategy, training approach, and product launch timing. Monitoring data on total DMPA-SC doses administered demonstrate that high consumption volumes can be achieved through public- or multisector product introduction at all levels of the health system, as done in Burkina Faso and Senegal. The MOHs of these countries chose to introduce DMPA-SC at all levels of the health system alongside DMPA-IM to expand the range of available contraceptive methods and maximize client choice. Using a rapid, cascade approach to provider training ensured that the maximum number of providers were trained in the shortest time possible, contributing to swift product uptake. The high consumption volume in Burkina Faso was also a result of their launching the product before other countries (thus having a longer time for administering doses) and introducing the product in the country's 4 most populous regions.

Data from Niger—where the pilot represented the first offering of injectables at the community level and where nearly half of doses administered were to new users—make a particularly

compelling case for extending access to injectable contraceptives to areas where they were not previously available. Relatively high consumption volumes can be achieved through community-level delivery, especially when making injectables available at this level for the first time or addressing high unmet need. The consumption volume achieved in Niger's public sector is significant considering the primary introduction channel consisted of low-volume health huts in only 2 rural districts.

Community-based distribution programs are a potential strategy to reduce unmet need in countries with large rural populations.⁴ Beyond the methods they provide directly, CHWs can also help increase use of clinic-administered contraceptive methods through counseling and referrals.⁴ Task sharing can increase contraceptive access even further by expanding the range of methods CHWs can offer. When CHWs provide contraceptives directly, uptake is significantly greater than when they offer referrals alone.^{21,22} Monitoring data on the relative proportions of DMPA-SC and DMPA-IM administered at the community level versus at all levels of the health system reveal that DMPA-SC is well positioned for task-sharing strategies. In Senegal and Uganda, a higher relative proportion of DMPA-SC doses were administered at the community level (75%) compared with all levels of the health system in Senegal and Burkina Faso (16% and 30%, respectively). Two factors may account for the greater use of DMPA-SC at the community level. First, CHWs are often more comfortable administering DMPA-SC than DMPA-IM. They find it easier to prepare and inject due to its all-in-one presentation in Uniject, compared with the separate vial and syringe used for DMPA-IM.⁷ In addition, previous studies on the acceptability of DMPA-SC among DMPA-IM users and providers revealed that the majority of clients preferred DMPA-SC due to the shorter needle, less pain during injection, and fewer reported side effects,^{9,10} perceptions that spread by word of mouth during pilot introduction, further adding to the method's appeal.

Stock-Outs Negatively Affect Product Consumption

Stock-outs had a negative effect on both consumption volumes and new users in Burkina Faso and Niger—underscoring the importance of commodity security and strengthening existing distribution systems when introducing a new

Subcutaneous DMPA has the potential to add value to national family planning programs by expanding the range of methods available through community-based distribution in order to reach new family planning acceptors, adolescents, and young women.

contraceptive product. Large quantities of product expiring, in addition to poor weekly stock surveillance, contributed to stock-outs in these 2 settings. Stock-outs were insignificant in Senegal and Uganda, where distribution was managed by private distribution partners. The impact of stock-outs was far-reaching and reverberated beyond periods of inadequate supply. Consumption trends in Burkina Faso and Niger revealed that product use was slow to return to previous levels following a period of heavy stock-outs, perhaps due to lack of provider and/or client confidence in continued product availability. Research on malaria treatment has demonstrated that stock-outs have the potential to alter prescribing behavior of providers.²³ Inadequate supply of drugs and the fear of stock-outs have led providers to avoid prescribing certain drugs or to ration drugs for patients they perceive as most in need or most deserving.²⁴ To design effective supply chains for community-based distribution programs, it is important to involve CHWs in the process,²⁵ consider CHW literacy levels, determine ways to track logistics management information systems, and track and aggregate data.²⁶

DMPA-SC Use by Adolescents and Young Women

Pilot introduction data on the proportion of DMPA-SC doses administered by client age group indicate that DMPA-SC may be an attractive option for adolescent girls and young women, particularly where available at the community level. Of the women using DMPA-SC in the pilot, a higher proportion were under age 25 compared with women using any injectables in the Niger and Uganda DHS. DHS data are from a population-based sample, whereas pilot data are solely from community-based distribution of injectables in 28 districts in Uganda, and health hut delivery of DMPA-SC by CHWs in 2 districts in Niger. However, the comparison indicates that youth may feel more comfortable or be better able to access contraceptives privately from a CHW in their own village. Since injectables were not previously available at health huts in Niger, young rural women interested in injectable contraception would have been required to travel some distance to a referral facility. These findings support existing evidence that community-based outreach is an effective intervention for increasing contraceptive use among youth.²⁷ The new option offers greater convenience and does not require travel or time away from home—an added benefit

for women whose mobility is restricted by socio-cultural norms.

Switching From DMPA-IM to DMPA-SC Not Widespread

Offering multiple methods provides individuals who find their initial choice unacceptable with the opportunity to switch methods—which may reduce method-specific continuation but improves client satisfaction and overall contraceptive continuation.²⁸ Positioning DMPA-SC and DMPA-IM side by side may improve injectables continuation by making another injectable option available to clients, particularly when one method is stocked out. Although introduction of DMPA-SC prompted some existing contraceptive users to discontinue their current method in favor of DMPA-SC, switching to DMPA-SC from other modern methods was not widespread and generally decreased gradually over time. In certain settings, switching was higher initially due to a misconception among providers that DMPA-SC was intended to replace DMPA-IM. This assumption was corrected through ongoing field supervision. Monitoring data from Uganda show that no more than 16% of total DMPA-SC doses administered went to women switching from DMPA-IM, and no more than 17% in Burkina Faso—indicating that DMPA-SC adds value to family planning programs rather than simply replacing existing methods. As communities become fully aware of a new method over time, the downward trend in switching is likely to continue. Switching to DMPA-SC from DMPA-IM and other modern methods was higher in Burkina Faso's public sector compared with the NGO sector, likely due to NGOs' focus on long-acting methods such as the implant and the intrauterine device (IUD), as women already using long-acting methods may be less likely to switch to an injectable.

In Uganda, where the relative proportion of DMPA-SC through community-based distribution was high (75%) compared with DMPA-IM (25%), the number of DMPA-IM doses administered stayed relatively constant over time—while DMPA-SC consumption increased steadily—indicating the presence of a consistent DMPA-IM client base that did not switch methods. In Senegal and Burkina Faso, where DMPA-SC was made available at all levels of the health system, the relative proportion of DMPA-IM was much higher (70% and 84%, respectively) than DMPA-SC (16% and 30%, respectively). DMPA-IM had been widely available and widely

Switching from intramuscular DMPA or other modern methods to subcutaneous DMPA was not widespread.

used among family planning clients in both of these settings, and those clients generally stayed with DMPA-IM. Nevertheless, the proportion of DMPA-SC relative to DMPA-IM increased gradually across the 3 countries where consumption was not affected by stock-outs. Based on global agreements and MOH guidance at the outset of these pilot introductions, project coordinators conveyed the message to providers (throughout training and follow-up supervision in all 4 countries) that DMPA-SC was not intended to replace DMPA-IM. If replacement becomes a clear priority of global and national family planning stakeholders, the proportion of DMPA-SC would likely increase.

Limitations

Due to the absence of client identifiers in monitoring data, individual clients were not tracked over time, resulting in certain limitations on analysis; for example, we were not able to distinguish how many doses were given to the same woman, since reinjection every 3 months is necessary for anyone continuing to use this method. Indicators on doses administered by client age group and method switching refer only to a proportion of doses administered to users in each category from quarter to quarter and do not reveal the true proportion of *individual clients* in each of those categories over time. For example, a client who is 20 years of age and receives 4 doses of Sayana Press over the course of a year has her age counted at each visit. "Total DMPA-SC doses administered" is the denominator for several calculated monitoring indicators (e.g., new users, age, method switching), which contributes to these indicators declining over time as clients return for repeat injections.

Reported figures underestimate actual product consumption because no country reporting was 100% complete. For example, overall, an average of 80% of health structures reported in Burkina Faso; 93% in Niger; 90% in Uganda (where health facilities reported aggregated CHW data); and 98% and 97% for routine reporting and sentinel sites, respectively, in Senegal. Due to the absence of formalized, contractual relationships, limited data were shared from NGO partners in Niger, Senegal, and Uganda—making it difficult to calculate the impact of introduction in the private NGO sector in these settings. In Burkina Faso, NGO-sector reporting was integrated with the public-sector HIS prior to the start of pilot introduction, which aided in accounting for NGO-

sector distribution and allowed disaggregation by sector for certain indicators. For other indicators, however, the aggregation of public and private NGO-sector data at the district level, as well as inaccurate application of indicator definitions, prevented disaggregation by sector or delivery channel (e.g., community-based distribution).

SCALING UP INTRODUCTION OF DMPA-SC

Using monitoring data to guide decision making, all 4 pilot countries decided to scale up provision of DMPA-SC nationwide, with expansion underway. In most cases, 1 year of monitoring data provided an adequate evidence base to inform the country MOH's decisions about scale. For example, the high proportion of doses administered to first-time users of modern contraception through rural health huts in Niger helped the MOH decide to scale up availability of injectables at health huts nationwide in order to expand the range of methods available to women through informed choice counseling—particularly in remote locations—in order to reach additional users of modern contraception and increase modern contraceptive prevalence rates. The Pfizer price agreement to offer DMPA-SC at US\$1 per dose to qualified purchasers was another significant factor in these decisions.²⁹ As of May 2017, the price dropped even further to \$0.85,³⁰ nearly equivalent to the cost of DMPA-IM at \$0.83 (\$0.74 for the vial³¹ and \$0.09 for the syringe³²). Monitoring results from pilot introduction of DMPA-SC may prove particularly beneficial for countries planning to introduce DMPA-SC or other new contraceptive methods and can inform country decision making about contraceptive introduction strategies.

Acknowledgments: Pilot introductions of DMPA-SC were led by the ministries of health of Burkina Faso, Niger, Senegal, and Uganda, carried out collaboratively with NGO implementing partners, and coordinated by PATH and UNFPA. The authors wish to acknowledge the stakeholders that made DMPA-SC pilot introductions possible and that contributed data to inform results, including: Association Burkinabè pour le Bien-Être Familial and Marie Stopes International (MSI) in Burkina Faso; Animas-SUTURA in Niger; Association Sénégalaise pour le Bien-Être Familial, ChildFund International, IntraHealth International, and MSI in Senegal; and FHI 360, Pathfinder International, Reproductive Health Uganda, Uganda Health Marketing Group, and WellShare International in Uganda.

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Competing Interests: None declared.

All 4 countries decided to scale up provision of subcutaneous DMPA nationwide based on results of the pilot introductions.

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ORIGINAL ARTICLE

Rapid Uptake of the Subcutaneous Injectable in Burkina Faso: Evidence From PMA2020 Cross-Sectional Surveys

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Availability and use of the subcutaneous injectable increased rapidly during national scale-up in 2016. Substantial increases were found in rural areas, where unmet need for family planning is higher. Since the method is amenable to community-based distribution, a new pilot is testing provision by community health workers to further improve access.

ABSTRACT

The subcutaneous (SC) injectable, widely known by its commercial name Sayana Press, has potential to improve access to contraceptive methods. In Burkina Faso, SC-injectables were first piloted in select regions in 2014 and introduced nationally in 2016. PMA2020 is the first national survey to track programmatic progress of SC-injectable introduction at both population and health facility levels in the country across 2 rounds of data collection: March–May 2016 and November 2016–January 2017. Over this 6-month period, SC-injectable availability at public service delivery points increased from 50% to 85%, largely driven by increases in availability among the non-pilot regions. In terms of use, while the modern contraceptive prevalence rate among all women remained constant at about 23%, SC-injectable prevalence nearly doubled from 1.1% to 2.0%, making up approximately 9% of all modern method users in Burkina Faso by late 2016, though the difference was not statistically significant. Increases were comparable between pilot and non-pilot regions. While the difference was not statistically significant, more rural women were using the method compared with their urban counterparts in the pilot regions, an interesting finding considering the opposite pattern is generally true for contraceptive prevalence nationally. In summary, following national scale-up, data show substantially improved availability of SC-injectables at service delivery points and potential for changes in the method mix in Burkina Faso. In order to further improve contraceptive access and choice, scale-up of community-based distribution of SC-injectables should be considered, especially among rural populations with higher unmet need for family planning.

INTRODUCTION

The subcutaneous (SC) injectable, often referred to by its commercial name Sayana Press, offers a new delivery design for injectable contraceptives that uses a simplified autodisable injection system (Uniject) to administer a lower dose of depot medroxyprogesterone acetate (DMPA). The simplified delivery mode allows providers at lower levels of the health system, such as community health workers (CHWs), and potentially users themselves to administer the method, with the ultimate goal of increasing women's access to a wider range of contraceptive methods.^{1–4} Studies conducted in Senegal and Uganda have demonstrated the method's acceptability and have identified approaches for its safe and effective introduction.^{1–3} Since then, SC-injectables

have been approved for use in a number of countries in Africa and Asia. A recent price reduction making the unit cost comparable to that of the intramuscular (IM) injectable will certainly also help improve affordability and access.⁵

As part of its larger strategy under the Ouagadougou Partnership and its Family Planning 2020 (FP2020) commitments to increase women's access to modern contraceptive methods, the government of Burkina Faso issued regulatory approval for SC-injectables in 2013. In 2014, the Direction de la Santé de la Famille (DSF), a division of the Burkinabé Ministry of Health, piloted SC-injectable introduction in 4 of 13 regions, focusing on regions with higher rates of unmet need for family planning⁶: Boucle du Mouhoun, Centre, Centre-Ouest, and Hauts-Bassins. The pilot program introduced SC-injectables in communities as well as facilities, intending to address both demand generation at the population level and supply factors at the facility level. From the outset, it was designed to demonstrate approaches to be readily scaled up at the national level.⁷

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Burkina Faso piloted introduction of the subcutaneous injectable in 2014 in 4 of 13 regions, and scaled up nationally in 2016 to the other 9 regions.

CHWs were not authorized or trained to provide the subcutaneous injectable because the policy environment did not allow community-based distribution of injectables.

Evaluation of program implementation confirmed the importance of key components that were initially designed in the pilot program, including supply chain management and training of health workers for better counseling, and the evaluation recommended no major changes in the approach for scale-up.

National scale-up beyond the 4 pilot regions occurred in 2016, again focusing on both demand generation and service provision. All components demonstrated during the pilot program were replicated in the remaining 9 regions. The DSF implemented introduction activities with technical and financial support from PATH, the United Nations Population Fund (UNFPA), and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) among various other national and international NGOs. The pilot program is described in further detail below.

No nationally representative studies have assessed availability and uptake of SC-injectables since their introduction in Burkina Faso. This study aims to assess such progress, using 2 rounds of data from Performance Monitoring and Accountability 2020 (PMA2020), a nationally representative survey platform for rapid performance monitoring. Specific objectives of this article are to explore trends in service and commodity availability for SC-injectables at facilities, as well as SC-injectable use at the population level, and assess differential uptake among women by background characteristics. The study provides for the first time national-level evidence on programmatic progress and population-level use of SC-injectables.

■ SC-INJECTABLES PILOT PROGRAM

The pilot program introduced SC-injectables in 4 selected contiguous regions of Burkina Faso with relatively high unmet need for family planning: Boucle du Mouhoun, Center, Center-Ouest, and Hauts-Bassins, as shown in [Figure 1](#).⁷ Launched in July 2014, the program aimed to improve the range of contraceptive methods available to women in order to accelerate increases in modern method use. By the end of 2015, the pilot aimed to train 700 providers on SC-injectable administration, ensure availability of the method in all public primary and district-level health facilities in these regions, strengthen communication campaigns and social marketing of the method, and augment the total number of additional modern method users. The program employed 2 coordinated strategies: (1) service provision

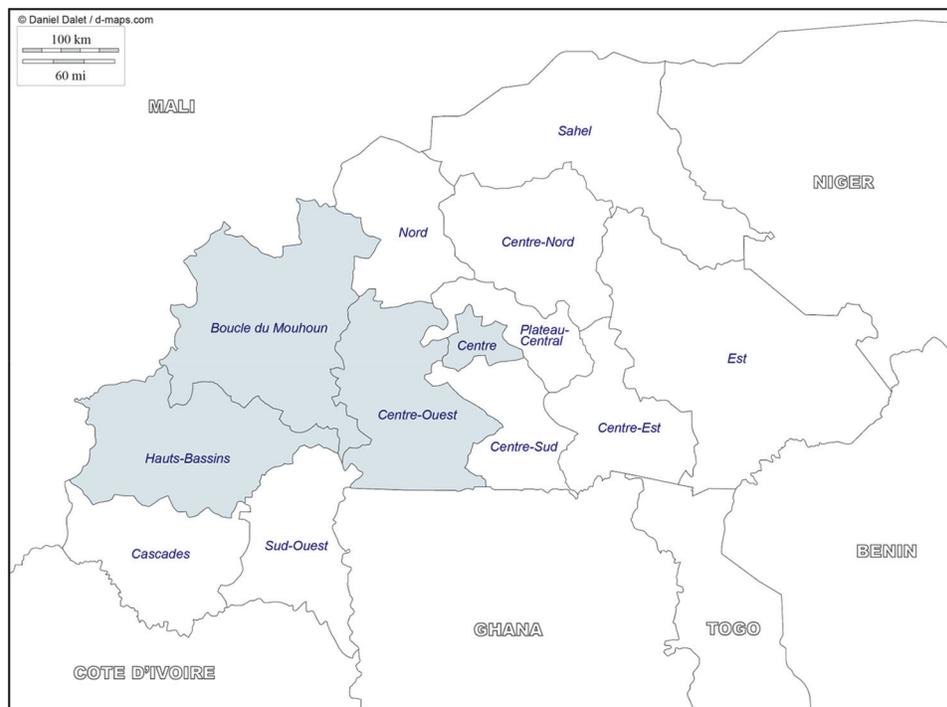
improvement at facilities, and (2) demand generation for the method among the target population.

Through provider training and direct method provision, SC-injectables were introduced in all public health facilities in the 4 regions, consisting of 23 district health centers and 684 primary health facilities, or Centres de Santé et de Promotion Sociale (CSPS). In addition, through a public-private partnership with Marie Stopes International (MSI) and the Burkina Faso Family Welfare Association (ABBF), the method was offered at 8 additional private, nonprofit facilities managed by the organizations as well as their 7 mobile teams. The mobile teams were designed especially to reach women in geographically inaccessible and remote areas. Of the 250,000 doses of SC-injectables made available by the donor consortium in early 2014, 72,500 doses were sent to these service delivery points (SDPs) as initial stocks for immediate service provision, once providers were trained.

A cascading approach was used to train providers at multiple levels. The program trained higher-level providers (i.e., doctors, specialized nurses/midwives, and other health professionals) to administer the method first. They, in turn, trained nurses at CSPS and at clinics managed by NGOs. No other lower-level health workers such as CHWs were authorized or trained to provide the method because the policy environment did not allow community-based distribution of injectable contraceptives. However, an alternative strategy was used to improve access to the method at the community level: family planning services, including SC-injectables, were integrated with vaccination outreach campaigns conducted by the Expanded Programme on Immunization (EPI) in villages. A total of 1,908 providers were trained, including 527 itinerant EPI health workers to ensure the integration of SC-injectables with immunization outreach.

In addition, demand for the method was generated using mass media campaigns and interpersonal and community-based communication activities. Mass media campaigns consisted of production and broadcasting of TV and radio messages among the most popular media channels in rural areas. The campaigns also produced print materials, including posters, brochures, and leaflets, which were distributed to the general population at facilities. Second, a more targeted information, education, and communications (IEC) approach was carried out. For example, *Boîtes à Images* ("Image Boxes," or a small collection of boxed flash cards with simple images

FIGURE 1. Four Regions for the Pilot Program Introducing Subcutaneous Injectables



depicting the SC-injectable and how it is administered) to promote SC-injectables were developed and used at health facilities across all levels, from CSPS up to Regional Health Directorates and managing authorities. A promotional film on SC-injectables was also produced and distributed to Regional Directorates of the Ministry of Health, NGO partners, and some youth associations, in order to help promote the new product. Community-based communication activities for demand generation included an innovative strategy called "Family Planning Djandjoba" or *laafi rããga* (health promotion market day in Mooré, the main local language in Burkina Faso), which mobilized women for a popular dance in the villages. During the event, family planning messages were disseminated, and women were given the opportunity to adopt family planning methods discreetly. These strategies may have generated greater interest in SC-injectable use among rural women.

Importantly, IEC facilitators, CHWs, and other community leaders were trained to lead demand generation outreach sessions at the community

level in rural areas. While CHWs were not authorized to administer the method as previously mentioned, CHWs were mobilized to generate demand for the method.

METHODS

Data

PMA2020 is a survey platform relying on resident enumerators to collect data on smartphones in order to track progress toward FP2020 goals, which were pledged by countries following the 2012 London Summit on Family Planning. Data are collected every 6 months during the first 2 years in a country, and annually thereafter. For each round, surveys are conducted among populations and at SDPs. The population-based survey collects data from a nationally representative sample of households, selected using a 2-stage cluster sampling design. The survey sample size is determined to estimate the modern contraceptive prevalence rate with a 3% margin of error at the national level. Household interviews are conducted with a competent household member,

often the household head, and information is collected on demographic characteristics of all household members as well as household characteristics. Interviews are also conducted with all women 15–49 years of age in sampled households to collect additional information on background characteristics, fertility preferences, demand for family planning, and contraceptive use.

The SDP survey is conducted among both public and private SDPs that are geographically and administratively accessible to the sampled population. Facility data are collected to measure availability of contraceptive methods among the primary, secondary, and tertiary public facilities designated to serve each sampled enumeration area (EA), and up to 3 private facilities located within the EA. Further information on survey design and implementation is available elsewhere.^{8,9}

Burkina Faso has conducted 4 rounds of PMA2020 surveys since 2014. To monitor the impact of SC-injectable introduction, the third and fourth rounds (conducted in March–May 2016 and November 2016–January 2017, respectively) included questions on SC-injectable use in the female questionnaire. Among women who reported current injectable use, a follow-up question was asked: "Was the injection administered via syringe or small needle?" Enumerators probed the respondent using images of the syringe and Uniject delivery modes on their smartphone screen. A total of 3,261 and 3,195 women were interviewed in Rounds 3 and 4, respectively.

In the SDP questionnaire, SC-injectables were included in the list of contraceptive methods to measure service availability (i.e., if a specific method was provided at facilities), availability of the method on the day of survey (verified by observation), and 3-month history of stock-outs. The SDP sample included 132 and 131 facilities in Rounds 3 and 4, respectively. Public facilities made up over 80% of the SDP sample, reflecting the extent and geographic distribution of private facility coverage in the country.

Availability of the subcutaneous injectable increased in public facilities, from 50% in early 2016 to 85% in late 2016.

Measurement

A woman was categorized as an SC-injectable user if she reported using injectables *and* a small needle was used to administer the method. To assess any differential uptake among women, background characteristics were assessed including current union status (i.e., married or cohabiting vs. not in union), region (4 initial pilot regions vs. 9 non-pilot regions), residential area (urban vs. rural),

and household wealth tertile, based on a wealth index.¹⁰ Finally, using the SDP surveys, binary variables were constructed to measure whether facilities provided SC-injectables and whether the method was currently available at the facility.

Analysis

Analyses were conducted using data from both the female and SDP surveys in Rounds 3 and 4. Rounds 1 and 2 did not include SC-injectable questions and were thus not included in this analysis. To measure trends of availability of SC-injectables at SDPs, we estimated the percentage of facilities providing the method *and* having it in stock on the day of survey, by survey round. In order to compare it against availability of IM-injectables, corresponding estimates were calculated.

To assess trends in SC-injectable use, we calculated the percentage of women using any method; any modern method (i.e., male or female sterilization, the intrauterine device [IUD], implants, SC- or IM-injectables, pills, male or female condoms, Lactational Amenorrhea Method, emergency contraception, diaphragm, spermicide, or the Standard Days Method); and SC-injectables in each round. Additionally, we compared distributions of methods among modern method users across the 2 survey rounds. The percentage of women using SC-injectables was assessed further by background characteristics, to explore any differential uptake. All estimates based on female interview data were adjusted for sample design, and 95% confidence intervals (CIs) were calculated. We used STATA 14.2 for all analyses.

RESULTS

Only 50% of public facilities offered SC-injectables in March–May 2016, compared with 98% for IM-injectables (Table 1). By late 2016, however, SC-injectables were offered in 85% of public facilities. The increase over 6 months came largely from the 9 regions where the method was introduced in 2016, with an increase from 20% to 81%, compared with 84% to 91% in the initial pilot regions. By late 2016, method availability was high among public facilities offering SC-injectables: 98% in the 4 pilot regions and 80% in the 9 non-pilot regions. The changes among all facilities mirror those among public facilities, as public facilities consist of nearly 90% of all facilities in the country.

TABLE 1. Percentage of Facilities Offering Intramuscular and Subcutaneous Injectables and With the Commodity in Stock Among Pilot and Non-Pilot Regions, PMA2020 Survey Rounds 3 and 4

| | Round 3 | | | Round 4 | | |
|---|----------------|------------------------|----------------------------|----------------------------|------------------------|----------------------------|
| | March–May 2016 | | | November 2016–January 2017 | | |
| | All Regions | In the 4 Pilot Regions | In the 9 Non-Pilot Regions | All Regions | In the 4 Pilot Regions | In the 9 Non-Pilot Regions |
| All facilities | | | | | | |
| Number of facilities | 132 | 62 | 70 | 131 | 61 | 70 |
| Offer IM-injectables, % | 84.1 | 83.9 | 84.3 | 91.6 | 90.2 | 92.9 |
| Offer IM-injectables <i>and</i> the method is in stock, % | 83.3 | 83.9 | 82.9 | 90.8 | 88.5 | 92.9 |
| Offer SC-injectables, % | 42.4 | 69.4 | 18.6 | 76.3 | 78.7 | 74.3 |
| Offer SC-injectables <i>and</i> the method is in stock, % | 39.4 | 64.5 | 17.1 | 67.9 | 77.0 | 60.0 |
| Public facilities | | | | | | |
| Number of facilities | 110 | 51 | 59 | 116 | 53 | 63 |
| Offer IM-injectables, % | 98.2 | 100.0 | 96.6 | 100.0 | 100.0 | 100.0 |
| Offer IM-injectables <i>and</i> the method is in stock, % | 97.3 | 100.0 | 94.9 | 100.0 | 100.0 | 100.0 |
| Offer SC-injectables, % | 50.0 | 84.3 | 20.3 | 85.3 | 90.6 | 81.0 |
| Offer SC-injectables <i>and</i> the method is in stock, % | 46.4 | 78.4 | 18.6 | 75.9 | 88.7 | 65.1 |

Abbreviations: IM, intramuscular; PMA2020, Performance Monitoring and Accountability 2020; SC, subcutaneous.

The level of modern contraceptive use remained comparable over 6 months, at about 23% among all women (Table 2). The percentage of all women using SC-injectables, however, increased from 1.1% (95% CI: 0.7, 1.7) to 2.0% (95% CI: 1.3, 3.0). Although not statistically significant, data also showed an increased share of SC-injectables among women using modern methods, from 4.8% in March–May 2016 (95% CI: 3.5, 6.4) to nearly 9% (95% CI: 6.9, 11.5) by late 2016 (Figure 2). Among unmarried sexually active women who use modern methods, the relative contribution of SC-injectables remained low.

Table 3 shows the increased use of SC-injectables across various background characteristics. Use increased in both the initial pilot regions, from 1.7% (95% CI: 1.1, 2.5) to 2.6% (95% CI: 1.5, 4.6), and in the non-pilot regions, from 0.7% (95% CI: 0.3, 1.9) to 1.5% (95% CI: 0.8, 2.8), although use was still higher in pilot regions. Although not statistically significant, SC-injectable use in late 2016 was slightly higher among rural women compared with their urban counterparts, 2.1% (95% CI: 1.2, 3.5) vs. 1.7% (95% CI: 1.0, 2.8),

respectively; an occurrence further pronounced among rural women in pilot regions, where SC-injectable use increased from 1.8% (95% CI: 1.0, 3.4) to 3.2% (95% CI: 1.3, 7.2) (Table 4). There was no clear pattern of SC-injectable use by wealth among women in the pilot regions. However, among women in non-pilot regions, a clearer wealth gradient was reported, with 4.0% (95% CI: 1.9, 8.1) of the wealthiest women using SC-injectables, compared with 0.7% (95% CI: 0.2, 2.3) among the poorest.

DISCUSSION

SC-injectables were first introduced in Burkina Faso in 4 pilot regions in 2014, with both demand generation and supply of the methods at facilities being addressed. The introduction program was designed ready for scale-up, and pilot evaluation recommended replication without major modifications. Thus, the same introduction program was scaled up nationally in 2016. As a result, SC-injectable availability increased substantially over a 6-month period during 2016. Although availability remained higher in pilot regions, by the end of 2016 SC-injectables were provided in 85%

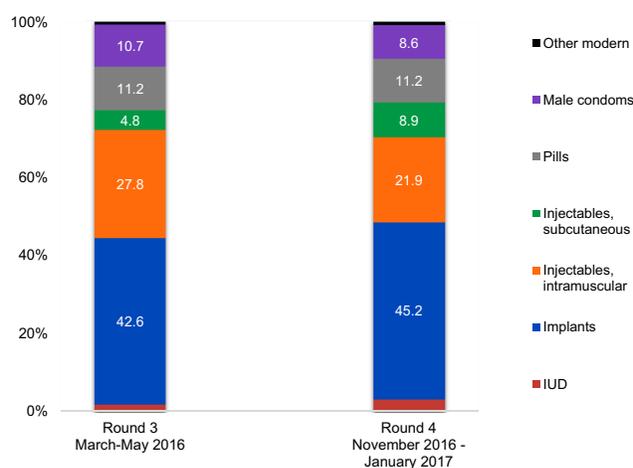
The percentage of all women using subcutaneous injectables increased from 1.1% to 2.0% over a 6-month period in 2016.

TABLE 2. Modern Contraceptive Use Among All Women, Women in Union, and Unmarried Sexually Active Women, PMA2020 Survey Rounds 3 and 4

| Percentage Using | Round 3 | | | Round 4 | | |
|---------------------|--------------------|-------------------------|---|----------------------------|-------------------------|---|
| | March–May 2016 | | | November 2016–January 2017 | | |
| | All Women (N=3261) | Women in Union (n=2239) | Unmarried Sexually Active Women (n=218) | All Women (N=3196) | Women in Union (n=2220) | Unmarried Sexually Active Women (n=226) |
| Any method | 22.8 | 25.5 | 43.5 | 22.9 | 25.5 | 41.6 |
| Any modern method | 21.5 | 24.2 | 41.2 | 22.0 | 24.5 | 38.8 |
| IUD | 0.4 | 0.5 | 0.0 | 0.7 | 0.9 | 0.5 |
| Implants | 9.2 | 10.9 | 12.8 | 9.9 | 11.8 | 7.1 |
| IM-injectables | 6.0 | 7.5 | 5.9 | 4.8 | 5.7 | 8.1 |
| SC-injectables | 1.1 | 1.3 | 0.3 | 2.0 | 2.5 | 1.0 |
| Pills | 2.4 | 2.8 | 4.7 | 2.5 | 2.8 | 5.0 |
| Male condoms | 2.3 | 1.0 | 17.1 | 1.9 | 0.8 | 16.4 |
| Other modern method | 0.2 | 0.2 | 0.3 | 0.2 | 0.1 | 0.6 |

Abbreviations: IM, intramuscular; IUD, intrauterine device; PMA2020, Performance Monitoring and Accountability 2020; SC, subcutaneous.

FIGURE 2. Percentage Distribution of Contraceptive Methods Among All Modern Method Users, PMA2020 Survey Round 3 and Round 4



Abbreviations: IUD, intrauterine device; PMA2020, Performance Monitoring and Accountability 2020.

of public facilities accessible to the national population.

Results indicate SC-injectable use has likely increased over the same period, although the

difference was not statistically significant at the 95% confidence level. The percentage of women using SC-injectables almost doubled, from 1.1% to 2.0% of all women, accounting for 9% of the modern method mix. Similar to the facility data, SC-injectable use remained higher in pilot regions, but the rate of increase was similar between pilot and non-pilot areas. While the magnitude of these changes did not reach statistical significance—largely since sample sizes for the survey were determined to monitor the overall modern contraceptive prevalence rate—the direction of changes in use is likely valid, as it is consistent and corroborated by implementation strategies and availability data from SDPs in our study.

Although not statistically significant, SC-injectable use was higher in rural than urban areas, which is interesting considering overall contraceptive prevalence is higher in urban areas in the country.^{11,12} This may have been a result of SC-injectable demand generation strategies that relied on CHWs, targeting rural rather than urban zones. Some health districts mobilized CHWs to promote SC-injectables, although they were not authorized to administer the method. For example, in Reo and Orodara districts, located in the pilot regions, CHWs could offer SC-injectables for purchase so that the method could

TABLE 3. Percentage of All Women Reporting Use of Subcutaneous Injectables by Background Characteristics, PMA2020 Survey Rounds 3 and 4

| | Round 3 | | | Round 4 | | |
|-------------------------------|----------------|-----|--------------|----------------------------|-----|--------------|
| | March–May 2016 | | | November 2016–January 2017 | | |
| | n | % | 95% CI | n | % | 95% CI |
| Total | 3268 | 1.1 | (0.67, 1.72) | 3213 | 2.0 | (1.28, 2.99) |
| Region | | | | | | |
| 4 pilot regions | 1281 | 1.7 | (1.09, 2.54) | 1389 | 2.6 | (1.45, 4.61) |
| 9 non-pilot regions | 1987 | 0.7 | (0.25, 1.91) | 1824 | 1.5 | (0.78, 2.77) |
| Residential area | | | | | | |
| Urban | 783 | 1.1 | (0.58, 2.06) | 759 | 1.7 | (1.00, 2.81) |
| Rural | 2484 | 1.1 | (0.58, 1.94) | 2454 | 2.1 | (1.21, 3.45) |
| Household wealth index | | | | | | |
| Highest tertile | 1098 | 1.4 | (0.80, 2.29) | 1058 | 2.7 | (1.69, 4.41) |
| Middle tertile | 996 | 0.7 | (0.28, 1.56) | 1044 | 2.0 | (0.99, 4.07) |
| Lowest tertile | 1174 | 1.2 | (0.55, 2.42) | 1111 | 1.2 | (0.54, 2.49) |

Abbreviations: CI, confidence interval; PMA2020, Performance Monitoring and Accountability.

be administered during outreach events or at a woman’s visit to a facility.

Given the cross-sectional design of PMA2020 surveys, we are unable to determine if SC-injectable users switched from other contraceptive methods or were entirely new contraceptive users. Considering comparable contraceptive prevalence rates coupled with changes in method mix between the 2 rounds, we speculate that SC-injectables were likely adopted by women already using a method, probably the IM-injectable. This would make sense given that the initial SC-injectable introduction occurred only among facilities already authorized to provide IM-injectables, without fully capitalizing on the elements of the SC-injectable that distinguish it from the IM-injectable.

Recently, community-level distribution of SC-injectables has begun in 2 pilot districts: Dandé in Hauts-Bassins and Tougan in the Boucle du Mouhoun. Based on a developed task-shifting strategy, 128 CHWs already working at CSPS in the 2 districts were trained between October 2016 and March 2017 to provide oral contraceptive pills and the SC-injectable. Service provision by CHWs started in May 2017, after a follow-up training and supervision at the end of April

2017. This expanded service delivery strategy and the recent price reduction is expected to further improve access to SC-injectables and, ultimately, choice and overall use of contraceptive methods among women in rural areas who have higher unmet need.^{11,12}

It is also notable that SC-injectable use remained minimal among unmarried sexually active women, despite IM-injectable use being common among this population. This may imply that SC-injectable introduction did not address barriers specific to unmarried adolescents such as provider bias¹³ and/or that the introduction efforts explicitly focused on women in union.

Limitations

PMA2020’s sample design does not allow detection of statistical significance for method-specific contraceptive prevalence rates nationally. We acknowledge large sampling error as the surveys are not designed to measure changes in method-specific use with statistical significance, but the direction of the trend is further supported by SDP-level data and corroborating programmatic efforts in the country. Finally, awareness of SC-injectables or switching of contraceptive methods

Community-level provision of the subcutaneous injectable by CHWs has recently begun in 2 pilot districts in Burkina Faso.

TABLE 4. Percentage of All Women Reporting Use of the Subcutaneous Injectable by Background Characteristics, PMA2020 Survey Rounds 3 and 4

| | Round 3 | | | Round 4 | | |
|-------------------------------|----------------|-----|--------------|----------------------------|-----|---------------|
| | March–May 2016 | | | November 2016–January 2017 | | |
| | n | % | 95% CI | n | % | 95% CI |
| 4 PILOT REGIONS | | | | | | |
| Residential area | | | | | | |
| Urban | 565 | 1.5 | (0.76, 2.77) | 557 | 1.7 | (0.90, 3.20) |
| Rural | 716 | 1.8 | (0.98, 3.41) | 832 | 3.2 | (1.32, 7.24) |
| Household wealth index | | | | | | |
| Highest tertile | 655 | 1.5 | (0.83, 2.83) | 688 | 2.1 | (1.24, 3.49) |
| Middle tertile | 358 | 1.0 | (0.31, 3.40) | 383 | 3.7 | (1.29, 10.06) |
| Lowest tertile | 268 | 2.8 | (1.13, 6.85) | 318 | 2.4 | (0.93, 6.18) |
| 9 NON-PILOT REGIONS | | | | | | |
| Residential area | | | | | | |
| Urban | 218 | 0.2 | (0.02, 1.52) | 203 | 1.6 | (0.60, 4.29) |
| Rural | 1769 | 0.8 | (0.26, 2.18) | 1622 | 1.5 | (0.70, 3.00) |
| Household wealth index | | | | | | |
| Highest tertile | 443 | 1.1 | (0.35, 3.36) | 370 | 4.0 | (1.91, 8.07) |
| Middle tertile | 638 | 0.5 | (0.11, 1.75) | 661 | 1.1 | (0.47, 2.36) |
| Lowest tertile | 906 | 0.7 | (0.20, 2.20) | 793 | 0.7 | (0.18, 2.34) |

Abbreviations: CI, confidence interval; PMA2020, Performance Monitoring and Accountability 2020.

was not assessed in either round. Considering SC-injectable demand generation campaigns in the country, inclusion of awareness questions should be considered in future survey rounds. Regarding method switching, PMA2020 is currently testing and considering adding questions to measure method switching in future surveys. Such information will provide important programmatic insight, especially in populations where new methods are introduced and promoted.

CONCLUSION

In conclusion, in Burkina Faso, SC-injectables were introduced in pilot regions in 2014, and the program was scaled up nationally in 2016. We report rapid increases in SC-injectable availability and use over 6 months in 2016 using nationally representative survey data. Community-level distribution by CHWs currently being piloted may further improve access to the method in rural settings. Routine and rapid monitoring surveys, such

as PMA2020, can continue to provide critical data for tracking nationally scaled programmatic progress at both the population level and among health facilities.

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ORIGINAL ARTICLE

Medical Education Partnership Initiative (MEPI) in Zimbabwe: Outcomes and Challenges

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The 5-year medical education and research strengthening initiative in Zimbabwe increased faculty retention and student enrollment, improved information technology infrastructure, provided mentoring for postgraduates and clinical training in specialty areas, instituted a competency-based curriculum reform process, and created new departments and centers to institutionalize health education and research implementation. A comprehensive review of the curriculum is still underway and uptake of technology-assisted teaching has been slower than expected.

ABSTRACT

Background: Sub-Saharan Africa has an inadequate number of health professionals, leading to a reduced capacity to respond to health challenges, including HIV/AIDS. From 2010 to 2015, the Medical Education Partnership Initiative (MEPI)—sponsored by the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) and the National Institutes of Health (NIH)—was enthusiastically taken up by the University of Zimbabwe College of Health Sciences (UZCHS) and 12 other sub-Saharan African universities to develop models of training to improve medical education and research capacity. In this article, we describe the outcomes and challenges of MEPI in Zimbabwe.

Methods: UZCHS in partnership with the University of Colorado, Denver; Stanford University; University of Cape Town; University College London; and King's College London designed the Novel Education Clinical Trainees and Researchers (NECTAR) program and 2 linked awards addressing cardiovascular disease and mental health to pursue MEPI objectives. A range of medical education and research capacity-focused programs were implemented, including faculty development, research support, mentored scholars, visiting professors, community-based education, information and technology support, cross-cutting curricula, and collaboration with partner universities and the ministries of health and education. We analyzed quantitative and qualitative data from several data sources, including annual surveys of faculty, students, and other stakeholders; workshop exit surveys; and key informant interviews with NECTAR administrators and leaders and the UZCHS dean.

Findings: Improved Internet connectivity and electronic resource availability were early successes of NECTAR. Over the 5-year period, 69% (115 of 166) of faculty members attended at least 1 of 15 faculty development workshops. Forty-one faculty members underwent 1-year advanced faculty development training in medical education and leadership. Thirty-three mentored research scholars were trained under NECTAR, and 52 and 12 in cardiovascular and mental health programs, respectively. Twelve MEPI scholars had joined faculty by

2015. Full-time faculty grew by 36% (122 to 166), annual postgraduate and medical student enrollment increased by 61% (75 to 121) and 71% (123 to 210), respectively. To institutionalize and sustain MEPI innovations, the Research Support Center and the Department of Health Professions Education were established at UZCHS.

Conclusion: MEPI has synergistically revitalized medical education, research capacity, and leadership at UZCHS. Investments in creating a new research center, health professions education department, and programs have laid the foundation to help sustain faculty development and research capacity in the country.

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INTRODUCTION

The ongoing shortage of health workers in sub-Saharan Africa severely undermines the ability of countries to treat diseases and deliver essential health

services. This health workforce crisis contributes to poor health outcomes, which are further compounded by the burden of HIV/AIDS.¹ One solution to addressing this crisis is to strengthen medical education and increase capacity in research and clinical training to retain qualified medical professionals.

The trajectory of medical education in sub-Saharan Africa has been turbulent, with overall growth seen in the early independence years for many countries (1960–1975), followed by a period of deterioration fueled by political and economic instability (1975–1990).⁴ The number of medical schools increased sharply from 54 in 1980 to 168 in 2009. Despite an increase in the number of doctors trained, there is still a severe shortage of medical practitioners in Africa, largely because of a "brain drain"—the flight of skilled medical professionals to other countries.³

In Zimbabwe specifically, efforts to strengthen medical education were severely hampered by the economic and political crisis from 1999 to 2009, which resulted in a 70% reduction in medical student enrollment, 61% faculty vacancy rate, and a near collapse of specialist training by 2010.³ The University of Zimbabwe College of Health Sciences (UZCHS), the only medical school in Zimbabwe until 2010, faced declines in infrastructure and limited capacity to use technological innovations in education and research.⁵ UZCHS was trapped in a vicious cycle, with the emigration of existing faculty and an inability to attract candidates for specialist training, leading to low faculty-to-student ratios, and in turn, low enrollment and graduation of students.

These challenges were mirrored by national shortages in the overall health workforce, with a ratio of 142 health workers per 100,000 people in 2009, which is far below the World Health Organization minimum threshold of 230 health workers per 100,000 people required to deliver essential health services.⁶ In addition, Zimbabwe faced a sharp demand to expand health services to address the HIV/AIDS epidemic, which escalated sharply in the 1980s and 1990s. Disparities in health service provision between urban and rural areas was also a critical problem because the majority (70%) of the Zimbabwean population is rural.⁷

To address this problem in Zimbabwe and related problems in other sub-Saharan African countries, the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), with financial support from the National Institutes of Health (NIH), launched the Medical Education Partnership

Initiative (MEPI) in sub-Saharan Africa in 2010 to implement robust medical education models and improve research capacity in HIV/AIDS, non-communicable diseases, and other health priorities.² The 3 core themes of MEPI are to (1) increase capacity by enhancing the quantity and quality of medical education, (2) retain faculty and graduates in order to strengthen the capacity of schools and graduates in their respective countries, and (3) ensure regionally relevant research to generate new knowledge and to strengthen and retain faculty.² MEPI grants were awarded to 13 medical schools in 12 sub-Saharan African countries—Botswana, Ethiopia, Ghana, Kenya, Malawi, Mozambique, Nigeria, South Africa (2 schools), Tanzania, Uganda, Zambia, and Zimbabwe.²

In this article, we provide a detailed description of how MEPI was implemented in Zimbabwe—specifically, the Novel Education Clinical Trainees and Researchers (NECTAR) program and 2 smaller linked programs pursuing cardiovascular and mental health research—and explore the outcomes and challenges of the initiative in the country.

MEPI IMPLEMENTATION IN ZIMBABWE

A critical core of faculty at UZCHS continues to be dedicated to the advancement of medical education and research despite historical challenges. In 2010, they received a MEPI award of US\$13 million to improve medical education and to strengthen medical research and clinical training. MEPI activities were implemented through faculty development, research support, mentored scholars, visiting professors, community-based education, information and communication technology, cross-cutting curricula, and collaboration with partner universities and the ministries of health and education (Figure).

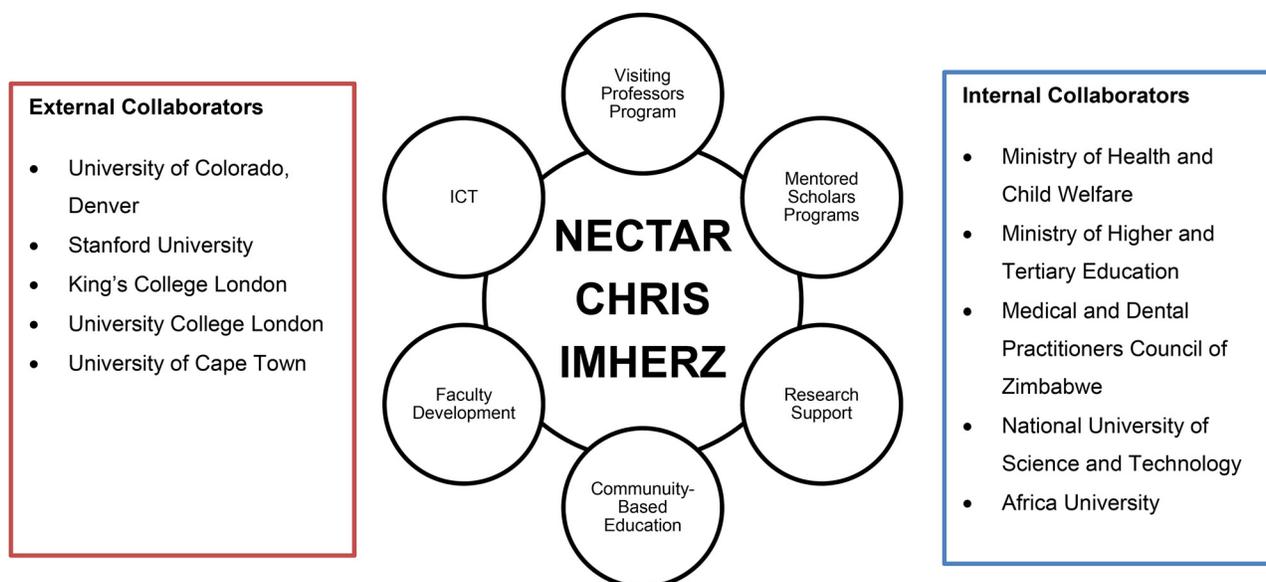
NECTAR was a 5-year program established in 2010 by UZCHS in partnership with the University of Colorado, Denver (CU Denver) and Stanford University. Oversight and administrative support was provided by NIH, the U.S. Health Resources and Services Administration, Office of the U.S. Global AIDS Coordinator and Health Diplomacy, and the MEPI Coordinating Center.

UZCHS hired staff to form a MEPI secretariat to oversee the implementation of programs in close collaboration with the UZCHS dean's office. UZCHS faculty and administration were enthusiastic supporters of the programs following

The trajectory of medical education in sub-Saharan Africa has been turbulent.

The University of Zimbabwe College of Health Sciences was trapped in a vicious cycle, leading to low enrollment and graduation of students.

FIGURE. MEPI Programs and Collaborators in Zimbabwe



Abbreviations: CHRIS, Cerebrovascular Heart failure, Rheumatic heart disease Interventions Strategy; ICT, Information and Communication Technology; IMHERZ, Improving Mental Health Education and Research Capacity in Zimbabwe; NECTAR, Novel Education Clinical Trainees and Researchers.

comprehensive sensitization and advocacy strategy efforts.

A major component of the programs was workshops facilitated by local and partner universities. UZCHS relied heavily on expertise from partner institutions at first, but the responsibility for facilitation gradually transitioned to local UZCHS staff after comprehensive training, capacity development, and mentorship. Toward the end of the 5-year MEPI grant, only a few highly specialized areas required input from partners.

Faculty Development

Faculty development workshops were offered 3 times annually for all UZCHS faculty. In addition, an advanced 12-month course called the Health Education Advanced Leaders program for Zimbabwe (HEALZ) was designed to equip faculty with the necessary knowledge, skills, and attitudes to implement best practices in pedagogy, reliable learner assessment tools, and curriculum evaluation while building leadership and change-management skills. The cross-cutting academic subcommittee undertook curriculum development, particularly in PEPFAR priority areas—HIV, tuberculosis, and malaria.

Research Support

NECTAR and grants from the Wellcome Trust and Netherlands government contributed to the establishment of infrastructure to support research policy development, skills building, and pre- and post-award grant implementation was an important aspect of research capacity strengthening. The construction of the Research Support Center was funded by this consortium, with the aim of institutionalizing research training (i.e., courses and workshops), disseminating information on funding and fellowship opportunities, and providing research administration. Training of research administrators and managers was also included in research capacity development.

Mentored Scholars Programs

The Mentored Clinical Scholars Program and the Mentored Research Scholars Program sought to retain Master of Medicine (MMed) residents to serve as medical educators, investigators, and mentors at UZCHS. The Mentored Clinical Scholars Program offered training in medical education, leadership, and other skills through interactive workshops. The Mentored Research Scholars Program provided research training and support through workshops, administrative and financial assistance

for research projects, and triangular mentoring (each scholar assigned to local and partner university mentors).

Visiting Professors Program

The Visiting Professors Program was developed to enable experts from NECTAR partner universities to spend 2 to 4 weeks in Zimbabwe providing lectures, bedside tutorials, and other skills. This program was a key stop-gap measure that ensured that NECTAR and the linked-awards were able to launch its activities from the beginning of the grant. Through the program, 106 experts made 211 visits to UZCHS. The contribution made by visiting professors was critical in addressing the lack of expertise in several subspecialty areas. UZCHS MMed residents also made visits to partner universities for training and observation in specialized areas.

Community-Based Education

Medical students spent between 2 and 4 weeks every year at district hospitals and other rural locations during their medical school training. This practice began in the 1980s to familiarize students with health determinants at non-urban and primary care settings.⁸ The curriculum, however, had not been revised since then. NECTAR provided improvements in Internet connectivity, housing infrastructure, and skills development at demonstration sites (Murewa and Howard district hospitals).⁹

Information and Communication Technology

MEPI interventions were underpinned by investments in information and communication technology, which included expansion of college-wide availability of Wi-Fi, the installation of high-capacity data storage arrays, bandwidth increases, e-learning resources, and virtual private networks to facilitate information sharing between disparate clinical and teaching sites.

Cardiovascular and Mental Health Research Programs

Two smaller linked awards—Cerebrovascular Heart failure, Rheumatic heart disease Interventions Strategy (CHRIS) and Improving Mental Health Education and Research Capacity in Zimbabwe (IMHERZ)—were designed to address research capacity and implementation needs in cardiovascular medicine and mental health, respectively. CHRIS and IMHERZ were developed in partnership with

CU Denver, University of Cape Town, University College London, and King's College London.³

The CHRIS program aimed to enhance the cardiovascular curriculum, student and academic staff research capacity, and foster scholarship in cardiovascular disease knowledge and skills. This included theoretical and practical skills training in cardiology and neurology. The program later extended to training in endocrinology and pulmonology.

The IMHERZ scholars were trained in child psychiatry, forensic psychiatry, neuropsychiatry, and community psychiatry. Additionally, IMHERZ supported curriculum development, research skills development, and multidisciplinary master classes to strengthen capacity in certain areas (psychotherapy, autism, cognitive behavioral therapy, and substance abuse).

MEPI Network

MEPI network activities were separate from the implementation of MEPI activities at the schools but were complementary and enabled adoption of best practices from the entire network. For example, 8 technical working groups were developed to provide a platform for all MEPI schools to pursue common academic and research interests in a community of practice model. The technical working groups focused on competency-based education, medical education research, community-based education, e-learning, research administration support, graduate tracking, monitoring and evaluation, and library and information science. Members met via Skype, email, webinars, workshops, and satellite meetings during MEPI symposia. Other MEPI network-wide programs that benefited the schools included the annual MEPI symposia, regular webinars, newsletters, and annual sponsor-led evaluation site meetings that included cross-site MEPI representation.

Collaborations

In-country collaborators included the Ministry of Health and Child Care, the Ministry of Higher and Tertiary Education, professional councils, and other institutions. Internationally, UZCHS has longstanding collaborations with CU Denver, Stanford University, University College London, King's College London, and University of Cape Town. These institutions played key roles in the implementation and evaluation of NECTAR activities. The MEPI Principal Investigators Council, composed of principal investigators from the 13 MEPI beneficiary schools, was formed in

TABLE. Survey Response Rates of Faculty, Master of Medicine Residents, and Undergraduates, 2011–2017

| Respondents ^a | 2011 | 2012 | 2013 | 2014 | 2015 | 2017 |
|-------------------------------------|------|------|------|------|------|------|
| Faculty | | | | | | |
| No. responded | 28 | 68 | 55 | 49 | 43 | 34 |
| No. approached | 116 | 151 | 185 | 189 | 166 | 65 |
| Percentage response rate | 24% | 45% | 30% | 26% | 26% | 52% |
| Master of Medicine residents | | | | | | |
| No. responded | 0 | 15 | 16 | 29 | 39 | NA |
| No. approached | 0 | 40 | 171 | 182 | 169 | |
| Percentage response rate | 0% | 38% | 9% | 16% | 23% | |
| Undergraduates | | | | | | |
| No. responded | 286 | 0 | 506 | 383 | 408 | NA |
| No. approached | 572 | 117 | 584 | 710 | 680 | |
| Percentage response rate | 50% | N/A | 87% | 54% | 60% | |

^a Responses were collected during annual surveys from 2011 to 2015. A follow-up survey was conducted in 2017 among faculty to assess whether they were using the various teaching approaches introduced in the Novel Education Clinical Trainees and Researchers program.

2011 to engender African leadership of MEPI activities. The council was instrumental in networking activities such as annual site visits and symposia. The council also oversaw the operations of the 8 technical working groups.¹⁰

METHODS

We analyzed quantitative and qualitative data from several data sources available during the implementation of the NECTAR program. An evaluation team developed a comprehensive evaluation framework and implemented it in partnership with the Evaluation Center of CU Denver. The UZCHS-NECTAR evaluation team provided program leaders with regular and timely formative assessments to inform ongoing program improvement and summative assessments to monitor progress toward MEPI goals. The evaluation was guided by 3 questions: (1) How can the number of medical students completing training at UZCHS increase? (2) How prepared are graduates to remain in Zimbabwe to practice, conduct research, and teach future generations of doctors? (3) How can researchers strengthen their capacity to address the priority health care needs of the region? These questions align with the 3 MEPI thematic areas to improve medical education capacity (quality and quantity), promote the retention of health professionals, and conduct regionally relevant research.

This article draws on quantitative and qualitative data from the following sources:

- **Annual surveys (2011–2015, 2017).** Surveys were administered to faculty, undergraduate students (all disciplines) and postgraduate students. Data were collected on all programs that addressed the MEPI thematic areas. The 2017 survey was administered to faculty only to assess the extent to which faculty were using the teaching approaches introduced during the implementation of NECTAR. The Table shows the survey response rates of faculty, MMed residents, and undergraduate students.
- **MEPI annual institutional surveys (2011–2015).** The MEPI Coordinating Center administered these surveys to gather information on MEPI thematic areas. Data was gathered on student enrolment, attrition/pass rates and on faculty numbers and retention.
- **Workshop and training session exit surveys (2010–2015).** Exit surveys following workshops and training sessions provided feedback on whether expectations were met, what knowledge and skills were gained, and levels of satisfaction with the content.
- **Community-based education report (2014).** The data for this report were gathered from UZCHS faculty and administrative

staff and from field training sites. It provided information on the strengths and weaknesses of UZCHS community-based education and made recommendations for improvement.

- **MEPI Network 5-year report (2015).** This was a compilation of reports from each of the 13 MEPI schools. It provided information on MEPI thematic areas, HIV/AIDS and program sustainability, functions of technical working groups, and the MEPI Principal Investigators Council.
- **NECTAR key informant interviews (2017).** These interviews explored the performance of the UZCHS Research Support Centre and the Department of Health Professions Education. We interviewed the directors and program officers of these units.
- **Other sources.** We also reviewed other sources of information including, report from annual site visits, and photo essays. MEPI sponsors organized annual site visits assisted by the MEPI coordinating center. The team gets updates on all NECTAR and linked award activities during a 3–4 day visit. They meet undergraduate and postgraduate students, faculty, the dean, Vice Chancellor and Ministry of Health and Education officials. The MEPI sponsors then makes a report available to the site documenting the visit. The photo essays were developed around faculty members identified by their peers to have made significant impact and shown leadership through their participation in NECTAR and the linked awards. There were 18 such champions.

■ FINDINGS

Short-Term Programmatic Outputs Faculty Development

Fifteen core faculty development workshops were conducted in 5 years, and 69% (115/166) of faculty members attended 1 or more workshops. The faculty development committee consisted of UZCHS and CU Denver members who selected workshop topics that included curriculum development, learner assessment methods, and adult teaching principles. In the 2015 annual faculty survey, 76% (33/43) of respondents felt they had gained new knowledge from participation in the workshops, 74% (32/43) felt they had gained new teaching skills, and 100% intended to incorporate their new knowledge and skills into teaching practice. Team-based learning and student assessment methods were most frequently cited as strategies incorporated into teaching practice. Medical students perceived an improvement in the quality of instruction over time, with clear objectives for each lecture, better prepared slides, and improved clinical teaching. In a follow-up survey in 2017, faculty respondents had implemented 1 or more key instructional innovations featured in the workshops, such as developing learning objectives, incorporating small-group work, or using single best answer multiple choice assessments.

By 2017, 5 cohorts of scholars (n=65) had completed the HEALZ program, with 3 cohorts (n=41) completing it during the grant period. As evidence of their value, 14 HEALZ scholars were nominated as members of the 24-member college-wide curriculum review committee. A survey performed among the first 3 HEALZ cohorts showed that 87% were highly satisfied

15 core faculty development workshops were conducted in 5 years, and 41 members of faculty had completed advanced training by 2015.



First annual MEPI partners' retreat in Harare, Zimbabwe, December 2011. © 2011 Ronald Nongwani

with the training and perceived a positive change in knowledge on key content areas, such as curriculum development, analyzing quantitative and qualitative data, assessing learners, and writing for publication.

Curriculum and Other Learning Improvements

A new 18-month HIV/AIDS curriculum for MMed residents was developed and launched in 2011. In addition shorter tuberculosis and malaria curricula were developed for both MMed residents and undergraduate students. Between 2011 and 2015, 525 undergraduate medical students in their final year completed a 10-week HIV/AIDS course consisting of 10 sessions, delivered through a modified team-based learning approach. In a survey that included 120 students, 94% agreed and 71% strongly agreed that team-based learning was a more stimulating approach to learning compared with didactic lectures, and 96% felt that team-based learning enhanced their knowledge of HIV management.⁵

Through NECTAR, UZCHS initiated a competency-based curriculum review adapting the 7 patient-centered competency domains of the 2005 CanMEDS framework: medical expert, scholar/researcher, educator, community health advocate, communicator/relationship builder, manager/leader, and ethical/professional.¹¹ In 2015, 79% of faculty respondents reported that they had begun the process of curriculum review. In 2017, 50% (17/34) reported their departments had completed the curriculum review and had developed a new working draft that was being implemented.

Enhanced Community-Based Education

In efforts to modernize its community-based education approach, UZCHS participated in a peer-review process through the Collaboration in Health Equity through Education and Research consortium.⁹ This review was supported by CapacityPlus, a program funded by the U.S. Agency for International Development that focuses on health workforce enhancement to achieve development goals. Peer reviewers included faculty from the universities of Botswana, Malawi, South Africa, and Zambia. The review provided useful feedback on the strengths and challenges of community-based education at UZCHS and suggested areas for improvement, such as strengthening coordination and conducting field programs in interdisciplinary teams.⁹ Other recommendations included modernizing the field attachment program to reflect new thinking on social determinants of health. Reviewers also

recommended aligning the community-based education program with the overall medical school curriculum in UZCHS's ongoing exercise of curriculum review.

Mentored Scholars Programs

The Mentored Clinical Scholars Program conducted 11 workshops facilitated by UZCHS faculty and partners from CU Denver. Average attendance of MMed residents increased from 44 (31.4%) in 2013 to 86 (49.7%) in 2015. All UZCHS departments were represented at the workshop sessions. According to interviews of 10 frequent attendees and 2 infrequent attendees (n=12) in 2014, the majority felt the program filled a gap in preparation for a career in medical education. According to 7 of these attendees, the most beneficial topics were end-of-life care, death and dying, delivering bad news, and bereavement.

The Mentored Research Scholars Program selected 33 scholars in 4 cohorts. In the final 2015 exit survey, 100% of surveyed scholars felt that they had engaged in relevant research, and 71% were highly satisfied with the mentoring experience. The vast majority (85%) reported they were more likely to pursue a career in research. By 2015, these scholars had contributed to research output through 7 international and national conference presentations, 4 accepted abstracts, 7 publications, and a noteworthy US\$100,000 grant in reproductive, maternal, newborn, and child health awarded to a scholar.

Improved Research Support

Most faculty members (85.1%) and more than half (55%) of students were satisfied with the services provided by the Research Support Center. Both students and faculty members most frequently cited the research training workshops as the most used service. The majority (79%) of faculty members thought their research skills had been enhanced through the Research Support Center. In 2017, 46% (16/34) of faculty respondents who participated in research training and used the Research Support Center reported they had made great progress in their medical research during the previous year.

Technology and Library Services

The NECTAR program established Wi-Fi connectivity at the college and major teaching sites, which was an important milestone given the previously limited connectivity. A range of online research and learning support resources were also

Participants felt that the Mentored Clinical Scholars Program filled a gap in preparation for a career in medical education.

UZCHS initiated a competency-based curriculum review and by 2017, more than half of faculty respondents were in the process of implementing a new curriculum.

made available such as Research Electronic Data Capture (REDCap),¹² eGranary Digital Library,¹³ Hinari,¹⁴ UpToDate, and Stanford University course materials.¹⁵ More than 400 students and 76 academic staff received training in online research and training support resources and learning management systems.

In 2015, 85% of faculty members surveyed were satisfied with the improvements in access to technology since the beginning of NECTAR, compared with 51% of MMed residents and 44% of medical students who felt satisfied. All (100%) faculty surveyed (n=43) and 72% (n=39) of MMed residents rated the online research and learning support resources as very useful; however, 47% (n=190) of medical students had insufficient knowledge of the resources to rate their usefulness.

HIV/AIDS Care

NECTAR was conceived to address the lack of a competent and responsive health workforce to deliver HIV services, especially antiretroviral therapy. In 2011, NECTAR developed and immediately implemented HIV/AIDS curricula for medical students and MMed residents in all disciplines. The benefits of this HIV/AIDS curriculum were noticed in the main teaching hospitals first, and then extended out as doctors and specialists became more qualified and spread to other parts of the country.

Strengthening Cardiovascular Expertise and Research Capacity

The CHRIS program offered cardiovascular training to 52 scholars in 4 cohorts: 17 MMed residents, 9 sonographers in echocardiography, 5 junior academic staff, and 21 physiology intercalated students (competitively selected second-year medical students who spent 1 year working for research degrees in physiology). CHRIS scholars were trained in a range of cardiology-related skills, including electrocardiogram interpretation, stress testing and ambulatory recording, pacemaker implantation, pediatric cardiology, and Holter monitoring. In neurology, the specialist management of stroke patients and interpretation of electroencephalograms for optimal management of epilepsy patients were key areas of training. In addition, respiratory services were expanded with capacity to do bronchoscopy and spirometry. Disease registries were established to generate local evidence to support the establishment of a stroke unit and adult cardiac research laboratory, and

5 new specialist clinics (neurology/stroke, cardiology, diabetes/endocrinology, pediatric cardiology, and epilepsy).

Strengthening Mental Health Expertise and Research Capacity

Through the IMHERZ program, 6 Masters degrees and 15 diplomas in psychiatry were awarded between 2010 and 2015. The program included 10 master classes for nurses, clinical psychologists, occupational therapists, and social workers on various topics—HIV adherence, autism, cognitive behavioral therapy, and substance abuse. Feedback from the master classes demonstrated that participants had increased confidence in managing mental health problems. IMHERZ gave rise to new curricula in behavioral science for preclinical students and 2 undergraduate modules on mood disorders and depression. The program established 4 community outreach clinics, which are considered pilot projects for nationwide replication. IMHERZ scholars also facilitated the establishment of child psychiatry clinics at the 2 central hospitals in Harare.

Medium-Term Programmatic Outcomes Addressing Faculty and Student Number Deficits and Retention

The long-term impact of MEPI in Zimbabwe has yet to be realized, a number of achievements are notable. Between 2010 and 2015, full-time academic staff numbers at UZCHS grew by 36% (from 122 to 166 posts), annual postgraduate enrollments increased by 61% (75 to 121), and annual medical student intakes rose by 71% (from 123 to 210). Twelve MEPI scholars have already joined faculty as junior lecturers. Survey results show that the number of medical students who intend to practice in Zimbabwe after graduation grew by 9% between 2011 and 2015, and more students felt that staying in Zimbabwe would enable them to get a good job, earn a living wage, do work that is satisfying, and earn respect from others in their field. The department of psychiatry experienced a fivefold increase in staff from just 1 member in 2010 to 5 in 2015. All 21 intercalated graduates in physiology and anatomy were engaged as teaching assistants and tutors. The number of medical practitioners registered to practice in Zimbabwe increased by 32.6% between 2011 and 2014 (from 2,003 to 2,656). This increase was due to a combination of factors including the return of medical practitioners who had left the country.

Scholars were trained in a range of specialized cardiology and neurology skills, and new disease registries led to the establishment of a stroke unit and adult cardiac research laboratory, and 5 specialist clinics.

NECTAR implemented new HIV/AIDS curricula for medical students and MMed residents, the benefits of which were first seen in teaching hospitals and then other parts of the country.

Between 2010 and 2015, full-time academic staff numbers at UZCHS grew by 36%, annual postgraduate enrollments increased by 61%, and annual medical student intakes rose by 70%.

After MEPI ended in 2015, faculty retention and student enrollment rates remained high.

After MEPI ended in 2015, faculty retention and student enrollment rates remained high. Of the faculty who were recruited during MEPI, 97% (58 of 60) were still at UZCHS in 2017. Annual enrollment of MMed residents increased by 12.5% (from 48 to 54) from 2015 to 2017 and the enrollment of medical students increased by 10.5% (from 210 to 232) during the same period. NECTAR enabled higher student graduation rates and better retention of graduates and faculty; however, improvements in the socioeconomic environment were also a key contributor.

Department of Health Professions Education

The Department of Health Professions Education was established in the third year of the NECTAR program to streamline professional health education at UZCHS. The establishment of this department was a crucial step in institutionalizing NECTAR activities and innovations. The core function of the department is to provide teaching and learning support and to oversee curriculum development and implementation. After the MEPI grant period, the department continued to organize 2 faculty development workshops per year with funding from the University of Zimbabwe. In 2015, a total of 157 faculty members were trained—114 in 2016 and 34 in early 2017. All these faculty members attended at least 1 workshop.

Under the HEALZ advanced faculty development program, 3 cohorts were trained—41 in 2015, 9 in 2016, and 15 in 2017. In the 2017 follow-up survey, 97% (33/34) of respondents agreed or strongly agreed that UZCHS maintained its MEPI goal to improve the quality of health education.

The Ministry of Health and Child Care is planning to replicate the stroke unit model in hospitals countrywide.

The Research Support Center has supported faculty in research output, evidenced by 31 publications, 86 abstracts, and 37 presentations from 2010 to 2015.

Research Support Center

The Research Support Center has supported faculty in research output, evidenced by 31 publications, 86 abstracts, and 37 presentations in local, regional, and international conferences from 2010 to 2015. The Research Support Center assisted in the submission of 23 successful grant applications worth more than US\$16 million. In addition, the center has played a critical role in training researchers and providing administrative support. In 2014, more than half (55%, n=29) of MMed residents surveyed were satisfied with services provided and the majority (77%, n=29) felt their research skills were enhanced.

Since the MEPI grant ended, the Research Support Center has increasingly supported itself financially by charging overhead on grants and

courses. In 2016, it supported 29 applications (8 of which were successful) and in 2017, it supported 9 applications (2 of which were successful by midyear). The number of grants managed by the center increased from 15 in 2015 to 21 in 2017.

Future Collaborations

MEPI partner universities are committed to working with UZCHS to ensure the sustainability of NECTAR innovations. The Department of Medicine at CU Denver has provided ongoing support for the Visiting Professors Program through a faculty and residents exchange program, the Colorado Zimbabwe International Exchange. Stanford University supports a faculty and residents exchange program to address the gaps in the disciplines of surgery, otorhinolaryngology, and anesthesia, in addition to the Global Health Equity Scholars Fellowship. Structured mentored research opportunities will continue to be available to junior faculty through 2 new programmatic grants—Promoting Excellence in Research and Faculty Enhanced Career Training (PERFECT) funded by NIH¹⁶ and the African Mental Health Research Initiative funded by the Wellcome Trust.¹⁷ In the last year of the MEPI grant, the Principal Investigators Council was actively engaged in developing an expanded African continent-wide forum (including nurses, midwives, and other health cadres) to continue to foster the transformative gains and best practices learned through MEPI.

Medical Subspecialist Services

Data have shown that establishment of the stroke unit has reduced first-week stroke-related mortality from 24.7% to 13.7% due to the introduction of interventions to reduce inhalation and consequent aspiration pneumonia. By 2017, the 8-bed stroke unit had admitted more than 1,000 patients since it was established in 2013. The Ministry of Health and Child Care has recognized the impact of the stroke unit and is planning to replicate the model in hospitals countrywide.

The subspecialty training in mental health through IMHERZ has made a substantial impact on the improvement of services in several sectors in the country. For example, with the availability of psychiatrists trained in forensic psychiatry, forensic services are now available to help inmates after a long stint without these services. IMHERZ was also a key player in drafting the mental health

policy of Zimbabwe, which is now a key Ministry of Health document.

Implementation Challenges and Supporting Factors

In 2012, faculty reported some challenges in implementing MEPI activities during the first 2 years. The primary challenge noted was finding protected time for active participation because of the multiple educational and clinical demands and responsibilities of UZCHS faculty and leaders. Given clinician and instructor shortages, these challenges were not completely addressed during the grant period; however, in later years, some compensation was provided for faculty who participated in extended trainings. Faculty also described the challenges related to communication across programs, departments, and institutions in the early years. In 2014, faculty indicated that effective communication mechanisms evolved over time including establishing regular meeting times and distributing meeting agendas and minutes.

Factors that contributed most to the programs' progress and success were effective leadership, a high degree of investment of faculty and ministry leaders, and the rapid establishment of the program infrastructure and visibility, according to a survey among faculty in 2012. In 2014, faculty members reported that the intentional involvement of all UZCHS departments and key faculty leaders was an effective strategy in moving toward achieving program goals.

Sustainability of MEPI. Immediately after MEPI was awarded in 2010, the NECTAR team engaged the University of Zimbabwe vice chancellor and other key stakeholders to share the purpose of the program, its implementation plan, and the necessary preparations to sustain these activities after the MEPI award period. During NECTAR, the university leadership was regularly informed and invited to participate and officiate at all key program activities. This resulted in a great appreciation of the program and strong buy-in among all stakeholders. The Department of Health Professions Education and the Research Support Center were given university departmental status and were allocated funds. As mentioned earlier, the Research Support Center is increasingly improving its income base by charging overhead costs.

Improvements in information and communication technology services such as Wi-Fi, e-resources, high capacity storage, and data management

systems have continued after the MEPI grant. The challenge is the capacity to maintain and upgrade these once the need arises.

The collaborating external universities have taken over funding of the visiting professors and resident exchange program. Further awards have continued to promote capacity development in research at UZCHS.

CONCLUSION

MEPI has brought about a renaissance in medical education at institutions in sub-Saharan Africa. Given the short life span of MEPI grants, however, sustainability has been a challenge at MEPI schools. NECTAR emphasized strengthening local capacity to sustain programs beyond the grant, and investments in infrastructure such as the Department of Health Professions Education and Research Support Center, are cornerstones for the sustainability of faculty development and research capacity. The Mentored Clinical Scholars Program and Mentored Research Scholars Program for postgraduates have created a pipeline of future academics with the capacity to build on gains made in the past 5 years. Furthermore, annual surveys revealed increased commitment from faculty members to sustain and expand on achievements made during the MEPI grant period.

A comprehensive review of the curriculum and the community-based education program will take longer to accomplish; however, NECTAR has laid the necessary foundation to achieve this goal. The uptake of technology-assisted learning and teaching has been slower than expected despite improvements in infrastructure, but new programs are committed to continuing progress in this area. The Department of Health Professions Education is focused on improving online research and learning support resources at UZCHS as a special focus area, buoyed by the overall commitment to accelerated technology by the university. Notable improvements in retention of faculty have been made; however, retention of medical practitioners is likely to remain a challenge in Zimbabwe because of many factors that are beyond the scope of NECTAR and UZCHS.

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MEPI has brought about a renaissance in medical education at institutions in sub-Saharan Africa.

Successful program factors included effective leadership, investment of faculty and ministry leaders, and the rapid establishment of infrastructure and visibility.

and Harare Central Hospital. Last but not least, we extend our thanks to CHRIS faculty from the University of Colorado, Denver: Larry Allen, Thomas Maddox, Brian Lowes, Joseph Schuller, Daniel Bessesen, David Kao, and David Katz and to IMHERZ faculty from the University of Cape Town and Bristol: Crick Lund and Ricardo Araya respectively.

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ORIGINAL ARTICLE

Can Family Planning Service Statistics Be Used to Track Population-Level Outcomes?

Robert J Magnani,^a John Ross,^b Jessica Williamson,^a Michelle Weinberger^a

Estimates of the modern contraceptive prevalence rate (mCPR), a population-level indicator, that are derived directly from family planning service statistics lack sufficient accuracy to serve as stand-alone substitutes for survey-based estimates. However, data on contraceptive commodities distributed to clients, family planning service visits, and current users tend to track *trends* in mCPR fairly accurately and, when combined with survey data in new tools, can be used to approximate the annual mCPR in the absence of annual surveys.

ABSTRACT

The need for annual family planning program tracking data under the Family Planning 2020 (FP2020) initiative has contributed to renewed interest in family planning service statistics as a potential data source for annual estimates of the modern contraceptive prevalence rate (mCPR). We sought to assess (1) how well a set of commonly recorded data elements in routine service statistics systems could, with some fairly simple adjustments, track key population-level outcome indicators, and (2) whether some data elements performed better than others. We used data from 22 countries in Africa and Asia to analyze 3 data elements collected from service statistics: (1) number of contraceptive commodities distributed to clients, (2) number of family planning service visits, and (3) number of current contraceptive users. Data quality was assessed via analysis of mean square errors, using the United Nations Population Division World Contraceptive Use annual mCPR estimates as the "gold standard." We also examined the magnitude of several components of measurement error: (1) variance, (2) level bias, and (3) slope (or trend) bias. Our results indicate modest levels of tracking error for data on commodities to clients (7%) and service visits (10%), and somewhat higher error rates for data on current users (19%). Variance and slope bias were relatively small for all data elements. Level bias was by far the largest contributor to tracking error. Paired comparisons of data elements in countries that collected at least 2 of the 3 data elements indicated a modest advantage of data on commodities to clients. None of the data elements considered was sufficiently accurate to be used to produce reliable stand-alone annual estimates of mCPR. However, the relatively low levels of variance and slope bias indicate that trends calculated from these 3 data elements can be productively used in conjunction with the Family Planning Estimation Tool (FPET) currently used to produce annual mCPR tracking estimates for FP2020.

INTRODUCTION

Until the late 1960s, family planning service statistics and vital statistics systems were, for all intents and purposes, the sole sources of data for tracking population trends and family planning program performance.^{1,2} Routine family planning program data have a number of strengths. Among these are that they (1) are collected in connection with service delivery and thus entail very limited additional data collection costs; (2) provide high geographic detail, even down to the service delivery point level; and (3) are available frequently—usually monthly, and potentially in real time. Routine program data also have weaknesses. These include that they (1) are prone to error (e.g., recording and processing

errors, facility underreporting, duplicate reporting of clients who visit more than 1 service delivery point during a given reporting period, reporting delays, and deliberate padding of numbers) and (2) generally do not measure population-level indicators well, due in part to the above errors and in part to limited coverage of the contributions of the private sector (i.e., NGO and commercial providers of family planning).

In response to the limitations of service statistics data and vital statistics systems, and to the challenging and often lengthy processes required to reform them,³ a shift toward greater reliance on data from large-scale surveys was well underway by the early 1970s. This shift was led by global survey programs such as the World Fertility Survey (WFS) and the Contraceptive Prevalence Surveys (CPS) in the 1980s, followed by the Demographic and Health Surveys (DHS) and most recently the Performance Monitoring and Account-

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Virtually all countries collect and process family planning service statistics on a routine basis.

The Family Planning 2020 initiative requires ongoing family planning performance data.

ability 2020 (PMA2020) surveys.⁴ A number of countries also conduct frequent, multipurpose national surveys that collect relevant data. Although virtually all countries continue to collect and process family planning service statistics on a routine basis, most countries and the international family planning community at large tend to rely more heavily on data from large-scale surveys to track national and global family planning progress.

Recent years have, however, witnessed a renewed interest in family planning service statistics (and program data more generally). One reason is that the global Family Planning 2020 (FP2020) initiative requests that countries provide updates on a number of FP2020's Core Indicators on an annual basis. This leaves countries that rely on large-scale surveys, which are generally undertaken only every 3 to 5 years, in a difficult situation. In the absence of annual survey measurements, countries must project values of key indicators for each year since the last large-scale survey, pending information from the next large-scale survey (see Figure 1 for a visual depiction of the problem).

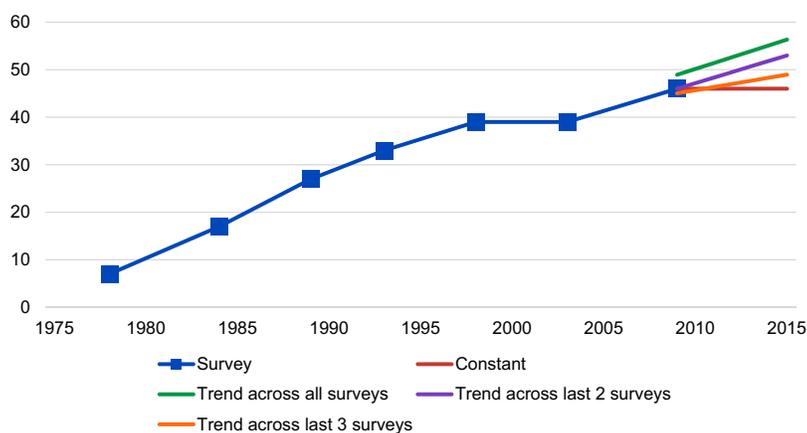
A second reason for the current interest in service statistics and program data, not related to FP2020, is that the high cost of national surveys has prompted some countries and international organizations to question whether reliance on surveys is cost-effective over the medium to long term. Discussions on this issue are by no means limited to family planning; for example, similar discussions about reducing the need for large-

scale surveys are ongoing with regard to HIV and AIDS program data.⁵

Because trustworthy health information systems are essential to effective public health program management,⁵ interest in improving routine data for family planning and other program areas has spawned numerous efforts to develop new tools and processes. Examples include the Performance of Routine Information System Management (PRISM)⁶ and District Health Information System 2 (DHIS 2)⁷ initiatives. Such tools are especially needed to reform government health information systems in low- and middle-income countries, and many countries have indeed shifted to electronic health management information systems (HMIS) in recent years. This shift has created new opportunities for greater use of service statistics. So far, however, the impact of these efforts on improving routine data system functioning for family planning or other health programs has not been systematically documented.

Given the ongoing need for credible, annual family planning program tracking data for FP2020, we sought to assess the extent to which a set of commonly recorded and reported data elements in routine service statistics systems could, with some fairly simple adjustments, track key population-level outcome indicators. Two main questions were addressed in this study: (1) How well do approximations of the modern contraceptive prevalence rate (mCPR) derived from service statistics track survey-based mCPR estimates? (2) Do some data elements perform better than others such that they should be preferred for tracking

FIGURE 1. Options for Projecting the mCPR Trend Since the Last Large-Scale Survey



Abbreviation: mCPR, modern contraceptive prevalence rate.

BOX. Description of Family Planning Data Elements Used in the Study

Commodities distributed to clients: The number of contraceptive commodities distributed to clients, such as the number of pill cycles and number of intrauterine devices (IUDs). Because our intent in using data on commodities to clients was to estimate the annual number of contraceptive users, we also included numbers of female and male sterilization services provided, although they do not involve commodities. We used data on commodities distributed from service delivery points—that is, counted when products or services are provided to clients—as opposed to further back in the supply chain, such as when products are distributed to warehouses or service delivery points.

Service visits: The number of times clients interacted with a provider for contraceptive services. For short-acting contraceptive methods, the same client may be counted multiple times because the client comes multiple times for resupply (e.g., an injectables client has 4 service visits because she receives 4 injections over the course of a year). The conversion of service visits data to an estimate of the number of contraceptive users in a given year must take this into account.

Current users: Persons who are currently using contraception, regardless of when the method was received. This is not directly comparable with the number of clients served in a year, because it includes people still using long-acting or permanent methods received in previous years (e.g., a woman who had an IUD inserted in 2012 may still be an IUD user in 2015). In service statistics systems, the estimated number of current users is calculated in one of several ways. Some countries calculate the number of current users for a given method in a year as the number of new users of the method plus the number of continuing or repeat users minus the number of dropouts or discontinuers. The challenges in producing the estimate are (1) to avoid double-counting clients and (2) to accurately track client dropouts or discontinuation.

purposes? There is at present little hard evidence available on these questions, yet the answers have important implications for how low- and middle-income countries can go about tracking national family planning program performance in the short term while information system development efforts proceed.

METHODS

We collected service statistics data from 22 FP2020 pledging countries that are being supported by the Track20 Project. The countries included in the analyses are listed in [Supplement 1](#). We considered 3 family planning data elements: (1) number of contraceptive commodities distributed to clients, by method; (2) number of client family planning service visits, by method; and (3) number of current contraceptive users. (See the [Box](#) for more detailed definitions of these elements.) Data used were from government databases and reports in the respective countries. To increase the robustness of the results, we required each country included in the analyses to have at least 3 years of data for at least 1 of the 3 data elements, including at least 1 year of data that overlapped with a large-scale survey. The service statistics data elements we analyzed are summarized in [Table 1](#), together with the number of countries that could supply each type of data.

The study compared service statistics data with the annual estimates of mCPR provided in the United Nations Population Division World Contraceptive Use dataset.⁸ The World Contraceptive Use (WCU) estimates were calculated using the Family Planning Estimation Model

(FP-EM) developed by the United Nations Population Division.⁹ FP-EM is a Bayesian hierarchical model that fits curves to historical data. The model fits a logistic growth curve to the contraceptive prevalence rate (CPR) data from all available surveys to determine the long-term trend in contraceptive use. It uses a time-series model with autocorrelation to capture country-specific deviations around the long-term trend. The long-term trend moves toward an asymptote (where the *trend* levels off) with the *pace* and *timing* of the increase in contraceptive use determining the exact shape of the logistic curve. These 3 parameters—trend, pace, and timing—are estimated from national data and informed by regional and global trends and patterns. A second model splits total contraceptive use into modern and traditional methods. A third model fits trends in unmet need. Related outcomes such as total demand for family planning are then calculated. FP-EM not only determines the most likely trends in family planning outcomes, but also estimates an uncertainty range around the trends so that each estimate contains a median estimate as well as a 95% uncertainty range. In fitting the models, FP-EM distinguishes between different types of data (e.g., DHS versus other national surveys) and automatically assigns higher credibility to sources of data with a lower estimated error variance. (In the model, DHS is estimated to have the lowest error variance.)

To make comparisons with World Contraceptive Use estimates of mCPR,⁸ we first had to convert the service statistics to approximations of the mCPR. This was accomplished using a tool

We compared family planning service statistics data with World Contraceptive Use data.

TABLE 1. Countries Included in the Analyses, by Availability of Service Statistics Data Elements

| Countries With Service Statistics Available (N=22) | Years of Data Available | | |
|--|-------------------------|-----|----|
| | 3–4 | 5–6 | ≥7 |
| Commodities data only (n=10) | 4 | 1 | 5 |
| Commodities and visits data (n=4) | | | |
| Commodities | 2 | 1 | 1 |
| Visits | 1 | 2 | 1 |
| Commodities and users data (n=5) | | | |
| Commodities | | 2 | 3 |
| Users | 1 | 3 | 1 |
| Visits and users data (n=1) | | | |
| Visits | | | 1 |
| Users | | | 1 |
| Commodities, visits, and users data (n=2) | | | |
| Commodities | | 2 | |
| Visits | | 2 | |
| Users | | 1 | 1 |

developed by Track20 called the Service Statistics to Estimated Modern Use (SS to EMU) tool.¹⁰ In the case of numbers of contraceptive commodities distributed to clients (by method) and numbers of client family planning service visits (by method), we converted annual counts into annual estimates of numbers of current or active contraceptive users. This was done differently for short-acting methods versus long-acting reversible contraceptives.

For short-acting methods, we estimated the number of users based on coverage needed for 1 year of contraceptive protection and estimated commodities to clients by applying couple-years of protection (CYP) conversion factors. Our estimate for service visits data was based on the average number of service visits needed per year to produce 1 CYP. Due to data limitations, it was not possible to account for the fact that not all client service visits are associated with new contraceptive use; for example, some consultations concern side effects with method use. As a result, estimates of total CYP based upon service visits data would tend to be biased upward. The conversion factors we used are documented in [Supplement 2](#).

We used a more refined calculation for long-acting reversible contraceptives to account for

continued use of intrauterine devices (IUDs) and implants from insertions in past years; the detailed calculations can be found in [Supplement 3](#). As the purpose of the exercise was to estimate total users, counts of persons sterilized were included in the estimate based on commodities to clients data (these users are already included in the service visits data).

Finally, we introduced a correction to recognize that government statistics on commodities distributed to clients and on family planning service visits account for differing shares of the overall market for each method across countries. This is because the extent to which private-sector family planning service outputs are included in government statistics varies considerably by country. In many countries, some portions of the private sector (usually NGOs) report into the government HMIS such that their outputs are already represented in government service statistics. To compensate for this, we adjusted the underlying data elements (e.g., number of commodities to clients or number of client visits) upward by a quantity equivalent to the estimated private-sector market share for each particular method. The preferred source of data for calculating the correction factors was DHS data on where women access each contraceptive method in the respective countries.

The estimated numbers of contraceptive users, calculated as described above, were then divided by the estimated number of women of reproductive age in each country during each year covered by the service statistics data. Estimates and projections of the number of women of reproductive age from the United Nations Population Division were used as denominators in the calculations.¹¹ This yielded approximations of annual mCPR estimates, referred to as estimated modern use (EMU) rates. EMU rates constitute an approximation of the actual mCPR, and as such we retain the label EMU rather than mCPR—to reinforce the point that they are approximations.

For the third type of service statistic, number of current contraceptive users, we used the absolute numbers provided by each country as numerators to calculate annual EMU rates, with the United Nations Population Division population data again providing the denominators for the calculations. The private-sector adjustment described above was also applied to the current users data.

The performance of the 3 data elements in tracking mCPR was assessed on the basis of their root mean square errors (RMSEs).¹² RMSE is a commonly used measure of the accuracy of a given estimate or set of estimates in relation to

We assessed the performance of 3 types of program data in tracking mCPR.

the "true" value. In the present study, the RMSE may be thought of as the average difference between the service statistics–based estimates (EMUs) and the survey-based estimates of mCPR, over the period of time for which both service statistics–based and survey-based estimates are available. While acknowledging that the World Contraceptive Use estimates are not free of error, we used these estimates as the "gold standard" for measuring the accuracy of the mCPR approximations derived from service statistics.

Total mean square errors (MSEs), a measure of total measurement error, were calculated as the average of the squared differences of the EMUs (the service statistics–based estimates of mCPR) versus the survey-based mCPR estimates. That is:

$$MSE = \sum (EMU_{year\ i} - mCPR_{WCU\ year\ i})^2 / n$$

Where:

$EMU_{year\ i}$ = the SS to EMU tool estimate of the mCPR for year i ;

$mCPR_{WCU\ year\ i}$ = the corresponding World Contraceptive Use survey-based estimate of the mCPR for year i ; and

n = the number of years for which service statistics–based estimates are available.

The RMSE is simply the square root of the MSE. It is calculated in order to convert the result to the same metric as the input data (i.e., percentages rather than squared percentages). An RMSE of zero indicates perfect accuracy (which is of course unachievable in actual practice), and the level of total measurement error is indicated by the magnitude of the estimated RSME.

To further explore the sources of error in the service statistics data elements, we attempted to determine the magnitude of several types of errors. Noting that the MSE consists of both random and systematic error (in simple terms, $MSE = \text{Variance} + \text{Bias}^2$), we estimated 3 error components:

- Random annual error (or variance)
- Systematic error or bias with regard to the level of the service statistics–based estimates
- Systematic error (bias) with regard to trend

Variance consists of random measurement errors that do not affect the mean or expected value of the estimate(s). Variance can be thought of as random "noise" in the data. Such variability can be caused by actual annual fluctuations in service volume as well as by inconsistent

recording and reporting of family planning service data from year to year. In the present application, we defined variance in terms of annual fluctuations about the least-squares linear trend line of EMU values for each of the 3 data elements (these amount to smoothed trend lines). Figure 2 presents a visualization using commodities to clients data from an unnamed country: Variance is calculated by comparing each of the annual EMU data points on line A (the blue line) against the respective annual values on the EMU trend or slope line represented by line B (the orange line). Although trends in EMU are not necessarily linear, any departure from linearity is unlikely to seriously distort the study findings over the relatively short intervals of time for which service statistics are available (see Table 1). Because countries with higher EMU rates have the potential for greater variability in EMU estimates in absolute terms, compared with countries with lower EMU rates, we used relative variance (RelVar), which expresses variability as a ratio to the level of the statistic being measured (EMU rates in the present case).

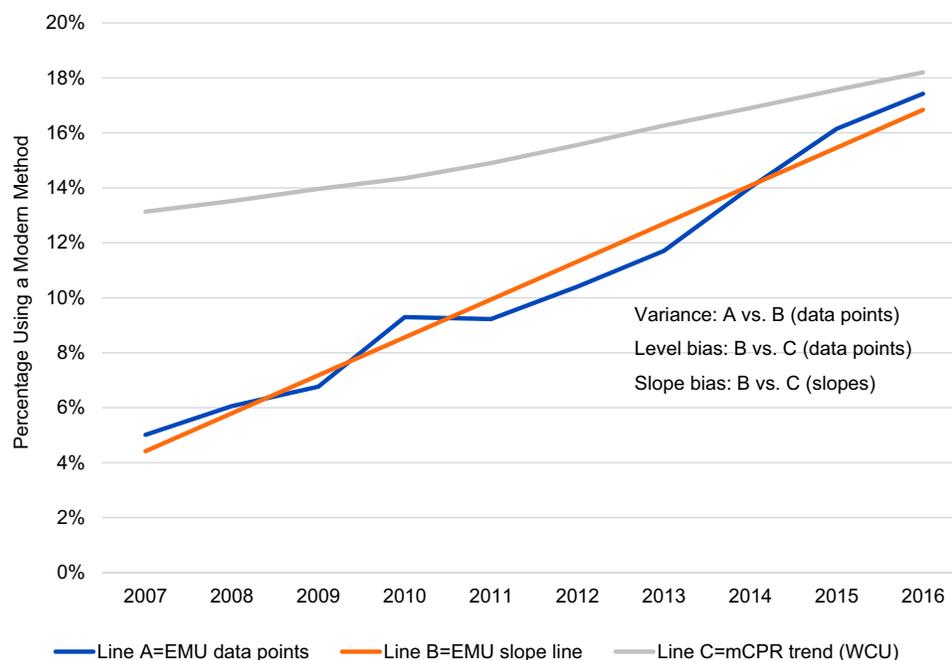
Bias, unlike variance, pertains to systematic measurement error; that is, errors that alter the mean or expected value of the estimate(s). Bias can be caused by consistent underreporting or overreporting of numbers of commodities distributed to clients, service visits, or current contraceptive users; by service delivery points not reporting data; and by a lack of private-sector data resulting in underreporting of services being provided nationally.

Two measures of bias were calculated in the analyses. *Level bias* was defined as the mean difference (absolute values) in level between the least-squares trend line of EMU estimates and the annual survey-based mCPR estimates. In Figure 2, this is represented by comparing the respective data points on the EMU trend or slope line (line B) against the corresponding annual estimates on the survey slope or trend line (line C, the gray line). This provides a measure of the extent to which the EMU rates are systematically higher or lower than the survey-based estimates of mCPR, and the magnitude of such systematic differences. As with estimates of variance, we expressed level bias relative to the mean of the survey-based mCPR estimates during the relevant time interval to account for the fact that countries with higher mCPRs had potentially higher levels of bias measured in absolute terms.

Slope bias was defined as the absolute value of the difference between 2 slopes: the EMU least-

Error in estimates based on program data was measured via variance and 2 measures of bias.

FIGURE 2. Variance, Level Bias, and Slope Bias as Components of Mean Square Error



Abbreviations: EMU, estimated modern use; mCPR, modern contraceptive prevalence rate; WCU, World Contraceptive Use.

squares slope or trend line (line B in Figure 2) versus the least-squares slope or trend line for the survey-based estimates of mCPR (line C in Figure 2). Slope bias quantifies how well the trend in approximate mCPR derived from service statistics (i.e., the EMU rate) tracks the trend in survey-based estimates of mCPR. It is possible for estimates based on service statistics to track the trend in survey-based estimates reasonably well despite variance and level bias, and we used the measure of slope bias to assess the extent to which this was the case in the countries included in the analyses. It can be empirically demonstrated that the absolute value of the differences between slopes accurately captures differences irrespective of whether the slope coefficients have different signs (one positive, one negative) or merely differences in magnitude (with the same sign). In Figure 2, slope bias may be visualized as the difference in slope or trend between lines B and C.

Computational details for the components of MSE may be found in Supplement 4.

RESULTS

MSE calculations for all countries (unnamed) are documented in Supplement 5. The data shown in

Supplement 5 were extracted and organized in different ways for presentation purposes. Table 2 shows data from all countries that met the inclusion criteria outlined in the Methods section. The numbers of countries on which the results for each component are based are shown at the top of the respective columns of the table; figures show median values. The first row shows the RMSEs for the 3 family planning service statistics considered in the study, while the bottom 3 rows show the median figures for variance, level bias, and slope bias errors, respectively.

RMSEs were modest for all commodities distributed to clients and service visits data (7% and 10%, respectively), but somewhat higher for current contraceptive users data (19%). Variance and slope bias tended to be relatively small for all 3 data elements. Level bias, on the other hand, was far and away the largest contributor to tracking error. Median levels of level bias ranged from a low of 31% for commodities data to a high of 58% for current users data, even with the several adjustments made in our analyses. Estimates of mCPR derived from service statistics (e.g., EMUs) tended to be lower than the estimates derived from surveys, but this tendency was far from

Level bias was the largest contributor to error in program data estimates.

TABLE 2. Median MSE Results Across Countries Providing at Least 1 Service Statistics Data Element

| MSE Component | Commodities to Clients Data (21 Countries) | Service Visits Data (7 Countries) | Current Users Data (8 Countries) |
|---------------|---|--------------------------------------|-------------------------------------|
| RMSE | 0.0695 | 0.0961 | 0.1864 |
| Variance | 0.0014 | 0.0002 | 0.0012 |
| Level bias | 0.3114 | 0.3452 | 0.5774 |
| Slope bias | 0.0114 | 0.0069 | 0.0104 |

Abbreviations: MSE, mean square error; RMSE, root mean square error.

universal (Table 3). Estimates based upon current users data were in fact equally likely to be higher versus lower than the corresponding survey-based estimates.

Because different sets of countries contributed to the figures for the respective data elements shown in Table 2, there is the danger that the comparisons shown in the table are confounded by country differences in the underlying quality of service statistics, irrespective of type of data. If this were to be the case, the data shown in Table 2 would be less than optimal for addressing the question of which of the 3 service statistics data elements performs best in tracking mCPR. To draw more valid conclusions, we undertook a series of paired comparisons among countries that could provide 2 or more of the data elements. The results, shown in Table 4, indicate an advantage for commodities to clients data versus both service visits and current users data with regard to overall RMSE. The advantage was somewhat larger when comparing commodities to clients data with current users data, but we noted that the slope bias for the users data was slightly lower than for the commodities data. The results for service visits versus current users data were based upon too few countries to draw

firm conclusions, but the data available suggested no clear preference.

DISCUSSION

The study findings are instructive with regard to the potential for making greater use of service statistics to track the progress of national family planning programs in low- and middle-income countries. On the less positive side, RMSEs ranged from 7% to 19%, and the results suggest that despite improvements in national health information systems used for family planning service statistics and the analytic adjustments introduced in this study, none of the family planning data elements we addressed tend to track survey-based estimates of mCPR very well with regard to level. Of the components of MSE, level bias was consistently the largest, and by a considerable margin. It is possible that making an additional adjustment for non-reporting by service delivery points would further reduce level bias, but our experience with some countries during related work indicates that this will not always be the case.^{13,14} We did not attempt such adjustments in the analyses reported here due to insufficient consistency in the reporting rate information provided by the participating countries.

Estimates based on family planning program data alone did not match mCPR estimates based on survey data.

TABLE 3. Relationship Between Service Statistics Estimates and Survey-Based Estimates of mCPR

| Relationship | Commodities to Clients Data (21 Countries) | Service Visits Data (7 Countries) | Current Users Data (8 Countries) |
|--|---|--------------------------------------|-------------------------------------|
| Service statistics estimates always < survey estimates | 14 | 5 | 3 |
| Service statistics estimates always > survey estimates | 5 | 1 | 4 |
| Varies by year | 2 | 1 | 1 |

Abbreviation: mCPR, modern contraceptive prevalence rate.

TABLE 4. Pairwise Comparisons of Median MSE Across Countries Providing at Least 2 Service Statistics Data Elements

| MSE Component | Commodities vs. Visits (6 Countries) | | Commodities vs. Users (7 Countries) | | Visits vs. Users (3 Countries) | |
|---------------|---|-------------|--|------------|-----------------------------------|------------|
| | Commodities Data | Visits Data | Commodities Data | Users Data | Visits Data | Users Data |
| RMSE | 0.0859 | 0.1182 | 0.1019 | 0.2216 | 0.2163 | 0.2115 |
| Variance | 0.0009 | 0.0001 | 0.0010 | 0.0013 | 0.0003 | 0.0008 |
| Level bias | 0.4054 | 0.4483 | 0.3103 | 0.5664 | 0.6015 | 0.5904 |
| Slope bias | 0.0029 | 0.0112 | 0.0161 | 0.0079 | 0.0158 | 0.0129 |

Abbreviations: MSE, mean square error; RMSE, root mean square error.

Note: Data from the 2 countries that collect all 3 types of service statistics are included in this table.

Service statistics data can be used in conjunction with the Family Planning Estimation Tool to produce better estimates of family planning program performance at the population level than using service statistics data alone.

On a more encouraging note, our results indicate that variance errors—or annual fluctuations in service volumes—tend not to be sufficiently large as to compromise annual tracking. This is important, as even with low levels of bias, annual estimates with high variability from year to year would not be of much practical use in tracking program performance. Yet more encouraging is that the slopes or trend lines constructed from the service statistics tend to track the trend lines constructed from survey data reasonably well.

In view of these findings, **how might one best use family planning service statistics to track family planning program performance at the population level?** Our recommended approach is not to use service statistics data to make direct, stand-alone estimates of CPR or mCPR, but rather to use them in conjunction with the Family Planning Estimation Tool (FPET).¹⁵ FPET is a modified version of the United Nations Population Division's FPEM that is designed to (1) permit individual countries to access the model to run country-specific analyses and projections and (2) incorporate service statistics into the estimation process. Individual countries can use these capabilities to obtain "best estimates" of past trends and to project them to years subsequent to the most recent national survey. A limitation of FPET is that the uncertainty bounds around annual estimates of mCPR grow large very quickly as the number of years since the last survey increases. On the other hand, a benefit of FPET is that including service statistics data informs only the trend (slope) of the estimates, thus avoiding the level bias observed in this study (the level of FPET estimates are informed by survey-based data, which are assumed to be more accurate). The key point is that the combination of the 2 sources—service statistics and FPET—employs the information from each that it is best

positioned to provide. Further information on FPET, including instructions for using service statistics along with survey data, may be found on the Track20 Project website.¹⁵ Note that 13 countries incorporated service statistics into their FPET projections for the 2017 FP2020 annual report.¹⁶

Is there a preferred data element for tracking program progress at the population level? Our analyses, albeit based upon a limited number of countries in which it was possible to make country-specific, paired comparisons, indicate a preference for commodities to clients data, but with the important nuance that none of the 3 data elements we considered performs well in tracking *levels* of mCPR. However, all 3 data elements appear to perform well enough with regard to tracking mCPR *trends* to be useful in FPET applications as described above. The individual country calculations provided in [Supplement 5](#) demonstrate considerable variability from country to country. In view of this, the choice of preferred data element is best made on a country-by-country basis, depending upon the relative performance of the respective data elements in each country. More countries collect data on commodities distributed to clients than data on client service visits or current contraceptive users, perhaps reflecting greater perceived utility, and in a sizable number of countries, commodities to clients data may be the only option available.

Strengths and Limitations

This study is based on data from 22 countries spanning both Asia and Africa. Population-based surveys make results and underlying datasets publicly available; however, there is no global repository for or system for disseminating service statistics. This article represents one of the most

comprehensive assessments of family planning service statistics available. While we feel that the wide selection of countries provides a robust overview, we recognize that our data reflect only a snapshot of health information systems across the developing world and that our conclusions may not fit all countries.

The countries included in our analyses self-selected to be pledging countries for the global FP2020 initiative and thus may be viewed as having above-average levels of government commitment to family planning among other low- and middle-income countries. Whether this translates into comparable commitment to and success in strengthening their routine data systems is unknown. We lack a comparable indicator of government commitment to improving routine data systems, and thus are unable to judge whether the countries included in the study are atypical in this regard.

Finally, we note that while countries are increasingly interested in making use of service statistics to generate estimates of population-level outcomes such as mCPR, for reasons described earlier in the article, service statistics data have merit and utility for other important purposes over and above their ability to track population-level outcomes. Among these purposes are routine program monitoring, micro-planning at the facility level, and strategy development and decision making at the national and subnational levels.

CONCLUSION

Estimates of the mCPR derived directly from family planning service statistics lack sufficient accuracy to serve as stand-alone substitutes for survey-based estimates. However, data on contraceptive commodities distributed to clients, and to a lesser extent family planning service visits and current users, have relatively modest variability from year to year and tend to track trends in mCPR fairly accurately. When used in conjunction with survey data and new estimation tools, they can be used to produce defensible annual approximations of the mCPR in the absence of annual surveys.

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ORIGINAL ARTICLE

Community-Based Management of Acute Malnutrition to Reduce Wasting in Urban Informal Settlements of Mumbai, India: A Mixed-Methods Evaluation

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Under the NGO–government partnership, wasting among children under age 3 decreased by 28% in intervention areas and by only 5% in comparison areas. Success factors included persuading and engaging with communities including delivery of tailored information, close presence and supervision of field staff, and holistic management of other issues beyond acute malnutrition. This intensive approach may be challenging for the government to adapt effectively at large scale.

ABSTRACT

Background: We evaluated an adaptation of a large-scale community-based management of acute malnutrition program run by an NGO with government partnerships, in informal settlements of Mumbai, India. The program aimed to reduce the prevalence of wasting among children under age 3 and covered a population of approximately 300,000.

Methods: This study used a mixed-methods approach including a quasi-experimental design to compare prevalence estimates of wasting in intervention areas with neighboring informal settlements. Cross-sectional data were collected from March through November 2014 for the baseline and October through December 2015 for the endline. Endline data were analyzed using mixed-effects logistic regression models, adjusting for child, maternal, and household characteristics. In addition, we conducted in-depth interviews with 37 stakeholders (13 staff and 24 mothers) who reported on salient features that contributed to successful implementation of the program.

Results: We interviewed 2,578 caregivers at baseline and 3,455 at endline in intervention areas. In comparison areas, we interviewed 2,082 caregivers at baseline and 2,122 at endline. At endline, the prevalence of wasting decreased by 28% (18% to 13%) in intervention areas and by 5% (16.9% to 16%) in comparison areas. Analysis of the endline data indicated that children in intervention areas were significantly less likely to be malnourished (adjusted odds ratio, 0.81; confidence interval, 0.67 to 0.99). Stakeholders identified 4 main features as contributing to the success of the program: (1) tailoring and reinforcement of information provided to caregivers in informal settings, (2) constant field presence of staff, (3) holistic case management of issues beyond immediate malnourishment, and (4) persistence of field staff in persuading reluctant families. Staff capabilities were enhanced through training, stringent monitoring mechanisms, and support from senior staff in tackling difficult cases.

Conclusion: NGO–government partnerships can revitalize existing community-based programs in urban India. Critical to success are processes that include reinforced knowledge-building of caregivers, a high level of field support and encouragement to the community, and constant monitoring and follow-up of cases by all staff levels.

INTRODUCTION

Tackling child malnutrition is critical for child survival and sustainable development.^{1–4} Globally, 17 million children under 5 suffer from severe wasting, and India is home to approximately one-third of these children.^{5,6} Though recent national surveys show improvements in child malnutrition indicators across

India, absolute levels remain high, with 15% of children being wasted or low weight-for-height.^{7,8}

The Ministry of Women and Child Development in India has been running the Integrated Child Development Services (ICDS) since 1975 to address child malnutrition. ICDS tracks the underweight or weight-for-age status of children up to 6 years of age through a network of informal preschools called Anganwadi centers. Each center is staffed with a community-based worker and helper who provide nutritional supplementation to children and pregnant women, basic informal education

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WHO recommends community-based management of acute malnutrition, but India has yet to formulate national guidelines.

The SNEHA CMAM program screened over 30,000 children under age 3 and over 5,600 pregnant women.

to children, and health education to mothers. While there are currently around 1.3 million Anganwadi centers functioning across local communities in India, the current policy focus for wasted children has been on hospital-based management through nutrition rehabilitation centers.⁹ Limitations of hospital-based treatment include poor cultural acceptance, hospital-acquired infections, and high relapse rates, which highlight the need for community-based therapeutic care for acute malnutrition in India.¹⁰⁻¹²

The World Health Organization (WHO) recommends community-based management of acute malnutrition (CMAM), which includes community outreach for the screening of acutely malnourished children, outpatient management, provision of ready-to-use therapeutic food (RUTF), and inpatient treatment of medical complications.¹³ While CMAM has been adopted by many countries worldwide, India has yet to formulate national guidelines for a CMAM strategy.

The intervention studied in this article is an adaptation of the CMAM approach that was designed for integration with ICDS growth monitoring activities at the Anganwadi centers. The intervention was implemented by the Society for Nutrition, Education and Health Action (SNEHA), in partnership with ICDS, in urban informal health settlements of Mumbai, India, to reduce the prevalence of wasting among children under age 3. This article reports on a quantitative evaluation of wasting prevalence in intervention communities along with a qualitative study of stakeholders who identified salient features that contributed to the success of the program.

PROGRAM DESCRIPTION

The SNEHA CMAM program was implemented between November 2011 and March 2016 to provide a continuum of care for pregnant women and children up to age 3 in Dharavi, an informal settlement in Mumbai. The approach incorporated prevention strategies for all children, along with active case-finding and screening for wasting by SNEHA frontline health workers. Children were categorized as experiencing either severe acute malnutrition or moderate acute malnutrition, based on weight-for-height anthropometric measurements. While the program's primary focus was on treatment of children who were wasted, key activities also included monthly growth monitoring of all children at the Anganwadi centers, home-based counseling on infant and child feeding practices to pregnant women and mothers of

all infants under 6 months of age, promotion of vaccinations, appropriate referrals to public health facilities, and regular follow-up. Severely wasted and eligible moderately wasted children were also given a locally produced RUTF called medical nutrition therapy. An overview of SNEHA CMAM program activities is provided in [Table 1](#).

Along with ICDS, the SNEHA program worked with the community health posts and the tertiary hospital, Lokmanya Tilak Municipal General Hospital (LTMGH), run by the Municipal Corporation of Greater Mumbai (MCGM). The Nutritional Rehabilitation and Research Center (NRRC), located within the LTMGH Urban Health Center, screens and admits severely wasted children and also provides medical nutrition therapy.

Intervention Areas

The program covered approximately 300,000 people in Dharavi in 4 phases, encompassing 300 Anganwadi centers. The 300 centers included all those that were functioning in Dharavi at the time of program implementation; ICDS organized the centers into 10 administrative areas, consisting of 30 centers per administrative area. From inception, the SNEHA CMAM program screened over 30,000 children under age 3 and over 5,600 pregnant women.

Intervention Team

The program relied on a broad base of frontline health workers who delivered program activities. At the time of the study, approximately 75 frontline health workers and 10 program officers supervised frontline health workers at the field level, all employed by SNEHA. Three program coordinators led the field teams and reported to the associate program director and program director. The program had a full-time training officer who was assisted by the program coordinators in organizing and leading the trainings. External technical experts were also brought in to assist and co-lead trainings. [Figure 1](#) depicts the staffing structure of the SNEHA CMAM program.

Profile and Training of Frontline Health Workers

Each frontline health worker collaborated with 3 Anganwadi centers to cover all pregnant women and children under 3 in the service areas, covering at least 750 households. Each frontline health worker monitored approximately 150 to 180 children at a given time during the intervention. Frontline health workers received intensive and

TABLE 1. Overview of Program Activities

| Activity | Description of Activity |
|--|--|
| Growth monitoring | SNEHA and ICDS frontline health workers jointly mobilized caregivers to bring children to the Anganwadi centers for monthly growth monitoring. The weight and height of all children in the community ages 0 to 6 years was measured. SNEHA frontline health workers used a mobile application to calculate weight-for-height nutrition grades and track information for children under age 3. Monthly growth monitoring enabled SNEHA frontline health workers to screen for severely and moderately wasted children and identify children at risk, including children faltering into malnutrition. |
| Home visits by SNEHA frontline health workers | SNEHA frontline health workers visited the homes of pregnant women and specific target groups of children under age 3 (severely wasted, moderately wasted, 0–6 months of age, and sick children). Caregivers, typically mothers, were counseled on various topics, including nutritious food habits and choices, age-appropriate nutrition, lactation and weaning, immunization, hygiene, and access to health services. SNEHA frontline health workers were trained on the topics of counseling and effective communication skills. Each target group had a specific protocol for the nature and frequency of visits, and program officers monitored the frequency and quality of the home visits. |
| Community-based medical nutrition therapy distribution | Medical nutrition therapy is a nutrient-dense dietary supplement for treating severely malnourished children. The peanut- and milk-based preparation was provided by the MCGM NRRC. Severely wasted or severely underweight and wasted children ages 7 to 36 months who have passed an appetite test and had no medical complications were eligible for medical nutrition therapy. Children were screened for complications by a pediatrician at a health camp or the NRRC before medical nutrition therapy treatment was initiated. Children were typically prescribed an 8-week treatment protocol with doorstep delivery of supplements and monitoring of consumption by SNEHA frontline health workers. |
| Health camps | Periodic health camps were organized by SNEHA in community spaces where a pediatrician checked wasted and sick children referred by SNEHA frontline health workers. Doctors validated the nutrition grade of the child, screened for complications, treated illnesses, prescribed medical nutrition therapy, and referred children for inpatient care. Other children also accessed the camps for minor ailments. |
| Referrals for MCGM and ICDS health services | Health posts are primary health facilities run by MCGM and responsible for numerous health prevention and promotion activities including distribution of iron-folic acid tablets and vitamin A syrup, deworming drives, immunizations, and detection and treatment of tuberculosis, leprosy, and malaria. SNEHA frontline health workers referred cases of illness and immunization to health posts and facilitated participation in deworming and vitamin A drives. The NRRC health facility is a center for inpatient and outpatient management of children with severe acute malnutrition; the NRRC validated the anthropometry conducted by SNEHA frontline health workers, conducted appetite tests and prescribed medical nutrition therapy, admitted and treated children with minor complications, and further referred children with severe complications to LTMGH, the tertiary MCGM hospital. SNEHA frontline health workers also referred children for services provided by ICDS including cooked meals and take-home rations. |
| Group meetings and community events | Health behavior change activities were conducted in the community, in partnership with MCGM and ICDS, through games, group discussions, celebrations, cooking demonstrations, and screening of educational movies. Events included breastfeeding initiation ceremonies, baby shower celebrations, and International Breastfeeding and Nutrition week. Every 6 months, mothers whose children recovered and remained recovered from severe wasting were celebrated in the community. |

Abbreviations: ICDS, Integrated Child Development Services; LTMGH, Lokmanya Tilak Municipal General Hospital; MCGM, Municipal Corporation of Greater Mumbai; NRRC, Nutrition Research and Rehabilitation Center; SNEHA, Society for Nutrition, Education and Health Action.

repeated trainings, with emphasis on building both knowledge and skills. **Box 1** provides an overview of frontline health workers in the program.

Program Objectives

The primary objective of the SNEHA CMAM program was to reduce the prevalence of wasting among children under 3 years old residing in the intervention areas of Dharavi. Secondary objectives included improved infant and young child

feeding practices, immunization coverage, vitamin A supplementation, and utilization of government health services.

Program Funding and Costs

The SNEHA CMAM program raised funds through philanthropic foundations, corporate foundations, and individual philanthropists. The funders had no role in study design, data collection, data analysis, or preparation of this article. The total approximate running cost of the program covering



Frontline health workers from the Society for Nutrition, Education and Health Action and Integrated Child Development Services conduct a group session together. © 2015 Aahar field team/SNEHA

the entire duration of the program was 56.5 million Indian rupees (INR), or approximately US\$868,217 (Reserve Bank of India Reference Exchange Rate, US\$1 = INR 64.5, July 2017). The main costs were for project personnel (64%) and project administration and implementation (33%), which included training, meeting and event costs, monitoring and evaluation costs, and other field expenses. The cost of running the program was to some extent subsidized because of the already available network of municipal health facilities, including an established and well-run NRRC at the

local municipal hospital. Costs were also minimized through the use of lower-cost, locally produced RUTF provided by the NRRC.

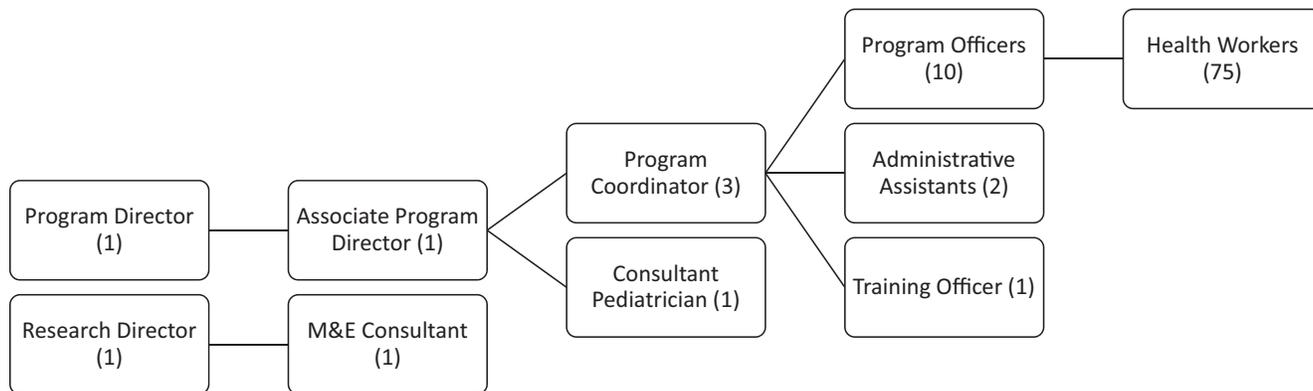
Routine Program Monitoring

The software used for electronic data collection, CommCare, is an open-source, mobile-based platform to aid community health workers in data collection and case management. The application functions offline where Internet connectivity is limited and enabled frontline health workers to continuously track and update the status of women and children that were screened. Questionnaires to monitor key outcomes and processes during routine activities were finalized using paper-based forms and then programmed in the CommCare application. The information collected by frontline health workers was sent to the server over a cellular data network and downloaded to Microsoft Excel for reporting and analysis. The system can be easily developed by project staff and scaled throughout an organization or government entity committed to the process of electronic data collection and standardized reporting. Please refer to the [supplement](#) for more details of the program.

METHODS

We used a quasi-experimental cross-sectional survey design with a comparison area to examine prevalence and association of wasting with program exposure among children under 3 in intervention areas. We also conducted a qualitative

FIGURE 1. Organogram of SNEHA CMAM Program, January–March 2016



Abbreviations: CMAM, Community-based Management of Acute Malnutrition; M&E, monitoring and evaluation; SNEHA, Society for Nutrition, Education and Health Action.

BOX 1. Frontline Health Workers in the Society for Nutrition, Education and Health Action (SNEHA) Community-based Management of Acute Malnutrition (CMAM) Program

Background: Close to 90% of the frontline health workers were women and over two-thirds were married. Approximately 78% had completed secondary school (tenth grade), and over 50% of all frontline health workers had completed higher secondary school (twelfth grade).

Recruitment and remuneration: Frontline health workers were recruited through advertisements or through informal networks, followed by interviews with senior program staff. They were paid a fixed monthly allowance and their contracts were renewed annually. Routine performance-based incentives were not given; however, during community events their hard work was appreciated and verbally praised.

Responsibilities:

- Understand community needs and develop rapport with community members.
- Conduct home visits with target groups (malnourished children, pregnant women, and children under 6 months of age).
- Work with Integrated Child Development Services (ICDS) frontline health workers to conduct anthropometry of all children under 6 years of age.
- Ongoing identification of children under 3 and pregnant women.
- Plan, mobilize attendees, facilitate, and document community group sessions on relevant topics.
- Assist with events, campaign logistics, and mobilizing community participation.
- Refer cases to municipal health facilities and follow up on cases.

Supervision: Program officers supervised and randomly observed frontline health workers conducting home visits. They provided individualized feedback on the quality of the counseling, covering both communication strategies and technical content. Frontline health workers reported all activities completed to their program officers on a daily basis. Home visits, anthropometry sessions, and event details were recorded manually and electronically in smartphones through the CommCare mobile application.

Training: Frontline health workers are intensively trained for knowledge and counseling skills. Details of the different types of training given to them are illustrated below.

Training Details for Frontline Health Workers: Illustrative Data From 2015

In 2015, 30 new training sessions, lasting 6 hours each, and 18 follow-up/repeat sessions, lasting 2–4 hours each, were conducted. Of the 30 new training sessions, 11 were thematic, 2 covered technical issues, 13 focused on skills development, and 4 centered on behavioral issues.

- **Thematic:** Sessions that impart knowledge on breastfeeding, anthropometry, the importance of nutrition, localized recipes, household and personal hygiene, illness management, antenatal and prenatal care, and child development.
- **Technical:** Sessions that cover use of the CommCare mobile application.
- **Skills development:** Sessions that cover interpersonal communication, art of listening, negotiating with the community, and body language in the community.
- **Behavioral skills:** Sessions that enable field health workers to cope with their own emotions while working in the community and to maintain relationships in the community.

study between January and July 2016 across all 10 areas of intervention, including pilot areas.

Quasi-Experimental Study Design

Selection of Intervention Areas

Due to the complex nature of the intervention, SNEHA piloted various iterations of the program processes across the first 150 Anganwadi centers (5 administrative areas) between 2011 and 2013, and then scaled up the program to the remaining 150 centers in 2014. To study the effectiveness of the SNEHA CMAM approach, we evaluated the 5 administrative areas where the CMAM program was implemented after piloting was completed.¹⁴ All 150 Anganwadi centers from the 5 scale-up areas were included in the quasi-experimental evaluation and the SNEHA

CMAM program ran for approximately 16 months before endline data collection.

In intervention areas, we collected baseline information from March through July 2014 from the caregivers of children under age 3. Intervention area baseline questionnaires covered socioeconomic status (education, occupation, asset ownership, housing status), household and environmental sanitary conditions (water supply and treatment, toilet ownership), infant and young child feeding practices, illness prevalence in children (diarrhea and acute respiratory infections), and utilization of government services for maternal and child health (ICDS, MCGM). We included the 2012 Progress out of Poverty Index (PPI) to assess the likelihood that a household is living below specific poverty lines. The PPI incorporates

household characteristics (number of children residing in household, type of fuel, father's education, and occupation) and asset ownership (10 small and large assets). Height/length and weight of the youngest child under 3 and the height and weight of the mother were taken.

Selection of Comparison Areas

In consultation with ICDS, we purposively selected 107 Anganwadi centers in nearby informal settlements of Wadala, Mumbai, as the comparison area. To the best of our knowledge, no nutrition rehabilitation centers were available in those areas, nor was there any other organization other than ICDS providing child nutrition services, such as growth monitoring, counseling, or food supplementation to children under age 3. The objective of the baseline in comparison areas was to give us a reliable indication of whether the areas were plausible comparison areas to implement a more rigorous evaluation at endline. We conducted a short baseline survey with the primary caregivers of children under 3, between September and November 2014, to measure the prevalence of wasting, the 10 indicators that encompass the PPI to compare socioeconomic characteristics, and any exposure to SNEHA activities.

Seasonality

Seasonality and associated periods of food insecurity have been linked to higher rates of malnutrition in rural India.¹⁵ In our experience, the incidence of wasting in urban informal settlements of our intervention areas were similar over an entire year, with the exception of the heavier monsoon months of July and August when children suffer greater levels of illness and diarrhea. We did our best to avoid collecting data during this heavy monsoon period. We examined our monitoring intervention data to estimate monthly incidence of wasting, as well as the monthly prevalence estimates of wasting from the evaluation data. We did not observe any clear patterns of seasonality that would impact our results.

The questionnaire used at baseline in intervention areas was also used at endline, from October through December 2015, with additional questions on program processes and migration patterns during the intervention period. The same endline survey tool was used in both intervention and comparison areas; investigators collected all information electronically using the CommCare mobile application.

Sample Size

We estimated sample sizes to capture a 25% reduction in wasting prevalence from baseline to endline in intervention areas. We assumed 15% prevalence of wasting at baseline, $\rho=0.04$, $\alpha=0.05$, 2-sided, and $\text{power}=0.80$. At baseline we sampled caregivers in all 150 intervention service areas, with a target of 18 respondents per area, totaling a target sample of 2,700 interviews. At endline we sampled each center in the intervention area with a target of 23 respondents, totaling a target sample of 3,450 interviews.

We increased the sample size for the intervention areas at endline due to our experience with the fluctuating nature of residency in the informal settlements. Throughout the intervention we observed substantial mobility of children and families in and out of the communities. Families went to the villages where they were born for extended periods, moved within the same informal settlement, moved to other parts of Mumbai, or they left the city altogether. In our monitoring data we estimated that approximately 30% of the children who left our program before turning 3 years of age fit in this broad category of children who were no longer at the residence where they lived at the time of screening. Assuming the influx of families was similar to the observed outflow, we increased the intervention-area target samples at endline in case we wanted to limit the intervention sample to children with a minimum level of time-exposure to the intervention areas. In the comparison areas, we sampled 107 Anganwadi center service areas at baseline and at endline, with a target of 20 respondents per center, approximately 2,140 total respondents for each round.

Data Collection Procedures

We used a modified systematic sampling approach to recruit respondents in the intervention areas. We conducted a house listing process, followed by random selection of a household as the starting point. Investigators spun a pen to determine which direction to move and then continued to every third household within the boundaries of that Anganwadi center service area until the target number of caregivers were identified and agreed to be interviewed. If a caregiver had more than one child under age 3, information was collected for the youngest child.

In the comparison areas, where we had not conducted a house listing activity due to resource constraints, the boundaries within each center service area were shown to the investigators and

The incidence of wasting in urban settlements remained constant, with the exception of July and August during heavy monsoons.

their supervisors by the ICDS staff. These endpoints were the starting points for data collection and investigators continued on to every third household within the service area until the target sample size was achieved.

Anthropometric data was collected using a standardized protocol. Bubble levels (manufactured by Freemans Measures Pvt. Ltd.) were used to verify that weighing locations were flat. Children and infants under 2 years of age lay or sat on an electronic baby weighing scale (manufactured by Nitiraj Engineers Pvt. Ltd.) with an accuracy of ± 10 grams and their lengths were measured on an infantometer (manufactured by Meditrin Instruments Pvt. Ltd.). All children over 2 years of age were weighed on an adult mechanical weighing scale and their heights were measured using a measuring tape with an accuracy of ± 0.1 cm and a wooden triangle to assist in marking the height with a pencil. Investigators confirmed that the scale was at 0 before the weighing of each child, and weighing scales were calibrated daily. Investigators took all measurements twice in pairs, with random cross-checking by supervisors. Indicators of wasting are derived from standardized z scores of weight-for-height/length anthropometric measurements. Wasting is defined as a weight-for-height z score 2 standard deviations below the median WHO growth standard (< -2 SD) and severe wasting is 3 standard deviations below the median WHO growth standards (< -3 SD). Anthropometric z scores were calculated using Emergency Nutrition Assessment software. Children with outlier values of weight-for-height z score > 5 SD or < -5 SD were removed from the analysis, along with children who had significant discrepancies in their height or weight measurements.¹⁶

Statistical Analysis

All statistical analyses were done in STATA 12.0 (StataCorp, College Station, TX). To compare prevalence levels of wasting, socioeconomic characteristics, infant and young child feeding practices, immunization, and government program coverage outcomes across intervention and comparison areas, we used Pearson chi-square for categorical variables and t tests for means. For the regression analysis of the endline data, we created a dummy variable for children living in the intervention or comparison areas. We estimated mixed-effects logistic regression models where the outcome of wasting was regressed against the intervention dummy variable,

adjusting for child, maternal, and household characteristics selected from literature.^{17–20}

Qualitative Study Design

We undertook a qualitative study between January and July 2016 across all 10 intervention areas, including pilot areas. The primary source of data for this study was in-depth interviews with 37 stakeholders (24 mothers and 13 staff).

Interviews With Mothers

We purposively sampled 24 mothers from all 10 administrative areas using the following criteria: their children were severely wasted, moderately wasted, or normal; few complicated cases that needed hospital intervention; severely wasted children who consumed/did not consume medical nutrition therapy; families that needed intensive persuasion to participate; children who relapsed; and women who were pregnant. Data from the interviews were triangulated with information from 3 focus group discussions with frontline health workers, 12 observation sessions, a review of monitoring data, and analysis of purposively selected success case stories routinely documented by frontline health workers. One limitation of case stories was that they documented information related to program successes only. Approximately 140 case stories were available from 2015; we chose 46 diverse case studies.

Staff Interviews

All senior staff implementing the program were interviewed. Three of 10 program officers and 6 of 75 frontline health workers were purposively selected for the interviews to obtain diversity in age, gender, and length of association with the program. The majority of the staff were female. Staff who had been associated with the program for less than 6 months were excluded.

A team of 2 independent investigators conducted the interviews and the focus group discussions. The duration of the interviews was 40 minutes on average, with a range of 20 to 90 minutes. The team interviewed mothers in their homes in Hindi and program staff in SNEHA field offices in a mixture of Hindi and English. We translated the tools for the study from English to Hindi and pretested them. We dropped 1 interview from the analysis due to non-completion. A summary of data collection methods used for the qualitative study is provided in Table 2.

TABLE 2. Data Collection Methods for the Qualitative Study

| Category | Details | Themes Explored |
|---|---|--|
| In-depth interviews (N=37) | | |
| Senior staff | Program head (discussion), implementation management (n=3), health camp doctor (n=1) | General experiences with the program, its conceptualization and its components, changes in the program, perceived achievements and challenges, working in partnerships, and sustainability under different models of implementation. Health camp doctor: implementation of the camp, perceived benefits of the camp, challenges, and role of health camps in the program. |
| Field team | SNEHA frontline health workers (n=6), SNEHA program officers (n=3) | Sharing typical work-week activities and roles played, experiences, perceived achievements and challenges faced, and case illustrations. |
| Community | Total interviews: 24 Maximum diversity sample including mothers of severely wasted, moderately wasted, non-wasted, pregnant women; by age (0–6 years and above)/gender/religion; purposively sampled some complicated cases) | Stories of interaction and familiarity with the program, perspectives (positive and negative) on various activities, suggestions for the program. |
| Focus group discussions (N=3) | | |
| Field team (SNEHA frontline health workers) | 3 focus group discussions, with 6 SNEHA frontline health workers per group | Protocols, time allocation to different activities, interaction with the community, program officers, and senior management. |
| Observations (N=12 sessions) | | |
| Home visits by SNEHA frontline health workers | Over 2-week period: 8 visits, approximately 20 minutes each | General processes, nuances of interaction with the community, process through which the SNEHA frontline health workers communicate information. |
| Growth monitoring | Over 2-week period: 4 sessions, half a day each | Growth monitoring process in the Anganwadi centers, community mobilization, and management of crowd during weighing and taking of measurements. |
| Site visit | NRRC and urban health post, 1-time observation | Crowd, physical infrastructure, placement of SNEHA staff at the NRRC, general familiarity of the field staff with the place. |
| Descriptive monitoring data and case stories | | |
| Descriptive monitoring data | Already exists in the program | Size and coverage of the program—number of beneficiaries, number of children monitored, number of home visits recorded. |
| Case stories | Already existed in the program to document successful cases to promote best practices. About 140 stories were recorded in 2015; we selected 46 diverse cases, translated them into English, and analyzed them. | Interaction of the field team with caregivers, process of identification of malnutrition, intervention with the family. |

Abbreviation: SNEHA, Society for Nutrition, Education and Health Action.

Management and Analyses of Qualitative Data

All interviews and focus group discussions were voice-recorded, transcribed verbatim into English, and anonymized. We entered the transcripts and field notes from observation in NVivo (version 10). We analyzed the data using the 3 steps described by Miles and Huberman: (1) data reduction (selecting, simplifying, and condensing

data systematically), (2) data display (organizing information in structured models or themes), and (3) drawing conclusions (through careful examination of the displays generated).²¹ We used generic thematic analyses techniques for the data reduction process, wherein data was sifted through and codes were affixed to blocks of text. The preliminary themes used to examine

program activities were decided before conducting interviews (see Table 2 for the list of themes). After preliminary analysis, we open-coded for the following: (1) broad ideas that cut across different implementation components and were perceived by the community and staff to contribute to program success, and (2) mechanisms through which the program worked in the community. Two rounds of formal discussions were held, wherein all authors gave input on the findings.

Ethical Approval

The protocol, questionnaires, and informed consent forms for the CMAM program evaluation were reviewed and approved by the Institutional Ethics Committee, Holy Family Hospital, and Medical Research Centre, Mumbai. All respondents gave their written informed consent before participation in quantitative surveys and qualitative interviews and focus group discussions. Additionally, for the qualitative interviews, we recorded consent verbally when respondents from the community were not literate. All women we approached for the qualitative assessment consented to participate in the data collection.

RESULTS

Quasi-Experimental Study

For the baseline, a total of 2,578 caregivers were interviewed in intervention areas and 2,092 caregivers were interviewed in comparison areas. At endline, a total of 3,455 caregivers were interviewed in intervention areas and 2,122 caregivers in comparison areas. Table 3 provides demographics of households in intervention and comparison areas at endline. Demographics among children (e.g., age, gender, and birth weight) in both areas were similar at endline. Although mothers were similarly educated and largely not working, the mothers' mean body mass index (BMI) and mean age at marriage were significantly lower in the comparison areas at endline. Mean BMI was 22.8 in intervention areas and 22.3 in comparison areas ($P \leq .01$); similarly, mean age at marriage was 20.3 years versus 19.9 years ($P \leq .05$). Mothers in intervention areas had a significantly different distribution in the location of their natal homes than mothers in comparison areas. Households in comparison areas had a significantly higher likelihood of poverty than intervention areas (73.7% versus 71.4%). However, households in intervention

TABLE 3. Household Demographics in Intervention and Comparison Areas at Endline, October–December 2015

| | Intervention (N=3,455) ^a | Comparison (N=2,122) ^a |
|--|--|--------------------------------------|
| Children | | |
| Age, months, mean | 16.3 | 16.8 |
| Female, % | 46.3 | 47.6 |
| Low birth weight (<2.5 kg), % | 21.5 | 21.3 |
| Mothers | | |
| Education, % | | |
| Illiterate, primary, informal | 20.1 | 21.2 |
| Secondary (grades 5–10) | 56.7 | 57.7 |
| Higher secondary and above (grade 11 and above) | 23.2 | 21.0 |
| Not employed, % | 93.8 | 94.9 |
| Body mass index, mean | 22.8 | 22.3** |
| Place of birth, % | | |
| South India | 7.7 | 2.4*** |
| North and Central India | 17.5 | 29.2 |
| East and Northeast India | 12.0 | 5.1 |
| West India | 14.5 | 25.9 |
| Mumbai | 48.4 | 37.4 |
| Age at marriage, mean | 20.3 | 19.9* |
| Households | | |
| Years of residence in Mumbai, % | | |
| Less than 1 year | 1.5 | 1.6 |
| 1–5 years | 6.4 | 5.0 |
| 6 or more years | 92.1 | 93.3 |
| Treatment of drinking water, ^b % | 32.9 | 32.1 |
| PPI: Likelihood below US\$2.16/day/ PPP line, % | 71.4 | 73.7** |
| Private toilet, % | 20.4 | 15.8 |
| Food insecurity, ^c % | 21.7 | 18.1* |
| Religion, % | | |
| Muslim | 45.2 | 37.5 |
| Hindu | 49.9 | 57.1 |
| Other | 5.0 | 5.5 |

Abbreviations: PPI, Progress out of Poverty Index; PPP, purchasing power parity.

Pearson chi-square for categorical variables and *t* tests for means.

* $P \leq .05$; ** $P \leq .01$; *** $P \leq .001$.

^aTotal sample sizes may vary due to missing values generated from data cleaning.

^bTreatment of drinking water includes chlorine, use of filter, solar disinfection, and boiling.

^cQuestion: "In the last month did you worry that your household would not have enough food?"

TABLE 4. Wasting, Socioeconomic Status, and Coverage of Services in Intervention and Comparison Areas at Baseline (March–July 2014 for Intervention, September–November 2014 for Comparison) and Endline (October–December 2015)

| | Baseline | | Endline | |
|--|-------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|
| | Intervention (N=2,578) ^a | Comparison (N=2,092) ^a | Intervention (N=3,455) ^a | Comparison (N=2,122) ^a |
| Wasting, % | 18.0 | 16.9 | 13.0 | 16.0** |
| Severe wasting, % | 3.8 | 3.3 | 2.3 | 3.9** |
| Moderate wasting, % | 14.2 | 13.6 | 10.6 | 12.1 |
| PPI: Likelihood below US \$2.16/day/PPP line, % | 72.6 | 77.3*** | 71.4 | 73.7** |
| Child received any service from SNEHA in previous month, % | 2.2 | 1.6 | 86.0 | 0.8*** |

Abbreviations: PPI, Progress out of Poverty Index; PPP, purchasing power parity; SNEHA, Society for Nutrition, Education and Health Action. Pearson chi-square tests comparing baseline intervention to baseline comparison areas and endline intervention to endline comparison areas. * $P \leq .05$; ** $P \leq .01$; *** $P \leq .001$.

^aTotal sample sizes may vary due to missing values.

Children in intervention areas had significantly lower odds of being wasted than children in comparison areas.

areas reported a significantly higher level of food insecurity in terms of worrying whether the household would have enough food to eat (21.7% as compared with 18.1%).

At baseline, caregivers in both comparison and intervention areas reported negligible levels of services received by SNEHA at less than 2%. At endline, after 16 months, more than 85% of sampled caregivers in intervention areas reported that they received services from SNEHA for their youngest child. Less than 1% of sampled caregivers in the comparison areas reported any services from SNEHA at endline, indicating that contamination was negligible. At endline we also asked caregivers whether the child had received any services from other organizations in the previous month; in both intervention and comparison areas, less than 1% reported getting any service from another organization for that child (data not shown). At both baseline and endline, PPI poverty likelihood estimates were significantly higher in the comparison areas, but socioeconomic levels remained relatively constant in both comparison and intervention areas.

At baseline, overall prevalence of wasting was not significantly differently between intervention and comparison areas. Prevalence of wasting from baseline to endline decreased by 28% (18.0% to 13.0%) in intervention areas and by 5% (16.9% to 16.0%) in comparison areas (Table 4). Severe wasting prevalence fell by 39% from baseline to endline—from 3.8% to 2.3%. The differences in overall wasting and severe

wasting prevalence levels at endline between intervention and comparison areas were significant, whereas the moderate wasting prevalence in intervention areas was lower but not significant.

We evaluated the program through logistic regression analysis of the endline data, comparing children residing in intervention areas with children residing in the comparison areas. Three logistic regressions models were used for the outcome of wasting: Model 1 adjusted for child characteristics; Model 2 adjusted for child and maternal characteristics; and Model 3 adjusted for child, maternal, and household characteristics (Table 5). All 3 models showed that children residing in intervention areas had significantly lower odds of being wasted (adjusted odds ratio [AOR], 0.81; 95% confidence interval [CI], 0.67–0.99 in Model 3), compared with neighboring comparison areas. Other factors for children that were also significantly associated with lower odds of wasting in all models included: being female (AOR, 0.76; 95% CI, 0.64–0.90 in Model 3); having a higher birth weight (AOR, 0.57; 95% CI, 0.49–0.66 in Model 3); having a mother with secondary level education as compared with primary or no education (AOR, 0.78; 95% CI, 0.63–0.98 in Model 3); and having a mother with a higher BMI (AOR, 0.96; 95% CI, 0.94–0.98 in Model 3). Factors for children significantly associated with a higher odds of wasting in all models included: having a mother born in east and northeast India as compared with south India (AOR 1.61; 95% CI, 1.00–2.59 in Model 3); a mother with higher age

TABLE 5. Multi-Level Logistic Regression Analysis of Household Demographics Associated With Wasting at Endline, October–December 2015

| | Null Model (N=5,524) | Unadjusted OR (N=5,524) | Model 1 ^a : AOR (95% CI) (N=4,913) | Model 2 ^a : AOR (95% CI) (N=4,889) | Model 3 ^a : AOR (95% CI) (N=4,869) |
|---|-------------------------|----------------------------|---|---|---|
| β_o (SE) | 0.154 (0.008) | 0.180 (0.013) | 1.122 (0.261) | 1.551 (0.798) | 0.673 (0.463) |
| Children | | | | | |
| Resides in intervention area | | 0.78 (0.64, 0.94)** | 0.80 (0.66, 0.97)* | 0.81 (0.67, 0.98)* | 0.81 (0.67, 0.99)* |
| Age, months | | | 1.00 (0.99, 1.01) | 1.00 (0.99, 1.01) | 1.00 (0.99, 1.01) |
| Female | | | 0.75 (0.63, 0.89)** | 0.75 (0.64, 0.89)** | 0.76 (0.64, 0.90)** |
| Birth weight | | | 0.53 (0.46, 0.62)*** | 0.56 (0.48, 0.65)*** | 0.57 (0.49, 0.66)*** |
| Mothers | | | | | |
| Education | | | | | |
| Illiterate, primary, informal | | | | 1 | 1 |
| Secondary (grades 5–10) | | | | 0.75 (0.60, 0.93)** | 0.78 (0.63, 0.98)* |
| Higher secondary (grade 11 and above) | | | | 0.74 (0.57, 0.97)* | 0.82 (0.62, 1.09) |
| Not employed | | | | 1.05 (0.67, 1.66) | 1.04 (0.66, 1.64) |
| Body mass index, mean | | | | 0.96 (0.94, 0.98)*** | 0.96 (0.94, 0.98)*** |
| Place of birth | | | | | |
| South India | | | | 1 | 1 |
| North and Central India | | | | 1.34 (0.87, 2.06) | 1.34 (0.86, 2.07) |
| East and Northeast India | | | | 1.60 (1.00, 2.54)* | 1.61 (1.00, 2.59)* |
| West India | | | | 1.23 (0.80, 1.89) | 1.21 (0.78, 1.87) |
| Mumbai | | | | 1.22 (0.82, 1.83) | 1.29 (0.86, 1.95) |
| Age at marriage, mean | | | | 1.02 (0.995, 1.05) | 1.03 (1.00, 1.06)* |
| Households | | | | | |
| Years of residence in Mumbai | | | | | |
| Less than 1 year | | | | | 1 |
| 1–5 years | | | | | 1.11 (0.52, 2.33) |
| 6 or more years | | | | | 0.92 (0.47, 1.81) |
| Treatment of drinking water ^b | | | | | 0.89 (0.74, 1.08) |
| PPI: Likelihood below the US\$2.16/day/PPP line | | | | | 2.06 (1.13, 3.74)* |
| Private toilet | | | | | 0.89 (0.70, 1.14) |
| Food insecurity ^c | | | | | 1.09 (0.88, 1.35) |
| Religion | | | | | |
| Muslim | | | | | 1 |
| Hindu | | | | | 1.23 (1.01, 1.49)* |
| Other | | | | | 1.12 (0.73, 1.73) |

Continued

TABLE 5. Continued

| | Null Model (N=5,524) | Unadjusted OR (N=5,524) | Model 1 ^a : AOR (95% CI) (N=4,913) | Model 2 ^a : AOR (95% CI) (N=4,889) | Model 3 ^a : AOR (95% CI) (N=4,869) |
|--------------------------------------|-------------------------|----------------------------|---|---|---|
| SD (SE) | 0.433 (0.061) | 0.416 (0.061) | 0.356 (0.072) | 0.330 (0.077) | 0.325 (0.078) |
| Intracluster correlation coefficient | 0.05 | 0.05 | 0.04 | 0.03 | 0.03 |

Abbreviations: PPI, Progress out of Poverty Index; PPP, purchasing power parity; SD, standard deviation; SE, standard error.

Statistical significance is calculated using mixed-effects logistic regression models.

* $P \leq .05$; ** $P \leq .01$; *** $P \leq .001$.

^aModel 1 adjusted for child characteristics; Model 2 adjusted for child and maternal characteristics; and Model 2 adjusted for child, maternal, and household characteristics.

^bTreatment of drinking water includes chlorine, use of filter, solar disinfection, and boiling.

^cQuestion: "In the last month did you worry that your household would not have enough food?"

at marriage (AOR, 1.03; 95% CI, 1.00–1.06 in Model 3); having a household with a higher PPI poverty likelihood (AOR, 2.06; 95% CI, 1.13–3.74 in Model 3); and being Hindu as compared with being Muslim (AOR, 1.23; 95% CI, 1.01–1.49 in Model 3).

Analysis of secondary outcomes, including infant and young child feeding practices and immunization levels, in comparison and intervention areas showed mixed results (Table 6). Exclusive breastfeeding prevalence improved significantly in intervention areas (from 48.6% to 66.6%) from baseline to endline, but the difference between intervention and comparison areas at endline was not significant. Comparing baseline and endline results in intervention areas showed no significant improvements in prevalence estimates of timely initiation of breastfeeding, continued breastfeeding, timely complementary feeding, introduction of solid foods, and children being fully immunized. There were significant positive differences from baseline to endline and between intervention and comparison areas for dietary diversity (26.9% to 35.0% from baseline to endline and 4.5 percentage points higher than comparison areas), consumption of iron-rich foods (29.6% to 40.1% from baseline to endline and 9.5 percentage points higher than comparison areas), and vitamin A supplementation (73.7% to 81.2% from baseline to endline and almost 10 percentage points higher than comparison areas). However, consumption of foods rich in vitamin A was significantly lower in intervention areas (24.8% to 20.5% from baseline to endline and 7.3 percentage points lower than comparison areas). Utilization of health services provided through government partners for the youngest child under age 3 also improved

significantly in intervention areas. For ICDS services, utilization increased from 29.0% to 60.7% from baseline to endline, approximately 31 percentage points higher than in comparison areas. For MCGM services, utilization increased from 35.4% to 51.5%, approximately 18 percentage points higher than in comparison areas at endline.

Analysis of secondary outcomes showed mixed results, with some improvements in child feeding practices but not across all indicators.

Utilization of health services provided through government partners for the youngest child under age 3 improved significantly.

Qualitative Study

A brief summary of participant demographics for the qualitative study is presented in Table 7.

General Perceptions on the CMAM Program and Its Activities

The SNEHA frontline health workers were mostly recognized for motivating caregivers to attend growth monitoring activities and for conducting home-based counseling. The community strongly identified the program with the growth monitoring activity; community members reported gathering for the growth monitoring activity when they saw their frontline health worker carrying a black bag with the weighing equipment. Table 8 summarizes the strengths and challenges of key program activities as reported by stakeholders.

A typical home visit by a frontline health worker lasted approximately 15 to 20 minutes, depending on the caregiver's time and availability. Some respondents also mentioned that frontline health workers helped them with referrals to health care services (public and private), including accompanying the mothers to hospitals if needed. Few respondents mentioned group activities conducted by SNEHA. When asked about these activities, mothers often mentioned the difficulties of gathering in a group or finding time to participate in the events. The few participants (3 of 24) who

TABLE 6. Secondary Outcomes in Intervention Areas and Comparison Areas at Baseline (March–July 2014) and Endline (October–December 2015)

| | Baseline | | Endline | | | |
|---|--------------------|------|--------------------|---------|------------------|---------|
| | Intervention Areas | | Intervention Areas | | Comparison Areas | |
| | N | % | N | % | N | % |
| Timely initiation of breastfeeding (0–23 months) | 1899 | 37.0 | 2417 | 37.2 | 1424 | 49.5*** |
| Exclusive breastfeeding (<6 months) | 488 | 48.6 | 679 | 66.6*** | 385 | 66.0 |
| Continued breastfeeding (12–15 months) | 315 | 74.0 | 456 | 79.2 | 314 | 83.1 |
| Timely complementary feeding (6–9 months) | 398 | 48.0 | 408 | 51.5 | 252 | 57.5 |
| Introduction of solid foods (6–8 months) | 293 | 51.5 | 304 | 53.3 | 181 | 56.9 |
| Minimum dietary diversity (6–23 months) | 1502 | 26.9 | 1863 | 35.0*** | 1115 | 30.5* |
| Consumed vitamin A-rich foods (6–23 months) | 1502 | 24.8 | 1863 | 20.5* | 1115 | 27.8*** |
| Consumed iron-rich foods (6–23 months) | 1502 | 29.6 | 1863 | 40.1*** | 1115 | 30.6*** |
| Fully immunized (9–23 months) | 1208 | 79.3 | 1557 | 81.5 | 934 | 72.2*** |
| Received at least 1 vitamin A supplement (9–23 months) | 1208 | 73.7 | 1557 | 81.2*** | 934 | 71.3*** |
| Child received any service from ICDS in previous month, % | 2578 | 29.0 | 3455 | 60.7*** | 2122 | 29.6*** |
| Child received any service from MCGM in previous month, % | 2578 | 35.4 | 3455 | 51.5*** | 2122 | 33.4*** |

Abbreviations: ICDS, Integrated Child Development Services; MCGM, Municipal Corporation of Greater Mumbai.

Pearson chi-square tests comparing baseline intervention to endline intervention and baseline intervention to endline comparison areas.

* $P \leq .05$; ** $P \leq .01$; *** $P \leq .001$.

had attended at least 1 group meeting acknowledged that they were useful in providing information. Consumption of medical nutrition therapy in the program was low. A summary of monthly averages for process indicators, including consumption of medical nutrition therapy, is presented in Table 9.

Program Success Factors

Program features that both the community and field staff perceived as critical to its success were:

- **Constant presence of field staff:** The majority of community respondents mentioned the constant presence of program staff in the field as a critical component of the program. The rental of community rooms for field teams to convene and eat lunch ensured that frontline health workers remained in the intervention areas for the duration of the work day. Secondly, the mothers felt the field teams were

always accessible because mobile numbers were shared between the staff and the mothers.

- **Information-sharing with the community through reinforcement and as a tailored process:** Repeated information-sharing by program field staff was perceived by the community as one of the most useful features of the program. Most counseling occurred at the individual level and frontline health workers carefully tailored communication. Frontline health workers reported being trained on ways to adapt information to the needs of individual mothers by using appropriate language and through observation of the household: its members (size, education, decision makers, support system for the mother), physical characteristics of the house (hygiene, kitchen, work place), and the mother's receptivity to information.
- **Persistence of field staff and collective persuasion:** A referral system existed within

Consumption of medical nutrition therapy in the program was low.

The constant presence and accessibility of staff in the field was critical to the success of the program.

TABLE 7. Demographics of Participants in Qualitative Study

| Staff Interviews | |
|--|------------|
| Number | 13 |
| Age, years, mean (SD) | 35.2 (9) |
| Female, % | 62.0 |
| Years of association with the program, mean (SD) | 2.7 (1.2) |
| Focus Group Discussions With SNEHA Frontline Health Workers | |
| Number in each focus group discussion | 5 to 6 |
| Age, mean (SD) | 32.5 (8.5) |
| Female, % | 81 |
| Years of association with the program, mean (SD) | 2.4 (1.2) |
| Community Interviews | |
| Total number | 24 |
| Age of mother, mean (SD) (n=20) | 26.6 (4) |
| No. of children in the family, mean (SD) (n=21) | 3 (2) |
| Religion, % | |
| Hindu | 54 |
| Muslim | 38 |
| Christian | 8 |
| Cases severely wasted or moderately wasted, % | 63 |
| Cases with medical complications, % | 17 |
| Pregnant women, % | 17 |
| Case Stories | |
| Number | 46 |
| No. of children in the family, mean (SD) (n=39) | 3 (1) |
| Type of Cases | |
| Non-wasted children, % | 21 |
| Severely wasted/moderately wasted, % | 54 |
| Pregnant, % | 9 |
| Complicated cases requiring holistic intervention, % | 11 |
| Others (contraception, family planning), % | 4 |

Abbreviations: SD, standard deviation; SNEHA, Society for Nutrition, Education and Health Action.

the program to persuade families who were reluctant to use services. Frontline health workers sought help from senior SNEHA and ICDS staff at all levels to persuade families to use appropriate services. In cases of domestic violence or lack of childcare, assistance was sought from other nonprofit organizations.

- Holistic case management:** Case management of children in the program was not limited to addressing wasting. Along with the management of routine illnesses associated with malnutrition, the SNEHA field staff assisted with emergencies and enabled access to treatment for complicated underlying medical conditions in children (e.g., vision correction or cleft palate surgery). In addition, field staff identified and supported children and mothers whose household environments were detrimental to their well-being, including situations of violence, mental illness, and lack of family support. Anecdotal evidence suggests that children from such households go through repeated bouts of severe malnutrition with intermittent periods of recovery. While these cases are atypical, the community appeared to have a high regard for the CMAM staff because of their intervention in such cases (see illustrative quotes from participants in Table 10).
- Training and supervision of the program team:** Staff emphasized that training, supervision, and support given to field staff were critical to success. Between June 2014 and March 2016, 74 training sessions were held for program staff on various themes (see Box 1 for illustrative details). Frontline health workers noted 3 aspects of the training that were especially appreciated: (1) each theoretical session was followed by mock practice sessions in the community to practice what they learned, (2) repeated trainings helped refresh their memory and correct misperceptions, and (3) the focus on skill-based training along with knowledge training was useful in their work. Frontline health workers felt that skill-based training taught them how to communicate with mothers in a language and method that mothers would appreciate, assess the mental state of the family they were dealing with, know when to back off and when to continue persuading the family, cope with their own emotions while dealing with difficult cases, and reconcile unsuccessful cases.

The staff also cited the stringent supervision mechanisms as instrumental for ensuring coverage and quality. Frontline health workers were continuously monitored by program officers in the community who always knew their whereabouts. Daily debriefing was done to review and respond to problems as necessary, enabling frontline health workers to get immediate assistance on difficult cases. When we explored whether such

TABLE 8. Strengths and Challenges of Key Program Activities as Reported by Stakeholders

| Strengths | Challenges |
|--|--|
| Growth monitoring | |
| <ul style="list-style-type: none"> • Growth monitoring had become a regular and well-planned activity at the Anganwadi center. • Most mothers acknowledged the usefulness of growth monitoring. • Mothers conceded their inability to remember growth monitoring dates; hence, frontline health workers' repeated mobilization of the community was useful. | <ul style="list-style-type: none"> • Most mothers were willing to bring their children for growth monitoring. Resistance to growth monitoring in the community mainly stemmed from practical difficulties (time, work pressure, and migration), rather than issues of cultural acceptance. |
| Home visits | |
| <ul style="list-style-type: none"> • Home visits by frontline health workers were well-accepted and welcomed by the community. • Frontline health workers had been well-trained technically. In addition, most had been trained in and had acquired the soft skills for approaching households as well as for tailoring information. • There was considerable oversight of frontline health workers that also played a role in ensuring home visits happened regularly and appropriately. | <ul style="list-style-type: none"> • Some severely wasted children required more visits than those required as per protocol; the frontline health workers often did not record why and when these additional visits were done in the monitoring software. • There was a need for training frontline health workers on information pertaining to the entire household rather than focusing on mothers alone. |
| Health camps and referrals to NRRC | |
| <ul style="list-style-type: none"> • Health camps were held regularly. • The community perceived health camps to be useful, mainly due to the easy access to free medicines and tonics. • Field staff felt that the main use of health camps was in confirming whether children were anthropometrically wasted or not. • The partnership with NRRC and the adjoining government hospital worked well for the program. The community often reported that frontline health workers referred them to the government hospital and even accompanied them there if required. | <ul style="list-style-type: none"> • Health camps, when established, were meant specifically for wasted children and pregnant mothers. But it was difficult for camps to turn away other sick children; hence, the camps were largely being used as general health camps for all children, which made them crowded. |
| Provision of medical nutrition therapy | |
| <ul style="list-style-type: none"> • The logistics for supply and distribution of medical nutrition therapy in the program had been clearly set by the time of scale-up of the program. A checklist format had been developed for tracking medical nutrition therapy consumption of each child; these checklists were being monitored closely. | <ul style="list-style-type: none"> • Consumption of medical nutrition therapy in the program was lower than expected. It was therefore difficult to make strong conclusions on the effectiveness of medical nutrition therapy in this context. • Overseeing compliance of medical nutrition therapy consumption by frontline health workers was challenging. Frontline health workers delivered several days of cups at a time to a child, but consumption by the child was self-reported by the mother. • While there were no serious issues with logistics (supply and storage) of medical nutrition therapy, there were mothers who found it difficult to feed the medical nutrition therapy cups to the severely wasted child for the full course of 56 days. Mothers and frontline health workers noted that some children got bored of the sweet flavor of the medical nutrition therapy and refused to eat it after a few days. There have been cases of children being pulled out of therapy due to persistent diarrhea or mere refusal to consume. |

Abbreviation: NRRC, Nutritional Rehabilitation and Research Center.

tight monitoring mechanisms had a negative influence on the staff, a frontline health worker pointed out that field staff sometimes escalated issues unnecessarily to catch the attention of senior staff;

overall, most found the close supervision helpful. See [Figure 2](#) for a chart showing successful program features, as well as the community's response to them and resulting actions.



Frontline health workers were constantly present in the community, repeatedly sharing information. © Aahar field team/SNEHA

Community Mechanisms in the Program

Mothers reported that they were motivated to participate in program activities due to a combination of the following factors:

- They felt cared for and supported:** The constant field presence and accessibility of field staff was both acknowledged and appreciated by the mothers. Mothers reported that frontline health workers frequently inquired about their children's well-being, called them for ongoing growth monitoring activities, repeated information for them, and took time to encourage the entire family. The active involvement of senior staff, who also visited the community to persuade reluctant caregivers, sent a clear message to the community that the program staff cared for them.
- They believed the knowledge imparted by the frontline health workers was useful:** Mothers found the frontline health workers to be a reliable health resource. They felt that the frontline health workers advised them appropriately on diet and feeding practices for their children and pregnant women. Mothers cited useful advice provided by frontline health workers on different types of food, recipes, cooking methods, and the importance of not eating junk food. They also valued information on hygiene, such as strategies for keeping their houses and children clean, and on the importance of immunizations, breastfeeding, and growth monitoring. Mothers expressed that the informal nature of interactions and frontline health workers' patience in explaining things to them gave them a higher degree of comfort than what they experienced with health professionals in hospitals. They often asked the frontline health workers for information on vaccination dates, qualifications of doctors, availability of hospitals in the vicinity, and even on issues such as education for the child, livelihood options, and vocational courses. There was a general consensus among mothers that following the frontline health workers' advice was beneficial for the well-being of their children.
- They felt monitored:** Mothers acknowledged their tendency to forget the information given by frontline health workers due to their preoccupation with household chores and other activities. The constant presence of the frontline health workers in the community and frequent interaction served as a monitoring

TABLE 9. Process Indicators in Intervention Areas (150 Anganwadi Centers)

| Activity for Child Under Age 3 | Monthly Average Oct 2014–Sep 2015 |
|--|-----------------------------------|
| Total children monitored | 7009 |
| Total moderately wasted in the program | 617 |
| Total severely wasted in the program | 112 |
| Children weighed each month | 4834 |
| Moderately wasted children receiving home visits | 443 |
| Severely wasted children receiving home visits | 89 |
| Children attending health camps | 289 |
| Children consuming medical nutritional therapy | 24 |

Source of data: Routine monitoring data of the program.

mechanism to ensure that the mothers complied with the advice given to them. According to the mothers, the frontline health workers played the role of counselor and overseer by persevering to inculcate healthy practices through reminders and reinforcement of messages, and also by arriving at the house at unexpected moments to inquire on what their children had been fed. This role was both appreciated and desired by the mothers.

Three additional themes emerged, although not as strongly: (1) Mothers felt a sense of obligation toward the frontline health workers for spending so much time seeking them out. This made the community feel grateful and motivated them to participate in program activities. (2) Mothers gained confidence to act on child health issues, for example to visit a health facility, since they were armed with both knowledge and support from the SNEHA team. (3) Mothers were encouraged by the appreciation and verbal praise they regularly received from the health workers (see illustrative quotes about successful community mechanisms in Table 11).

DISCUSSION

The results demonstrate that the SNEHA CMAM program was successful in achieving high levels of coverage and lower levels of wasting, particularly severe wasting, in the program intervention areas. The large decline in severe wasting prevalence was not surprising because the program focused on identifying and treating severely wasted children. By the end of the program, children residing in intervention areas had significantly lower odds of being wasted—by 19%—than in neighboring comparison areas. While most characteristics (birth weight, gender, mother's BMI) significantly associated with wasting in our approach are known, in urban CMAM programs the regional origin of mothers may be another factor to consider in targeting and developing implementation activities.

The secondary outcomes showed mixed results, with some improvements in child feeding practices but not across all indicators. The intervention improved the utilization of health services provided by government partners in the program for children under age 3. These findings are consistent with an evaluation of an NGO–government partnership to enhance ICDS services in rural northern India, where women residing in the intervention area had improved program



Growth monitoring of an infant conducted by a frontline health worker.
© Aahar field team/SNEHA

coverage and breastfeeding practices, but with limited effects on complementary feeding practices.²²

The core strength of the SNEHA CMAM approach was its intensive and persistent engagement with the community. This need for engagement with the community as a key factor in ensuring success of community-based malnutrition programs has been well-documented in the literature^{23–25} and was a planned feature of the SNEHA CMAM program. The use of RUTF is currently a subject of debate in academic and practitioner's circles in India, and studies on cultural acceptability and adherence to these regimens in this country are lacking. Unlike CMAM programs in other contexts, overall compliance with the RUTF component by caregivers of severely wasted children in our program was low. This could be attributed to implementation challenges, as well as issues related to community acceptance. From the program point of view, we faced initial logistical issues with supply and storage of medical

TABLE 10. Quotes from Participants Illustrating Program Features Contributing to its Success

| Themes | Illustrative Quotes |
|--|--|
| Constant field presence of staff | <p>"Now if the community does not see me for one day, next day I get a call—where are you? Sometimes the community people even directly come to our center to inquire where I am. (Male field staff, 27 years, employed with SNEHA: 1.5 years)</p> <p>"If anyone requires, we give our mobile number so that they can call us when they need any guidance or help. I had given my mobile number to her so she can call me if she has any problem—even in the night. She does not have a proper family support system." (Female field staff, 34 years, employed with SNEHA: 2 years)</p> <p>"They are here only. They keep coming. They had visited here yesterday only; they gathered several women to explain to them . . . actually there was a meeting." (Mother, 30 years, housewife, Muslim, 6 children, youngest girl, age 2 years, was severely wasted, recovered)</p> <p>"They mostly come quite often in a week, like they were here 2–3 days ago. They ask how we are. (Pregnant woman, 28 years, housewife, Christian, 2 kids)</p> |
| Information-sharing with the community through reinforcement and as a tailored process | <p>". . . but doctors telling is different, their telling is different. Doctors are always in a hurry. They are under pressure because of patients, so they tell in shortcuts, some of it I understand and some I don't. These people (from SNEHA) are free, they tell us freely, each and everything, that you do this way. Then they come next day and ask whether we did the way we were told. Then we tell them that yes, we did. Then they again ask us after 1 week whether it was beneficial or not. It happens like this. And what will the doctors say, they just tell, whether we do it not, only we and our children are responsible. This is how doctors do it. And these people come and ask us regularly, ask us again after 1 week about whatever happened, whether the child is eating or not, whether the child is liking it or not, they ask us all of these. (Mother, 24 years, Muslim, 4 kids, 2 younger kids were severely wasted and 1 was on medical nutrition therapy)</p> <p>"SNEHA believes in giving messages, and individualization of messages was very important. So when you do home visits, there are 2 or 3 things which would help. Firstly, it was like you know a message for a particular person only, secondly you come to know the home situation also because there are times when the home situations are interfering with the actual process." (Senior staff, other details masked to protect identity)</p> <p>"Today in the morning I visit one house. I found some bad smell was coming. So I will not tell immediately. First I will observe how that woman is. I will see the cleanliness in the house. While talking with her we see all how is kitchen maintained." (Female field staff, 40 years, employed with SNEHA: more than 3 years)</p> |
| Persistence of field staff and collective persuasion | <p>"When she asked about the registration at that time she told that no, her husband has no time to pick up her to hospital. So she asked her father's mobile number. But they don't have that also. Then SNEHA frontline health worker asked for the neighbor's mobile number. The lady said okay. Then the next day, the SNEHA frontline health worker called her neighbor and spoke to her husband: 'what is the reason why you did not register her for a pregnancy checkup?' Then the program officer also called her husband and explained about the importance of the registration, medicine, everything. The next day the SNEHA frontline health worker, the ICDS frontline health worker, and the health post frontline health worker all went to her house and explained jointly. Then her husband took her to the hospital and did the registration. The continuous visits helped the family." (Case study of a pregnant woman, age not known, Hindu, 3 children)</p> <p>"One family was not ready for immunization. Not even at a private clinic, since one of their relatives died after immunization, they said. The SNEHA frontline health worker spoke to the mother again and again. She agreed but her mother-in-law did not. We all went several times—me, the program officer, ICDS frontline health worker, and even our doctor visited to tell them. We all went together and told them. Then they agreed. (Female field staff, 35 years, employed with SNEHA more than 3 years)</p> |
| Holistic case management | <p>"When the SNEHA frontline health worker first identified the child, he was 3 months old. She oriented the mother regarding SNEHA and its work. The child had a cleft palate. The SNEHA frontline health worker spoke to the mother regarding her feelings for the child, ongoing treatment, and her difficulties faced while feeding the child. The mother replied that they had recently shifted to Mumbai as her husband worked here and mainly for the child's treatment. She did not know any hospital and was looking for one. While talking, she was upset and in tears. She said that all her relatives blame her for her child's condition and they say that he looks like a mouse. The SNEHA frontline health worker counseled her that it was a birth defect and can be successfully treated with surgery. She referred her to the hospital and screened the child. The mother fed breast milk to the child with a bowl and spoon. Sometimes the mother did get irritated, too, she shared, and felt bad and angry when other people came home to see the child and gave suggestions. When the mother shared her concerns, the SNEHA frontline health</p> |

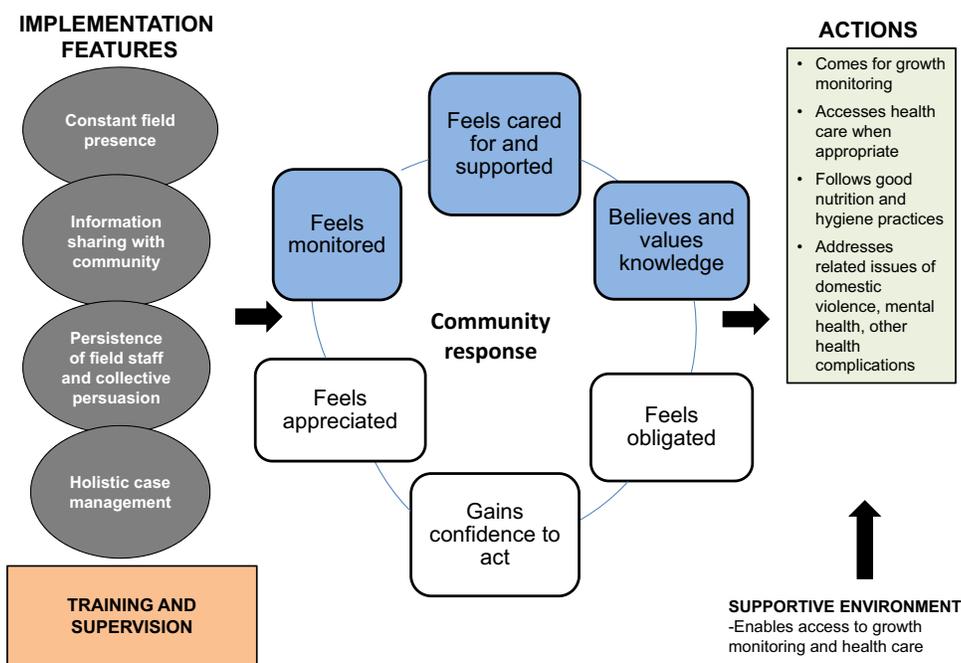
Continued

TABLE 10. Continued

| Themes | Illustrative Quotes |
|--------|---|
| | <p>worker could feel her helplessness. The SNEHA frontline health worker asked the mother to calm down and said she understood her feelings. The SNEHA frontline health worker inquired about the father and the mother replied that he was nice, but due to family pressure, he also felt it was the mother's fault. The mother cried a lot. In the hospital, the doctors advised an operation. After the operation, the child could feed better. The mother started top feeds and the child gained weight. (Case story of an 8-month-old boy, cleft palate, migrant population, mother's age not known.)</p> <p>"The woman was mentally disturbed. She had a 3-month-old girl. She could not feed the child breast milk and so it was on top feed. The SNEHA frontline health worker visited her house many times and told her not to take stress. The woman said she had a problem with her family and her in-laws; and they were not accepting her. She wailed loudly—'I am suffering because my husband is not accepting me,' and she used abusive language. Our concern was that her small daughter will suffer because of this. This case was referred to the prevention of violence against women and children in SNEHA. The program counseled the entire family repeatedly. Now her family has understood and given her permission to live separately with her husband. (Case story of a new mother, 23 years, with a 3-month-old baby girl)</p> |

Abbreviations: ICDS, Integrated Child Development Services; SNEHA, Society for Nutrition, Education and Health Action.

FIGURE 2. Success Factors of the SNEHA CMAM Program



Abbreviations: CMAM, Community-based Management of Acute Malnutrition; SNEHA, Society for Nutrition, Education and Health Action.

nutrition therapy. Even with a high level of community engagement and doorstep delivery of medical nutrition therapy cups by the frontline health workers, overseeing the delivery and compliance of medical nutrition therapy consumption in the community setting was a challenge. Retrospectively, the implementation team felt

that the promotion of medical nutrition therapy required more intensive programmatic efforts. In addition to implementation difficulties, the repetitive flavor may have contributed to some difficulty in caregivers consistently feeding medical nutrition therapy cups to the severely wasted child for the full course of 56 days. We suggest that

TABLE 11. Quotes from Participants Illustrating Successful Community Mechanisms in the Program

| Themes | Illustrative quotes |
|---|---|
| Community felt cared for and supported | <p>"I remember how often we had to take [child's name] to the hospital, even in the rains. Now he is okay. Everyone in the neighborhood says that he's come back from death's jaw. There was no hope. His chest was full. [SNEHA frontline health worker] was here at that time, she walked in the rain and first took us to the small hospital, and then walked to the big hospital with us. She stayed until the admission process was over and then she left." (Mother, 36 years, housewife, Muslim, 6 children, youngest boy, age 1.5 years, was severely wasted with pneumonia complications, recovered)</p> <p>"She [SNEHA frontline health worker] even took me along on 2–3 occasions to the hospital . . . because I wouldn't understand anything, hence she came along. There she accompanied me for 2 days, then I understood everything. Before I could get there, she would have the case paper ready and would show me the medicines . . . after that I'd return and she would stay back for some work." (Mother, 25 years, housewife, Hindu, 2 children, younger girl, age 2.5 years, is severely wasted)</p> <p>"When they are not there, we have to manage on our own. When they [SNEHA frontline health workers] came, we felt a sense of support." (Mother, 30 years, housewife, Muslim, 6 children, youngest girl, age 2 years, was severely wasted, recovered)</p> |
| Community believed that the knowledge imparted by the SNEHA frontline health workers was useful | <p>"This person from SNEHA, she comes daily . . . doctor comes once or 2 times a month . . . they advise us on weight and tell us about doctors. We get to know if child is not the right weight. We receive information so their visits are beneficial to us." (Pregnant women, 25 years, housewife, Hindu, 1 girl, age 2 years, severely wasted, recovered)</p> <p>"They ask you to take care of the child, give them milk on time, feed them milk for 15 minutes on one side and then other . . . that the child should be fed milk 10–11 times through the day, and only then his weight will increase. Children should not be given any food from outside and you should start after 6 months. They should be given all the medicines on time." (Mother, age not known, housewife, Hindu, 1 girl, age 3 months old, non-wasted)</p> |
| Community felt monitored | <p>"If they are there, it is good because then parents look after their children properly. They keep coming, so we also have to be attentive to our children." (Mother, 30 years, housewife, Hindu, 2 children, younger boy, age 4 years, was severely wasted with complications, recovered)</p> <p>"If there is something that you may have forgotten to follow, you will instantly remember it after seeing them. Yes, because I don't feed him properly then how will he grow? That is why as soon as he wakes up in the morning I wash his hands and mouth and then give him milk and thereafter I give him something to eat. By that time what if someone comes to ask me what I fed him? That is why I feed him properly. We will also become careless . . . because we are being told [by the SNEHA frontline health worker] all the time, so we are attentive and we also fear that they might come anytime to ask us. Because of their visits we would know that today we are supposed to go to check the weight; otherwise, amidst these kids one tends to forget these things. It feels good because they come and call us." (Mother, 25 years, housewife, Muslim, 4 children, twins were 11 months, girls, one of them was moderately wasted with complications of not walking)</p> |

Abbreviations: CMAM, community-based management of malnutrition; SNEHA, Society for Nutrition, Education and Health Action.

other CMAM programs should develop strategies to overcome these issues in the program design phase itself. **Box 2** summarizes the key findings from our program.

Specific contextual factors were advantageous to the program. The ICDS Anganwadi centers and health posts were close to the community, and the health posts provided accessible immunizations. The biggest advantage was that houses were spaced closely, which enabled frontline health workers to make frequent home visits to specific households while also monitoring children across the community more generally. The rigorous data monitoring component, which was critical for intensive supervision, was achieved through the use of electronic data collection. After monitoring

formats and reporting needs had been established during the pilot phases, they were easily scaled up across the program.

The bulk of program costs were related to employment, training, and supervision of frontline health workers (details are available in the [supplement](#)). The cost of running the program was to some extent subsidized by the available network of municipal health facilities, including an established and well-run NRRC at the local municipal hospital (LTMGH). Costs were also minimized through the use of lower-cost locally produced RUTF provided by the NRRC. Adopting components of the SNEHA CMAM program may not be prohibitively costly if the same municipal government infrastructure that supported our

BOX 2. Key Findings From the Society for Nutrition, Education and Health Action (SNEHA) Community-based Management of Acute Malnutrition (CMAM) Program

By the end of the program, children residing in the intervention areas experienced lower levels of wasting than in comparison areas. Successful components of the program included regular growth monitoring of children, intensive home visits, and referrals to locally available primary care. The consumption of ready-to-use therapeutic food in our program was low, possibly due to implementation challenges as well as issues related to community acceptance. We recommend that other CMAM programs develop strategies to overcome these issues during the design phase itself.

Robust community engagement mechanisms can be influential in reducing severe malnutrition among children. For robust community engagement, frontline health workers who are motivated, trained, and well supervised are essential. This can be achieved through appreciation and verbal praise of frontline health workers and repeated training. Training should focus not just on technical aspects of the program, but also on community engagement skills. Supervision includes constant monitoring of frontline health workers, especially while handling difficult cases, random field-level quality checks, and electronic data collection mechanisms for overseeing monthly targets.

To examine the feasibility of a similar programmatic approach to reduce severe malnutrition, programs may consider the following questions:

1. Can pockets of the population be selected for intensive intervention?
2. Are geographical distances amenable to community outreach by frontline health workers and their supervision?
3. Can frontline health workers be trained and motivated? This program recruited a set of in-house frontline health workers who worked closely with the government frontline health workers. In government programs, where long-term frontline health workers are used to set patterns of working, adoption of new skills and routines could be more challenging.
4. Is government support available, in terms of access to local hospitals or provision of facilities, for carrying out the growth monitoring activities?

program can be integrated with the work of ICDS. While monetary costs of additional training and supervision of ICDS field staff may be feasible, other aspects of implementation need to be considered carefully. The adoption of new skills and new tasks by frontline health workers of programs like ICDS that have a history of poor implementation could be challenging. Partnerships need to be established at various levels between the ICDS staff and the health sector.

A major drawback of the program was the lack of focus on sustainability—that is, handing over responsibility of key program activities to either the government partners or to the communities. In the next phase of the program, having now established credibility for the urban CMAM approach in the communities and with the partners, SNEHA is piloting an approach with the aim of gradually transferring ownership of the program to ICDS. In April 2016, SNEHA has signed a memorandum of understanding with the ICDS Commissionerate and the Mumbai Municipality (MCGM) to formalize the partnership through the Mumbai Child Health and Nutrition Committee. The memorandum of understanding will enable SNEHA, ICDS, and MCGM to coordinate resources, manpower, and sharing of data to serve Mumbai's most vulnerable areas.

Since April 2016, SNEHA frontline health workers in this program no longer participate in

direct implementation, but instead they work more intensively to strengthen the capacity of public health systems and ICDS staff in order to build ownership of key processes. This is to be done by increasing ICDS field presence, improving referrals of pregnant women and children to the public health system, and thereby increase access and utilization of public health facilities and ICDS services. The program is working toward strengthening the capacity of not just the ICDS frontline health workers, but also their supervisors. After experiencing the success of the partnership working with SNEHA frontline health workers, we believe ICDS frontline health workers and supervisors will be motivated to continue the improved processes with technical support.

The program also envisions building greater ownership within the community. It will therefore actively involve community groups and unpaid volunteers to help implement the next phase, with the aim of creating greater demand and accountability for public health services. Studies in similar contexts have shown that community groups and unpaid volunteers have contributed to improving child health and nutrition and have taken on roles similar to frontline health workers.^{26–28}

We have yet to evaluate this next phase of the approach. We do not yet know the feasibility of transferring ownership of program activities to

Constraints at baseline limited our ability to provide a more rigorous explanation for the decline in wasting levels in the intervention areas.

the government and community; however, findings from other countries suggest that CMAM programs run by NGOs during nutritional emergencies have been successfully handed over to governments for subsequent functioning.^{29,30} Findings from Bangladesh, Ethiopia, Malawi, and Niger suggest that handing over the CMAM activities to government health systems may be possible, and that it requires political commitment from the ministries, sustained resources, and general health system strengthening.^{29–32} However, a literature review of 33 studies of community-based malnutrition rehabilitation programs under routine health systems found that all successful programs had external support.³³ In the Indian context specifically, training and supervision of frontline workers in government systems has been mentioned as an important hurdle.³⁴ An assessment of the NGO–government partnership to enhance ICDS in northern India points to the challenge of scaling up a complex intervention through the existing health systems and staffing structures. The authors suggested the need for more rigorous and coordinated efforts with repeated reinforcement over longer periods of time.³⁵

In this regard, we feel that an NGO–government partnership CMAM approach could provide technical support and additional resources to the government. Transferring ownership to the government may need to be gradual and in phases, with strong emphasis on ensuring that frontline health workers in the existing system are motivated, trained, and well-supervised—and have the resources available for effective day-to-day functioning.

Limitations

The primary limitation of the qualitative study was that the views of the government partners were not included. Though stakeholders were questioned on the non-consumption of medical nutrition therapy, the reasons why it was not adopted widely were not explored specifically in this study. There is a need for further in-depth studies on understanding why the RUTF component was weak in our program.

The quantitative study had several limitations. First, the assessment of impact relies on cross-sectional endline data, which enables us to examine associations between variables but does not necessarily show causality. Second, the timing and length of the baseline survey in comparison areas was not optimal due to the practical

constraints of conducting an evaluation within operational timelines. Due to limited time and financial resources, we used a shorter baseline survey in the comparison areas and could not conduct the data collection concurrently in both areas. We also did not conduct a comprehensive house listing in comparison areas as we had done in the intervention areas prior to the baseline. Our analysis of data from baseline to endline between intervention and comparison areas was therefore limited, and we could not provide a more rigorous explanation for the decline in wasting levels in the intervention areas using other statistical methods such as the difference-in-difference approach. There are seasonality implications on food availability and illness levels that affect wasting; however, due to timing and lack of data in the comparison areas at baseline, we were unable to control for differences that would likely affect dietary diversity and consumption of foods rich in vitamin A. We also do not have baseline data in the comparison areas on secondary outcomes, which limits our analysis in terms of showing the effects of intervention on infant and young child feeding practices, immunization coverage, vitamin A supplementation, and utilization of government health services.

Third, the intervention and comparison areas at endline were generally similar, with some differences particularly in the regional location of mothers' natal homes. We aimed to minimize these differences by controlling for a wide range of potential confounders. The endline data also indicated that no other organizations were working on child malnutrition in comparison areas and therefore no contamination was evident. Finally, the mixed results in secondary outcomes provided a limited explanation for the decline in wasting in intervention areas. Findings from other studies on the effectiveness of large-scale comprehensive nutrition programs is limited,^{36,37} typically focusing on primary outcomes without a deeper examination of the mechanisms for success or failure.³⁸ Positive significant changes in secondary outcomes were observed in vitamin A supplementation, consumption of iron-rich foods, dietary diversity, and exclusive breastfeeding practices; however, overall levels of consumption remained low in intervention areas. We posit that the lower overall results for population-level behavior changes are due to the short duration of the intervention, as well as the focused counseling given to the target groups—wasted children and children under 6 months of age. Bringing down levels of malnutrition to achieve global targets

and impacting the secondary outcomes will require more sustained efforts.

CONCLUSION

To the best of our knowledge, this is one of the first evaluations of a large-scale urban CMAM program in India. While India bears the burden of the largest number of malnourished children in the world, evidence on both effectiveness and implementation processes of CMAM have largely been from African countries. With the growing interest in developing an in-country CMAM approach,³⁹ concerns have been raised regarding the direct application of approaches from African countries (e.g., Ethiopia, Kenya, and Malawi) in India.⁴⁰ Rural projects in Rajasthan, Bihar, and Madhya Pradesh^{41–43} have focused on the use of existing rural frontline health workers and public hospitals to piggyback on CMAM activities. Child malnutrition indicators in urban informal settlements and rural areas are equally distressing,⁴⁴ yet there are few urban CMAM programs in India. Urbanization in India is increasing and urban community-based programs face specific challenges in migratory movement and the culturally heterogeneous nature of informal settlements. However, as was the case in the SNEHA program, crowded urban spaces also offer a unique advantage for frontline health workers to make frequent home visits with ease.⁴⁵ The study was conducted as part of a large-scale program conducted in partnership with national and municipal government partners. This action-oriented research provides critical evidence for the kind of complex interventions required to achieve national and international objectives for improving child health.^{46,47}

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ORIGINAL ARTICLE

Building Support for Adolescent Sexuality and Reproductive Health Education and Responding to Resistance in Conservative Contexts: Cases From Pakistan

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While there is no one-size-fits-all approach to building community support for such programs, key strategies in Pakistan included: (1) sensitizing and engaging key stakeholders, including religious groups, schools, health and education government officials, parents, and adolescents themselves; (2) tactfully designing and framing the curricula with careful consideration of context and sensitive topics; (3) institutionalizing the programs within the school system; (4) showcasing school programs to increase transparency; and (5) engaging the media to build positive public perceptions.

ABSTRACT

Background: Despite international recommendations and supportive evidence, there are few examples of scaled-up and sustained programs to provide adolescents with sexuality education. Moreover, despite acknowledgment that building community support and responding to resistance are key challenges, there is a lack of detailed discussion on specific programmatic strategies to address these issues.

Objectives: This article reviews the work of 2 organizations—Aahung and Rutgers Pakistan—that are successfully implementing large-scale sexuality education programs in Pakistan, collectively reaching more than 500,000 students. This review aims to answer the following questions: (1) How did Aahung and Rutgers Pakistan work to understand Pakistani society and culture and shape their programs to build community support? (2) How did Aahung and Rutgers Pakistan overcome resistance to their efforts?

Methods: We reviewed program documents and publications, synthesized key themes, identified questions of interest, and engaged key informants from Aahung and Rutgers Pakistan's leadership.

Results: The success of Aahung and Rutgers Pakistan was grounded in their readiness to understand the nuanced context within the communities, collaborate with groups of stakeholders—including parents, school officials, religious leaders, media personnel, and adolescents themselves—to ensure support, and stand up to forces of resistance to pursue their goals. Specific strategies included working with communities to select content, tactfully selecting and framing issues with careful consideration for sensitivities, engaging adolescents' influencers, strengthening media presence, showcasing school programs to increase understanding and transparency, and choosing opportune times to introduce messages.

Conclusion: The successful strategies used by Aahung and Rutgers Pakistan to promote adolescent sexual and reproductive health through sexuality education can inform programs worldwide. Additionally, the programmatic weaknesses identified can guide future planning and action by Aahung and Rutgers Pakistan. We call on other programs to continue sharing challenges, specifically related to resistance, with sexuality education programs in order to develop a toolbox of additional strategies for community uptake.

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INTRODUCTION

Pakistan has long been a challenging setting for the promotion of adolescent sexual and reproductive health (SRH).^{1,2} As in many other countries worldwide, there is little acknowledgment that adolescents have sex, whether consensual or coerced, before marriage and many believe that exposure to sexuality education will incite unwanted behavior. Furthermore, despite the fact that many adolescent girls marry early, there is also little acknowledgment that married

adolescents need to be proactively prepared to meet their SRH needs and promote their well-being.³

Two NGOs in Pakistan—Aahung and Rutgers Pakistan (the Pakistani chapter of Rutgers)—have developed effective strategies to support adolescents' knowledge and understanding of SRH, and in some cases empowerment, in this context (Box 1). Working around the social and religious barriers to sexuality education, Aahung and Rutgers Pakistan have skillfully crafted and implemented large-scale sexuality education programs in Pakistan, collectively reaching more than 500,000 students.

While there are numerous descriptions of projects and programs on sexuality education, there is a lack of research and discussion on successful strategies to create support for and overcome resistance to its implementation in schools and communities.^{6–8} The landmark 1994 International Conference on Population and Development called on countries to educate young people about SRH using age-appropriate and context-specific content and strategies.⁹ However, since this call, organized resistance and misconceptions about sexuality education have challenged efforts. A 2014 report from the United Nations Educational, Scientific and Cultural Organization (UNESCO) noted that there are few examples of scaled-up and sustained programs on these issues.¹⁰ The growing body of evidence on the scale-up of sexuality education programs has noted resistance as a challenge, but it has not provided a detailed discussion of the nature of resistance or strategies to overcome them.

To fill this gap, we examined the strategies used by Aahung and Rutgers Pakistan to design and implement sexuality education programs in Pakistan. This analysis will not examine the programs' coverage, quality and fidelity, the reactions of young people, or the effects of the programs on knowledge, understanding, behaviors, or health, as these topics have been documented elsewhere.^{4,5,11} Instead, we guided our analysis of Aahung and Rutgers Pakistan's programs on sexuality education with the following 2 questions:

1. How did Aahung and Rutgers Pakistan work to understand Pakistani society and culture and shape their programs to build community support?
2. How did Aahung and Rutgers Pakistan overcome resistance to their efforts?

METHODS

To address these 2 questions, we drew from Aahung and Rutgers Pakistan's program

BOX 1. What Are Aahung and Rutgers Pakistan?

Aahung

Aahung is a Pakistani organization that has been working to support girls' and boys' sexual and reproductive health and rights in Pakistan's Sindh province since 1995. Over the past 8 years, Aahung has institutionalized life skills-based education by operating within the school system and by working directly with teachers to strengthen capacity on participatory and learner-centered methodologies. Its curriculum, which introduces critical health information and management skills in line with the emerging capacity of adolescents, has been implemented in 196 schools, training 1,946 teachers and ultimately reaching more than 200,000 students.⁴

Rutgers Pakistan

Rutgers Pakistan (founded in 1997) is the Pakistani chapter of Rutgers, a Dutch organization that operates internationally with extensive expertise on sexual and reproductive health and rights in the Netherlands, Africa, and Asia. Rutgers Pakistan coordinates 3 life skills-based education programs—Access, Services and Knowledge; Unite for Body Rights; and dance4life—to empower young people to achieve and safeguard their sexual and reproductive health and rights. Their school-based adolescent education program has reached a total of 1,188 schools and 312,807 students.⁵

documents and publications to synthesize information and extract strategies for building community support, overcoming resistance, and advancing sexuality education. Building on this review, we identified questions of interest and engaged key informants from the leadership of Aahung and Rutgers Pakistan. We conducted interviews with Sheena Hadi, the executive director of Aahung, and Qadeer Baig, the country representative for Rutgers Pakistan. Their expert testimonies provided critical insights and allowed for a focused discussion on Aahung and Rutgers Pakistan's experiences of building community support and overcoming resistance.

FINDINGS

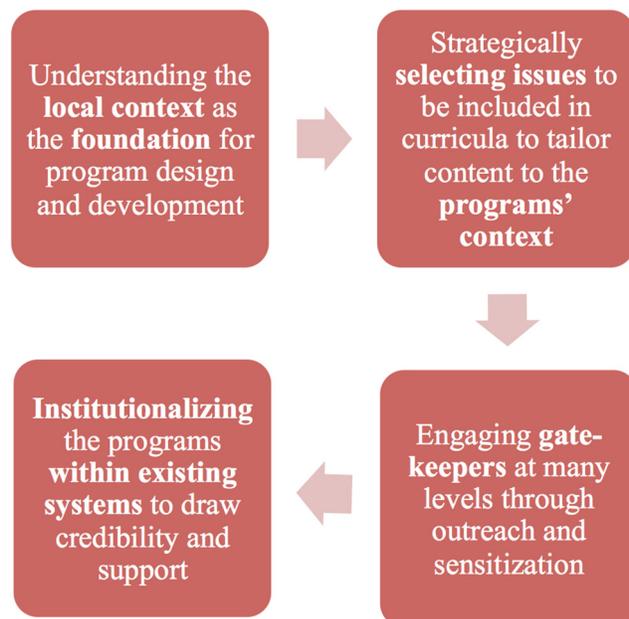
Pakistan in Context

The World Economic Forum's *Global Gender Gap Report 2016* ranked Pakistan 143 (out of 144).¹² Compared with their male counterparts, women in Pakistan typically have little to no decision-making power, fewer educational opportunities, and less control over assets and resources.⁴ Perhaps unsurprisingly, the country has long been a challenging setting for programs relating to sexuality education, reproductive health, youth engagement, and women's empowerment. Young people, who comprise 21% of Pakistan's total population, face numerous challenges related to their SRH, including high rates of early marriage and pregnancy, sexual violence, and risk behaviors such as substance use.¹³ Meanwhile, schools

There is a lack of research on strategies to create support for and overcome resistance to sexuality education.

Young people in Pakistan face numerous challenges related to their sexual and reproductive health.

FIGURE 1. Strategies Used by Aahung and Rutgers Pakistan to Build Community Support for Their Sexuality Education Programs



Aahung carried out community-based research, which served as the foundation of the program's content development.

rarely include SRH content in their curricula, lack of knowledge and misconceptions about SRH are common, and adolescent-friendly SRH services are largely absent in the public sector.^{4,5} Religious resistance is commonly identified as a major barrier to large-scale, and particularly school-based, sexuality education programs. Additionally, the 2010 decentralization of policy-making power in key areas such as health, education, and social welfare to the provincial level has posed a significant challenge to the large-scale implementation of sexuality education programs.⁵

Instead of viewing such opposition as an insurmountable barrier to sexuality education initiatives, Aahung and Rutgers Pakistan have created strategies to work within this context to improve the SRH and developmental well-being of young people in Pakistan. Operating independently, but as part of an informal network of NGOs working on adolescent SRH in Pakistan, Aahung and Rutgers Pakistan are running sexuality education programs in all 4 provinces of Pakistan, reaching a total of more than 500,000 students, with geographic coverage concentrated in the provinces of Punjab and Sindh.

How Aahung and Rutgers Pakistan Shaped Their Programs to Build Community Support

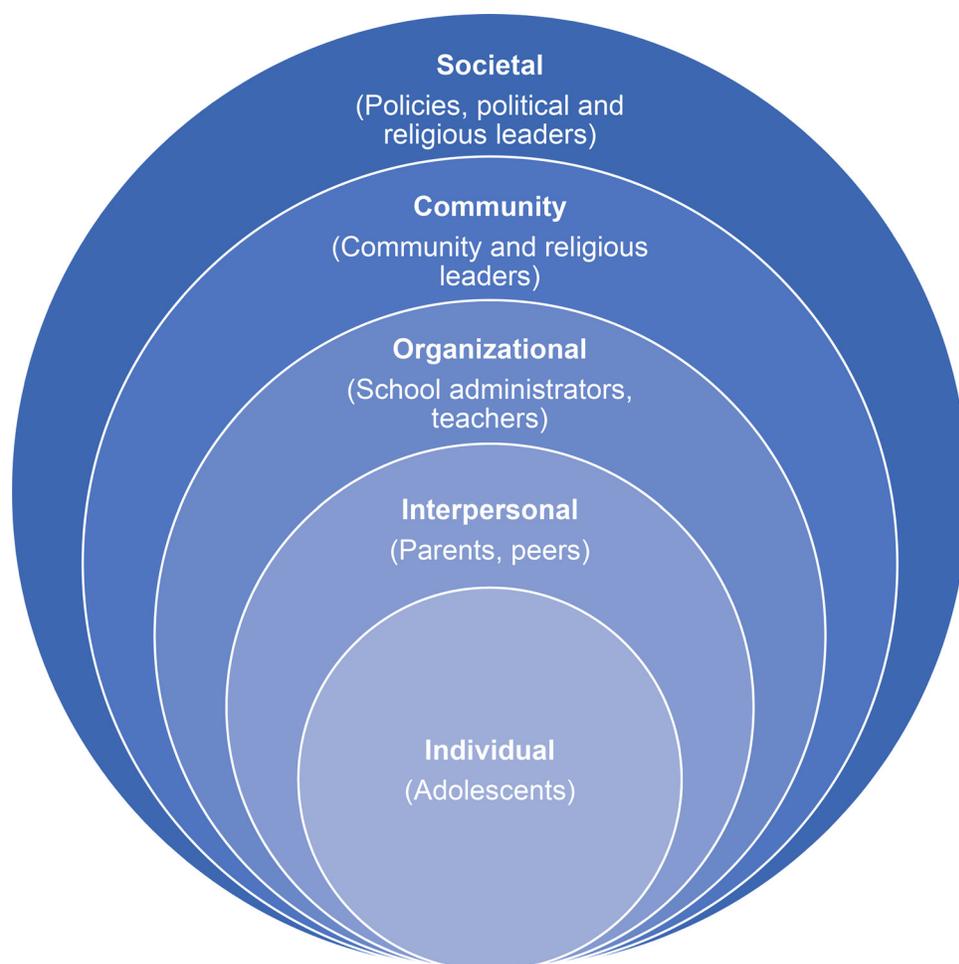
Acknowledging deep-rooted societal and cultural barriers, both Aahung and Rutgers Pakistan have prioritized building community support through a series of strategies as an essential component of their programs (Figure 1).

Understanding the Local Context

Before engaging with stakeholders to create the first adolescent-specific SRH curricula in Pakistan, Aahung carried out a power-mapping exercise to identify key decision makers in the lives of adolescents. This exercise revealed various levels of influence within an adolescent's environment, in line with an ecological framework, that needed to be understood in order to sensitize and engage influencers to successfully reach adolescents with sexuality education (Figure 2). The exercise also included a series of communication-focused activities, such as learning forums and in-person meetings, to secure buy-in from groups at the organizational, community, and provincial and national levels, ranging from local religious groups and school associations to the School Education and Literacy Department. At the same time, Aahung conducted a context evaluation, with specific attention to existing vulnerabilities and access to SRH information and services. This community-based research, which identified critical influencers, health and social problems, gaps in adolescents' SRH knowledge, and myths and misconceptions that contribute to inequitable gender norms, served as the foundation of the program's content development.

Designing and Framing the Curricula With Careful Consideration of Context and Sensitive Topics

After consulting with their communities, Aahung recognized it would be culturally inappropriate to directly address sensitive topics like premarital sexual activity or adolescent contraceptive use. Additionally, they recognized the stigma associated with the term "sexuality education." Instead, they labeled their program as life skills-based education (LSBE), which is an interactive teaching methodology that informs students about health while equipping them with skills to better manage their own lives and make healthier decisions.⁴ They adapted the World Health Organization's key guidelines for LSBE,¹⁴ UNESCO's *International Technical Guidance on Sexuality Education*,¹⁵ and additional curricula resources, such as the

FIGURE 2. Ecological Framework: Levels of Adolescents' Influences

International Planned Parenthood Federation's *It's All One Curriculum*,¹⁶ to the local context.

Aahung targets related challenges identified as problems—including child marriage and gender-based violence—by local actors themselves, thus navigating the minefield of cultural sensitivities that frequently halt action. Their curricula use only widely acceptable terminology, were pilot-tested in schools and communities, and were reviewed by an advisory group of parents, educators, school administrators, religious scholars, and members of the Sindh School Education and Literacy Department (Box 2). In this way, Aahung simultaneously serves community interests and adheres to internationally established recommendations by focusing on common intermediate outcomes that contribute to positive SRH

behaviors, such as comfort with one's own body, communication skills, confidence, and decision-making abilities, with specific attention to issues related to power and gender (e.g., questioning why fathers usually make important financial decisions for the family, or why boys are expected to do better in certain academic subjects than girls). If more explicit or sensitive questions arise during discussions, teachers are trained to provide accurate information. This approach is backed by supportive evidence: a recent report found that programs that addressed gender or power were 5 times more likely to be effective at decreasing rates of sexually transmitted infections or unintended pregnancy as those that did not.¹⁷

Building on existing sexuality education content from programs elsewhere, Rutgers Pakistan's

Programs that address gender or power are more effective at decreasing rates of sexually transmitted infections or unintended pregnancy.

BOX 2. Deciding on the Curricula's Inclusion or Exclusion of Religious Content

As a strategic choice, Aahung decided to maintain a purely secular, human-rights based program during the consultation process with religious scholars, despite pressure from the government to include religious content in the curriculum. Aahung believed that the acceptance of the program should be led by schools and parents, not religious groups, and were therefore cautious with their allocation of decision-making power. Additionally, they hoped this decision would ensure that the program could be defended purely based on human rights and prevent unnecessary politicization of the content. However, Aahung did collaborate with religious scholars to ameliorate contentious issues through tactful emphasis and phrasing. For example, while there was initial pushback on discussion of condom use in the chapter on HIV/AIDS, Aahung helped the scholars understand the significance of condoms, specifically as a critical tool for preventing HIV to promote health and well-being among sexually active individuals. A subsequent point of contention emerged when the scholars asserted that the recommendation for condom use should explicitly be made in reference to married couples. In response, Aahung restructured the chapter to simply discuss unsafe sexual intercourse, without specifying its relevance for married or *unmarried* individuals. Through the years, Aahung has continued to revise content based on emerging issues and revised laws and policies (e.g., Sindh changed the minimum age of marriage from 16 to 18).

Following backlash by certain religious groups and the media in parts of Pakistan in 2011, Rutgers Pakistan decided to engage religious scholars to provide support for key messages in life skills-based education through teachings from the Quran and Hadith. Relevant references to the Quran were included in the workbooks and teachers' manual, which helped to demonstrate that the Quran is, in fact, more progressive on topics related to relationships and growing up than was commonly perceived in communities.

Rutgers Pakistan created a strategy to involve parents and also focused on engaging men and boys specifically.

curricula materials also underwent several consultative processes to tailor the content to the target audience and the local context, as informed by relevant stakeholders. The program was adapted to the LSBE methodology, and it introduced content on abuse, protection, child marriage, and gender (and later, gender-based violence). The revised curriculum was then pilot-tested with adolescents in Pakistan to ensure that the content was understandable and relevant to their needs. Additionally, after the decentralization of political power to the provincial level in 2010, Rutgers Pakistan consulted education departments, religious scholars, civil service organizations, media personnel, and young people and their networks to determine whether province-specific content was necessary. This process led to the alignment of the content and key messages in all provinces, along with the inclusion of different illustrations and designs to complement specific elements of each province's social and cultural contexts.

Lastly, Aahung and Rutgers Pakistan tailored their curricula to appropriately respond to the evolving cognitive and social development of their students, based on school and community demands. For example, Aahung's curriculum proceeds from a focus on body protection and communication skills in early primary school years, to content on pubertal changes, harassment, and negotiation and conflict resolution skills in middle school years, to more specific reproductive health topics in secondary school years, with an overarching emphasis on

understanding and navigating gender and power dynamics. Additionally, Aahung developed content to specifically address the needs of older out-of-school adolescents (over age 15).

Engaging Gatekeepers Through Outreach and Sensitization

Successfully reaching adolescents also requires engaging their influencers or "gatekeepers"—in their immediate lives and at higher levels of the ecological framework (Figure 2). To accomplish this goal with interpersonal-level influencers, Aahung supported the sensitization and counseling of gatekeepers, such as parents and community members, by school administrators and teachers to improve engagement and transparency of the program. This strategy also served to proactively address layers of potential resistance. To increase outreach, Aahung held public theater performances, *melas* (fairs), mobile cinema campaigns, and discussion sessions to demystify LSBE and demonstrate its benefits. They also invited parents to school discussions about the importance of adolescent health, where Aahung and partners explicitly asked their permission to teach LSBE topics.

Similarly, Rutgers Pakistan created a Parent Involvement Strategy in 2011 to develop parents' interest in their children's education and to enhance communication and transparency of the program's content and objectives. Their evaluations indicated that parents generally viewed the LSBE program positively and noted

improvements in parent-child communication.¹¹ Rutgers Pakistan also trained men as Fathers for Change, disseminated "responsible fatherhood" and gender-equality messages through radio and social media, hosted events to celebrate International Father's Day, and conducted theater plays aimed specifically at men and boys. The focus on men and boys has been well received, with many men thanking the program for explicitly including them in their considerations. Integrating adolescents' parents in these early stages allowed Aahung and Rutgers Pakistan to create a positive impression and a foundation for future engagement and transparency of their programs.

Finally, to secure support from critical gatekeepers at the community and societal levels and to attain institutional support from key power structures, Aahung conducted an extensive national power-mapping exercise. The exercise revealed key advocates and decision makers among influential government officials, as well as relevant processes and policies. Through subsequent advocacy efforts, including lobbying stakeholders, meeting face-to-face, coordinating learning forums, circulating position papers, and tailoring messages on an ongoing basis, Aahung garnered commitments from the Sindh School Education and Literacy Department, Board of Curriculum, Sindh Education Foundation, and the Sindh Private School Association.⁴ To harness the collective benefits of international and local advocacy efforts, it has similarly cultivated partnerships with organizations that share aligned objectives, such as the United Nations Population Fund, International Women's Health Coalition, Family Planning Association of Pakistan, Rozan, World Population Foundation, Shirkat Gah, and Oxfam Novib.

Likewise, Rutgers Pakistan's strategy has focused on consistently engaging community members, religious leaders, and government stakeholders in the education and health departments in ongoing learning and advocacy forums to create an enabling environment for all young people to exercise their rights. They have partnered with local civil service organizations, such as the Health and Nutrition Development Society in Sindh, AwazCDS-Pakistan in Punjab, and Participatory Integrated Development Society in Balochistan.¹¹ By prioritizing evidence generation through operational research, Rutgers Pakistan has been able to share the tangible value of their initiatives with stakeholders in communities and the government. Advocacy efforts such as these have contributed to the inclusion of

references to LSBE in the National Education Policy of 2009 and the inclusion of information about HIV/AIDS in the national curriculum for grades 9 and 10.¹¹

Institutionalizing the Programs

Using the goodwill generated through the continued engagement of key stakeholders, both Aahung and Rutgers Pakistan implemented their LSBE programs within the school system and worked closely with school administrations and teachers. By embedding their efforts within already accepted institutions and drawing credibility from their partners, the organizations accelerated the general acceptance of their LSBE programs. For Aahung, this process involved ongoing diplomacy and partnership building with school administrators, teachers, and school communities. They began by leveraging key advocates among government officials and civil service organizations to sensitize school decision makers on the utility of LSBE to address young people's health and social needs. Once a partnership was formed with schools, teachers—key determinants of successful implementation—were carefully selected based on their aptitudes and willingness to teach LSBE topics.⁴ Aahung then provided an intensive 5-day training-of-trainers course on comprehensive LSBE topics and participatory teaching methodologies, complete with teachers' guides, workbooks for students, and designated content delivery and skill-building practice sessions. These activities were complemented with on-site teaching support, advanced teacher trainings on skills such as counseling, and annual refresher trainings. Aahung's model of sustainability—grounded in its integration with existing systems and its front-loaded financial model predominantly based on human resource investments—has allowed more than 70% of the program's partners to operate independently.⁴ As another critical component of the program's ability to scale up and be sustainable, Aahung is working with the School Education and Literacy Department, the Textbook Bureau, and the Bureau of Curriculum to convert the current LSBE curriculum, which was designed to be taught as a stand-alone subject, to a framework that can be integrated with approved subject areas already taught in all public schools.

How Aahung and Rutgers Pakistan Overcame Resistance

Despite Aahung and Rutgers Pakistan's best efforts to preempt resistance to their programs, the media

Aahung conducted a national power-mapping exercise to identify key decision makers and gain their support through advocacy efforts.

Aahung's model of sustainability is grounded in its integration with existing systems.

Advocacy efforts by Rutgers Pakistan contributed to the inclusion of life skills-based education in the National Education Policy of 2009.

and religious leaders both emerged as forces of resistance. In 2011 and 2012, conservative media outlets linked to a religious political party, Jamaat-e-Islami, criticized Rutgers Pakistan for "breaking the moral fabric of Pakistan" and corrupting the minds of students by promoting vulgarity. Following parliamentary discussions, its work was stopped in Punjab and in Sindh, where the government required that religious scholars vet the content. Aahung also experienced backlash ranging from religious disapproval and media pushback to misunderstandings from schools and communities about intentions and content.

Rutgers Pakistan stimulated public discussion by reaching out to a small group of respected and well-known journalists.

When the media leveraged attacks, both NGOs strengthened their media presence to build positive public perception of their work and discredit false statements. Rutgers Pakistan reached out to a small group of respected and well-known journalists from print, radio, and television to facilitate dialogue with mass media personnel in the affected provinces. This stimulated public discussion of the utility of LSBE in addressing the vulnerabilities of adolescents and helping the country reach national education and health goals. Currently, Aahung is developing a more detailed risk management strategy to emphasize consistent engagement of media by building a network of supportive media personnel.

Aahung increased community acceptance by strategically using opportune moments to stress the value of their work.

As part of their media engagement strategies, both organizations relied on schools to demonstrate the positive impact of their programs on the confidence and performance of students and teachers. Because teachers and school administrators had been engaged with the LSBE programs from the beginning of their implementation, they served as a strong support base, with substantial buy-in for the programs' success. Rutgers Pakistan organized school visits for journalists, who then produced a number of positive stories about their firsthand observations. Aahung led sensitization and value clarification workshops with schools and the media and created an additional active mechanism, which included organizing specific meetings to discuss issues, to provide support to teachers and school administrators when cases of opposition arose by parents or the community. Furthermore, Aahung reviewed language, increased transparency, leveraged strategic partnerships, and engaged "champions" when faced with backlash.

Rutgers Pakistan assisted textbook writers in drafting a module for life skills-based education, resulting in its inclusion in provincial textbooks.

Rutgers Pakistan and Aahung also took advantage of key moments of positive momentum when society would be more receptive to their messages. For example, Aahung strategically used opportune moments, such as during Ramadan or

after widely publicized reports of gender-based violence emerged, to stress the value of their work and thereby increase community acceptance. Rutgers Pakistan used a resurgence of positive media attention to arrange for progressive religious scholars to review the content of their LSBE curriculum and supplement its content with messages from the Quran. This work fed into a series of meetings with parliamentarians, policy makers, religious scholars, and media personnel in Balochistan, whereby Rutgers Pakistan was able to present positive results of the LSBE programs to the provincial Secretary of Education and the Bureau of Curriculum. Rutgers Pakistan then shared all of the program materials with the Bureau of Curriculum, the Provincial Institute of Teacher Education, and the School Education and Literacy Department, who formed a committee to review the materials and encourage institutional ownership of the programs. Rutgers Pakistan supported this review by providing explanations and acceptable recommendations, and later assisted public-sector textbook writers in drafting a module for LSBE.¹¹ The module was reviewed by the committee and approved by the Secretary of Education.¹¹ Through perseverance, willingness to collaborate, and patience during changing administrations, these efforts culminated in a letter of recommendation by the Bureau of Curriculum to include LSBE in provincial textbooks.¹¹

■ DISCUSSION

In our review of the development of Aahung and Rutgers Pakistan's LSBE programs, we found 2 themes that improved uptake and positive reception of sexuality education: (1) building community support, and (2) responding to resistance. Within these themes, strategies included collaborating with leaders to select issues to address, tactfully framing issues with careful consideration for sensitivities, engaging adolescents' influencers, strengthening media presence, showcasing school programs to increase transparency, and choosing critical times to introduce messages. The success of Aahung and Rutgers Pakistan was grounded in their readiness to understand the nuanced context within the communities, to collaborate with many groups of stakeholders at different levels of the ecological framework—including parents, school officials, religious leaders, media personnel, and adolescents themselves—to ensure support, and to stand up to forces of resistance to pursue their collective goals. Additionally, both programs have noted areas of

weakness, such as the lack of detailed content on sexual diversity and sexual behavior (especially related to contraception and abortion), the need for expanded work with parents and other community members to create a truly enabling environment for adolescents to exercise their rights, and the challenge of securing sufficient buy-in from government and schools to ensure meaningful institutionalization, which will guide future planning and action.

The value of comprehensive sexuality education for adolescents is well established, and past studies have collected data on the effective characteristics of sexuality education programs around the world.¹⁸ The counter-arguments to common points of resistance to sexuality education have been clearly outlined by numerous sources.¹⁸ Additionally, resistance has been identified by many sources as a key obstacle in scaling up sexuality education in diverse contexts.^{6–8,19} Too often, however, the conversation stops there. There has been very little discussion on specific programmatic strategies to proactively prepare for backlash and respond timely and effectively.

We recognize that this review is limited to Pakistan and the work of only 2 NGOs, but it is an important contribution because resistance to sexuality education has limited coverage in the literature. We obtained data from key informants at Aahung and Rutgers Pakistan, who provided valuable insights to our analysis. We acknowledge that our analysis could also benefit from the perspectives of other community groups.

The implication of our findings is that even in conservative contexts, we can find ways to build support for sexuality education and stand up to forces of resistance. It takes an extraordinary amount of local knowledge, work, and courage to do so, which potentially explains why we have not seen more progress on SRH education. In the specific context of Pakistan, Aahung and Rutgers Pakistan remained cognizant of the fact that resistance comes in many shapes and forms. There can be general resistance due to the discomfort of discussing sensitive topics such as adolescent SRH. There can be logistical resistance due to resource constraints and a lack of adequately trained professionals to carry out and manage the programs. Lastly, there can be conservative resistance to the basic premise of LSBE, the idea that young people should receive any information pertaining to reproductive health, and the perception of "western" ideological influence. As described, the success of the 2 NGOs is grounded in the understanding that preventing and responding to each

form of resistance requires specific strategies and contextual knowledge. There is no one-size-fits-all approach to building community support and responding to resistance. In this case, Aahung chose to use a rights-based approach to bring legitimacy to its work, while Rutgers Pakistan supplemented its content with messages from the Quran, as informed by a review with progressive religious scholars. We need further research on diverse strategies to build community support and respond to resistance in a variety of settings, and some combination of these strategies must be an integral part of successful sexuality and reproductive health education programs.

CONCLUSION

The experiences of Aahung and Rutgers Pakistan in the promotion of SRH education are inspiring and their approaches to identifying strategies that worked in their context can inform programs in countries around the world. They recognized that it is not enough to run effective education programs if the programs are not accepted locally and by society at-large. Both organizations know they must be ready to respond to occasional backlash (often coordinated) from media, religious institutions, and other groups. A 2-pronged approach, whereby these organizations reached out to local communities while simultaneously working with the media and religious institutions, secured local support for both organizations as well as a network of journalists and community leaders ready to champion their cause in the face of heated opposition. We call for further sharing of challenges, specifically related to resistance, with sexuality education programs in order to develop a toolbox of additional strategies for community uptake.

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Building community support and responding to resistance improved uptake and positive reception of sexuality education.

Even in conservative contexts, we can build support for sexuality education and stand up to resistance.

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ORIGINAL ARTICLE

Evolution and Resistance to Sexuality Education in Mexico

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Esther Corona Vargas^e

Mexico's efforts at sexuality education have progressively evolved, from a biological focus in the socialist era in the 1930s, to adding a demographically concerned family planning component in the 1970s and including a wider reproductive health perspective in the 1990s, and finally shifting to a broader sociological context in the early 21st century. Opposition to sexuality education rose steadily in the time period considered, with a growing range of more organized and well-financed actors. Despite this opposition, alliances between academic, government, civil society, and NGO champions have helped ensure sustainability.

ABSTRACT

Background: Since the 1930s, Mexico has made substantial progress in providing adolescents with sexuality education through an evolving national school-based program. As part of a broader effort to document strategies to build support for and deal with resistance to sexuality education, this analysis uses a historical lens to answer 2 key questions: (1) How has the nature of sexuality education in Mexico evolved from the 1930s to the 2010s? (2) How have the drivers, responses, support, and resistance to sexuality education impacted Mexico's experience implementing and sustaining school-based sexuality education?

Methods: The analysis was informed by a review of peer-reviewed and gray literature as well as the personal experience and documents of one of the authors, who has played a central role in Mexico's sexuality education effort for 50 years. The findings were organized according to 4 time periods—the 1930s, the 1970s, the 1990s, and the first 2 decades of the 21st century—that emerged during the analysis as distinct periods with regard to the social and political context of school-based sexuality education. Within each of these time periods, the following 4 thematic aspects were assessed: drivers, responses, support, and resistance, with a particular focus on the rationales and strategies of resistance over time.

Findings: This analysis identified determined support for school-based sexuality education in the 4 historical time periods from a range of governmental and nongovernmental stakeholders. However, opposition to sexuality education also steadily rose in the time period considered, with a growing range of more organized and well-financed actors. The Mexican government's commitment to delivering school-based sexuality education has driven its inclusion in public schools, along with expansion of its curricula from primarily biological content to a more comprehensive approach.

Conclusion: Mexico's experience with sexuality education can inform other countries' efforts to consider the drivers, responses, support, and resistance that may be present in their own contexts. This type of analysis can contribute to strategic, well-informed, and well-conceived programmatic design and implementation to build support for sexuality education and deal with resistance.

INTRODUCTION

Over the past century, Mexico has made substantial progress in providing adolescents ages 10 to 19 years with sexuality education. First implemented in the 1930s, the government-run national school-based sexuality education program operates an integrated

curriculum for primary and secondary school students. The current version of the national sexuality education program has been operational since the early 1970s. The program has experienced both support and resistance since its inception, with a notable evolution of its opposition's rationale and strategies over time. The strategies used by Mexico's governmental and nongovernmental advocates to maintain political commitment to sexuality education in the face of resistance can provide other countries with ideas and evidence to develop and support their own sexuality education programs.

Despite wide recognition of the need for sexuality education, evidence of its effectiveness in research and in certain countries, regional and national commitments to sexuality education, and availability of guidelines and programmatic resources for governments and

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Despite wide recognition of the need for sexuality education, "there is less clarity about how to implement [sexuality education] and how to scale [it] up in diverse contexts."

NGOs, the United Nations Educational, Scientific and Cultural Organization (UNESCO) states that "there is less clarity about how to implement [sexuality education] and how to scale [it] up in diverse contexts," especially when faced with sensitivity and resistance.¹⁻¹⁶ Although Mexico's sexuality education program stands out due to its remarkable longevity, documentation of the program has thus far been limited. A review of existing evidence, including published and gray literature, reveals only brief references to the support of and resistance to sexuality education in Mexico, no analysis using a long-term perspective, and major gaps in the assessment of thematic components.¹⁷⁻²⁵

To fill these gaps, this analysis aims to evaluate Mexico's experience with sexuality education as part of a broader effort by the World Health Organization (WHO) to document strategies to build support for sexuality education and deal with resistance in diverse contexts.^{26,27} This analysis will not restate the evidence base for sexuality education, nor will it assess the programs' coverage, quality, or fidelity, or the impact of the program on knowledge, behavioral, or health outcomes. Instead, this analysis will use a historical lens to answer the following questions:

1. How has the nature of sexuality education in Mexico evolved from the 1930s until the 2010s?
2. How have the drivers, responses, support, and resistance to sexuality education impacted Mexico's experience in implementing and sustaining school-based sexuality education?

■ METHODS

Data Collection

Data were collected through a literature review of peer-reviewed journals and national plans and reports, along with English and Spanish newspaper articles and website content to complement information gaps. The literature search was conducted using Google and Google Scholar with the following keywords: sex education, sexuality education, Mexico, history, and resistance. Mexico's government platform Gob.mx was searched for national plans and reports.²⁸ After identifying specific organizations that opposed sexuality education during each time period, the researchers analyzed the rationale and strategies using information from each organization's website, as published sources were not available.²⁹⁻³¹ Additionally, the personal

experience and collection of documents of one of the authors (ECV), who has played a central role in Mexico's sexuality education efforts for more than 50 years, provided crucial information for understanding the challenges and successes of the program since the 1970s.

Data Analysis

Relevant information was extracted from peer-reviewed and gray literature, including national plans and reports, newspaper articles, website content, and personal testimonies. The findings were organized according to 4 key time periods—the 1930s, the 1970s, the 1990s, and the first 2 decades of the 21st century—that emerged during the analysis as distinct periods with regard to the social and political context of school-based sexuality education. Within each of these time periods, the following 4 thematic aspects and questions were assessed:

1. Drivers: What was the social and political context that encouraged the delivery of school-based sexuality education?
2. Responses: How did sexuality education evolve in this time period?
3. Support: Who were the main players behind sexuality education's accomplishments?
4. Resistance: Who were the main players in the opposition and what were their rationales and strategies?

Lastly, we explored the changing nature of these 4 factors over time, with particular attention to the aspect of resistance.

■ FINDINGS

Mexico in Context

Mexico is a large middle-income country with an adolescent population of 23.7 million people in 2015, composing 19% of the country's total population.³² In 2009, approximately one-quarter and one-fifth of adolescent boys and girls, respectively, were sexually active, and almost 30% of married and/or sexually active girls aged 15 to 24 years had an unmet need for contraception.^{33,34} In most states of the country, access to safe abortion services remains restricted.³⁵ Because of limited access to sexual and reproductive health services and conservative social factors, national adolescent pregnancy and unsafe abortion rates have been high, albeit with regional variation.^{33,34,36} Meanwhile, national attendance rates in Mexico's

National attendance rates in Mexico's primary and secondary schools are very high, giving school-based sexuality education programs the potential to reach many young people.

primary and secondary schools have reached 98% and 80%, respectively, giving school-based sexuality education programs the potential to reach many young people and reduce these risks if implemented and delivered effectively.³⁷

Mexico is regionally and ethnically diverse and is defined by its constitution as a pluricultural state. Mexican society also has a strong Catholic foundation—with more than 80% of the population nominally affiliated with the church—and strong conservative values on premarital sexual activity, traditional family structures, and inequitable gender norms.³⁸ Despite this, the country has a largely secular government, which has promoted progressive policies, and a decentralized system of political authority comprised of 31 independent and autonomous states and the Federal District of Mexico City. These factors contribute to substantial diversity in the nation's state-level policies. For example, while the federal government decides on the content included in curriculum and textbooks, which are delivered to all children and adolescents free of charge, state governments control the content of an extra module in secondary schools. Together, these factors have created challenges to implementing a cohesive national framework for adolescent sexual and reproductive health education, despite demonstrated need.³⁹

How Sexuality Education in Mexico Evolved, 1930s–2010s

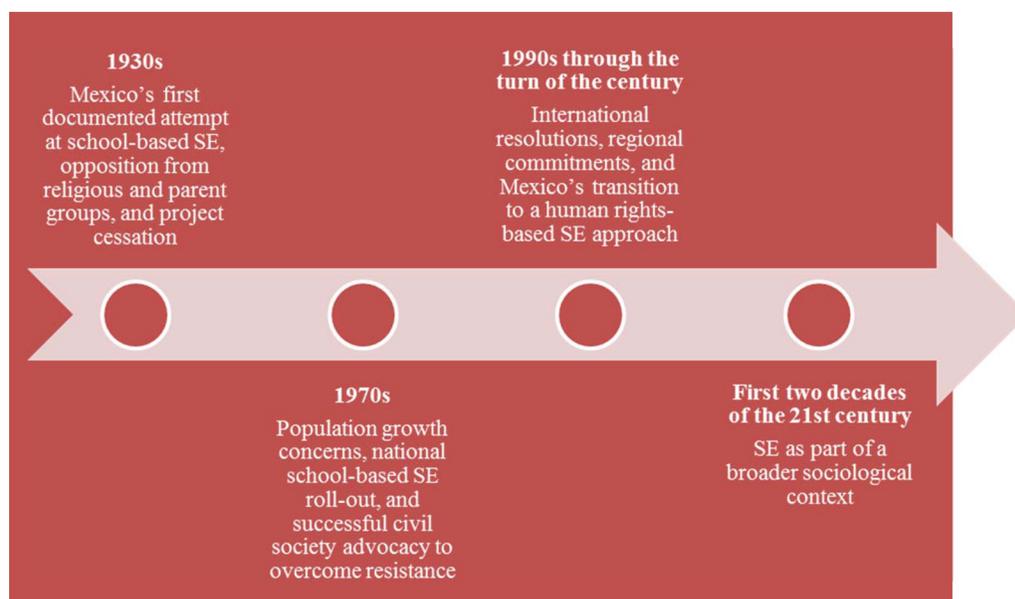
Our findings are first organized chronologically by the following 4 historical time periods (Figure 1).

1930s: Mexico's First Documented Attempt at School-Based Sexuality Education

The first documented attempt to introduce sexuality education in primary schools in Mexico City was led by Public Education Secretary Narciso Bassols in 1932.^{16,26} This initiative, part of his larger vision of a socialist education policy, was driven by sexuality education recommendations from the 1930 Pan-American Congress of the Child, held in Lima, Peru, and aligned with objectives of the Mexican Eugenic Society. The Mexican eugenics movement, prompted by concerns over poverty, internal displacement, and high rates of mortality and illness after the Mexican Revolution (1910–1917), greatly influenced national policies on public health, education, and welfare in the 1930s, especially those related to maternal and reproductive health. The rationale of Bassols's initiative was that children are part of a secular world where schools play a significant role, and, thus, schools are obliged to respond to the rights of children to obtain information on conception, birth, and reproduction.²⁰

The first documented attempt to introduce sexuality education in primary schools in Mexico City was led by Public Education Secretary Narciso Bassols in 1932.

FIGURE 1. Historical Time Periods of the Evolution of Sexuality Education in Mexico



Abbreviation: SE, sexuality education.

Arguments against school-based sexuality education asserted that parents should provide such education, as they are best able to assess the age-appropriate information needs of their children.

Many government officials, academics, and health and education professionals supported the underlying rationale for Bassols's initiative, agreeing that sexuality education is necessary for children to reach their full potential and achieve healthy development.²⁰ However, the initiative became conflated with an ongoing conflict between the Catholic Church's assertion of religious authority and the Mexican State's assertion of secular authority.²⁵ Supporters and critics of sexuality education both used the media to influence public opinion and lobby stakeholders to support or oppose sexuality education. Strong resistance arose from conservative parent associations of private schools and religious institutions.³¹ Arguments against school-based sexuality education asserted that parents and the family should provide sexuality education, as they were best able to assess the age-appropriate information needs of their children and that only families had the right to provide their children with values regarding sexuality. Many parents also agreed with religious leaders who worried that sexuality education would encourage adolescents to engage in sexual activity.⁴⁰ Concerned mothers gathered for demonstrations and alleged that sexuality education was a communist plot. Male secondary school students protested sexuality education in a movie theatre, arguing that it would corrupt their female classmates, and their arrest prompted a general school strike and street protests.²³

Soon after the initiative's inception, Bassols was asked to resign—a decision attributed to both his sexuality education initiative and his support for socialist education.⁷ The first official effort for school-based sexuality education in Mexico failed to sustain itself amidst substantial resistance, and the initiative was halted.²³

1970s: National School-Based Sexuality Education Roll-Out

During the 1970s, policy makers in Mexico became increasingly concerned with demographic trends, including rapid population growth, driving a renewed prioritization of sexuality education.

During the 1970s, policy makers in Mexico became increasingly concerned with demographic trends, including rapid population growth, driving a renewed prioritization of sexuality education. Government officials introduced numerous policies, including a modification of the Mexican Constitution to protect the individual's right to decide the number and spacing of their children, the creation of the National Population Council, and the introduction of a family planning policy in the Secretariat of Health. These changes enabled the government to declare school-based sexuality education the educational foundation

for population policies. In response, sexuality education was introduced into national primary and secondary education curricula in the early 1970s and integrated into several mandatory courses, including biology and civic education.²² The new sexuality education content was rooted in human biology, and reinforced conservative values that recognized only heterosexual unions and marriage as acceptable spaces for sexual practices.^{19,21,23} Chapters on puberty, menstrual cycles, pregnancy, and childbirth were added to primary school textbooks, and information on prevention of unintended pregnancy and sexually transmitted infections was added to secondary school textbooks. These textbooks were distributed free of charge to all children in public schools. Primary and secondary school teachers received preservice training at teacher training colleges, such as the National Pedagogical University (Universidad Pedagógica Nacional), to incorporate the textbooks' content into the curriculum.

Despite the relatively conventional nature of the sexuality education content, conservative sectors, arguing for adherence to traditional and cultural norms, fervently resisted the school-based sexuality education program.²² They asserted again that it was the parent's right to teach values about sexuality to their children, and that sexuality education was not an appropriate topic to be taught in schools. For example, parents and teachers were opposed to discussion of masturbation and accused sexuality education of promoting socialist ideas.²³ At times, the backlash reached violent expression: book burnings and calls to tear the offending pages from textbooks occurred in Aguascalientes and San Luis Potosí, 2 of the most conservative and religious states.¹⁹

In contrast to the opposition from conservative political parties, parent associations, and Catholic sectors, Mexico's secular government supported the integration of sexuality education content into the education curriculum.²³ The curricula development team, with the approval and support of then-Secretary of Education Victor Bravo Ahuja, organized a tour of numerous cities to inform communities about the curricular changes and met with opposition groups, particularly in areas where major protests had occurred. Additional support for school-based sexuality education was led by organized civil society and NGOs, such as the Mexican Association for Sex Education, founded in 1972. Through the years, the number of NGOs directly or indirectly involved with the promotion and delivery of sexuality education grew substantially, largely influenced by the

emergence of the HIV/AIDS pandemic in the 1980s. By advocating with uncertain or critical government officials and nongovernmental stakeholders about the rationale and characteristics of sexuality education, these groups reinforced the government's sustained support for sexuality education. As a result, sexuality education content was retained in the national curriculum and textbooks with only minor changes until the mid-1990s.

1990s: Mexico's Transition to a Human Rights-Based Sexuality Education Approach

Building on progress made in the 1970s and 1980s, Mexico affirmed its commitment to sexuality education in the 1990s alongside resolutions of the International Conference on Population and Development in 1994 and the Fourth World Conference on Women in 1995. Driven by ongoing organized civil society advocacy efforts and growing evidence of sexuality education's benefits for young people, Mexico issued a reform on the General Law of Education in 1993 to include clauses in support of the goals of sexuality education^{22,40}:

Article 7.- The education imparted by the State ... will ... create conscience of the preservation of health, family planning and responsible paternity, without impairment of freedom and absolute respect of human dignity. ...

Article 8.- The rationale guiding education that the State and its decentralized organisms impart ... will be based on results of scientific progress, fighting ignorance and its effects, servitude, fanatics and prejudice.

As a result of this reform, primary school textbooks on natural science, civics, and ethics were expanded to include social, emotional, and ethical aspects of sexuality, including information on gender, sexual rights, and pleasure. While states controlled the content included in the extra module in secondary schools, inclusion of sexuality education content in national textbooks and curricula resulted in the most progressive education curricula in Mexico's history to date.

The policy reform met fierce resistance from Catholic Church authorities and organizations, such as the National Union of Parents of Families (Unión Nacional de Padres de Familia [UNPF]) and the National Pro-Life Committee (Comité Nacional Pro-Vida) (Box).^{29,31} Groups of parents deemed the new textbooks "pornographic" and "perverse."²⁵ While most of the resistance

manifested in local protests, it was also communicated through the media, with debates about sexuality education featured on television and radio.²³

Civil society's support for sexuality education from the 1970s was strengthened by the numerous organizations formed in the 1980s in the wake of the HIV/AIDS pandemic.²³ In the 1990s, these NGOs formed 2 large networks—the Mexican Federation of Sexology and Sex Education (FEMESS) and Democracia y Sexualidad (DEMYSEX)—that linked more than 300 organizations, including MexFam, an International Planned Parenthood Federation affiliate. They collaborated to use print media, such as newspapers and magazines, and audiovisual media, such as television and radio, to build favorable public opinion and community support. Through activities including press releases, conferences, and academic events, the networks were able to build community support and successfully expand and sustain the new human rights-based sexuality education content.^{41,42}

First 2 Decades of the 21st Century: Sexuality Education as Part of a Broader Sociological Context

In the first 2 decades of the 21st century, responses to sexuality education became increasingly driven by linkages to related movements, including HIV prevention, adolescent pregnancy prevention, and lesbian, gay, bisexual, transsexual, and intersex (LGBTI) rights promotion. In 2008, Mexico City was home to the 17th International AIDS Conference and the first Meeting of Ministers of Health and Education of Latin America and the Caribbean (LAC). The latter meeting brought together 30 Ministers of Health and 26 Ministers of Education, or their personal representatives, from the LAC region, who collectively committed to implement sexuality education and sexual health promotion programs in their countries in order to promote concrete action for HIV prevention among young people. The main outcome, the Ministerial Declaration "Preventing through Education," included goals to reduce by 50% the number of adolescents and young people who lack access to sexual and reproductive health services and to reduce by 75% the number of schools that failed to institutionalize sexuality education. This declaration, along with a progressive series of implementation evaluations, was an important tool to help strengthen and revitalize government commitment to sexuality education, not only in

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BOX. Important Players in the Opposition to Sexuality Education in Mexico

- The **National Union of Parents and Families** was created in 1917 as a conservative group opposed to the Constitution's liberal and secular articles. In particular, it opposed the third article that guarantees secular education and, later, the provision of free textbooks and sexuality education to school children. The objective of the union was to allow parents to demand respect for their rights, including the right to educate their children according to their principles and values.¹⁷ Demonstrations by the union against sexuality education date back to 1934.¹⁹
- The **National Pro-Life Committee** was founded in 1978 as an anti-abortion NGO with links to the Catholic Church. This organization played a major role in resisting legislative attempts to decriminalize or liberalize abortion in Mexico, as well as opposing same-sex marriage, LGBTI rights, and sexuality education.²⁰
- The **National Front for the Family** is an alliance of more than 1,000 civil society institutions nationwide, which uses Catholic principles to defend the sacred institution of matrimony between man and woman and the natural family as the basis of society. It was created in 2016 to oppose the president's initiative to recognize and legalize same-sex unions. The alliance is gathering support for a petition for constitutional reform introduced to the Senate on February 2016 by ConFamilia (Consejo Mexicano de la Familia). The initiative, which has gathered more than 200,000 signatures, calls for the recognition and protection of the family entity and unions of men and women and the guarantee of parents' right to choose the kind of education their children receive. Lastly, it demands that the impact on the family entity be evaluated for all laws and policies.¹⁸

Mexico, but throughout Latin America and the Spanish-speaking Caribbean.⁴³

While the Ministerial Declaration and other advocacy and programmatic efforts improved the Mexican government's official commitment to sexuality education, they had a limited impact on preventing adolescent pregnancy. Despite major declines in total fertility rates, adolescent birth rates have not decreased to the same extent and the percentage of registered births to adolescent mothers under 20 years old has continued to increase—from 16.9% in 1994 to 18.1% in 2015.⁴⁴ President Enrique Peña Nieto prioritized addressing this concerning trend by developing an intersectoral National Strategy for Adolescent Pregnancy Prevention (ENAPEA) in 2015.⁴⁵ Within this strategy, the Ministry of Education developed a sectoral agenda for comprehensive sexuality education to ensure such education was rooted in evidence-based curricula that considered the biological, psychological, social, cultural, economic, and political aspects of sexuality with respect to human rights and dignity. This measure aimed to improve the quality of education and to ensure access to, continued enrollment in, and completion of schooling as a means of preventing unwanted/unplanned adolescent pregnancies.⁴⁶

In 2015, resistance to the adolescent pregnancy prevention initiatives took the form of a digital petition platform to revise the ENAPEA. In this platform, citizens expressed concerns about the strategy, arguing that it was based on distribution of contraceptive methods and condoms to adolescents in schools and public places without

parental approval, encouraged early adolescent sexual activity by incorporating discussions on pleasure, and promoted abortion as a family planning method. Furthermore, the petitioners argued that the strategy failed to consider values of love, compromise, and responsibility in expressing sexuality and did not adequately promote abstinence until marriage. This particular petition was promoted by 7 organizations, including the UNPF, gathering over 14,000 signatures by 2016.⁴⁷

Additionally, sexuality education experienced a new wave of opposition driven by the current administration's promotion of LGBTI rights. On the 2016 National Day against Homophobia, President Peña Nieto convened LGBTI groups and other NGOs, including FEMESS, to launch an initiative calling on members of Congress to modify the civil code and other laws to guarantee the right to same-sex marriage and access to changes in gender identity, and establish equality for adoption, among other initiatives.⁴⁸ As a result, Secretary of Public Education Aurelio Nuño promised to revise the current sexuality education curriculum to include sexual diversity by 2017.⁴⁹ Protests from conservative voices, such as the National Catholic Bishops' Conference and the UNPF, arose quickly and a new alliance of resistance formed in May 2016: the National Front for the Family (Box).^{30,50} This opposition group used social media networks to organize several nationwide protests to influence public opinion against the presidential initiative and the revision of the national textbooks. They convened massive demonstrations and attracted substantial external

Despite major declines in total fertility rates, adolescent birth rates have not decreased to the same extent and the percentage of births to adolescent mothers under 20 years old has continued to increase.

sources of technical and financial support for opposition to sexuality education to a degree that previous waves of resistance had not experienced.⁵¹⁻⁵³ Many believe that the opposition's critical reaction to the President's decision in favor of inclusion of sexual diversity largely influenced the governor elections in 2016, which resulted in great losses for the ruling party. In November 2016, the initiative for constitutional reform to guarantee rights for the LGBTI community was rejected by Congress.⁵⁴

During this recent period of opposition, NGOs supporting sexuality education in Mexico persisted in leading research, technical assistance for teacher trainings and production of educational materials, and, especially, advocacy for sexuality education's inclusion in formal and non-formal curricula. The Mexican Association for Sexual Health (AMSSAC) continued to conduct nationwide training programs for teachers, which they had initiated as early as 2012, to complement broader violence prevention efforts.⁵¹ The National Population Council and the Mexican Institute for Radio ran a series of media campaigns on adolescent sexual and reproductive health, which included phrases such as "The responsibility is yours. Informing yourself is your right. Protect yourself." and "Informed, free, and safe sexuality avoids surprises which can alter your future."^{55,56} The DEMYSEX alliance led advocacy efforts at the state level. In 2016, supporters of sexuality education achieved a major victory in a Supreme Court of Justice ruling that established children and young people's right to comprehensive sexuality education and contraception as a component of their basic human right to the highest possible level of physical and mental health. According to government officials, including the Secretary of Health, and in the view of supportive NGOs, this ruling offers many opportunities for the defense and continuation of comprehensive sexuality education programs and actions.^{52,53} Accordingly, on International Population Day in 2017, the National Population Council explicitly called for strengthening of adolescent sexuality education.⁵⁷

How Drivers, Responses, Support, and Resistance Impacted Mexico's Delivery of School-Based Sexuality Education

The following sections analyze the evolution of sexuality education in Mexico by extracting cross-cutting themes within the 4 thematic aspects: drivers, responses, support, and resistance.

Drivers

The drivers in the evolution of efforts toward national school-based sexuality education in Mexico have changed over time. Starting from a socialist education project in the 1930s, based on recommendations from the Mexican Eugenics Society and the Pan-American Congress for the Child, the drivers shifted to concerns about rapid population growth in the 1970s, to commitments toward international treaties and regional agreements in the 1990s, and, finally, to adolescent pregnancy prevention targets, protection of LGBTI rights, and efforts to address discrimination in the 21st century. In 2016, human rights movements and political momentum made a substantial impact, culminating in the acknowledgment and inclusion of adolescents' right to sexuality education and contraception as a basic element of a child's human rights, as recognized by the 2016 Supreme Court ruling.

Responses

The responses prompted by these drivers varied, greatly influenced by the social, economic, and political contexts of each time period. Mexico's first major response in this analysis was the initiation of a national school-based sexuality education initiative in the 1930s, followed later by inclusion of sexuality education content in textbooks and curricula for all public primary and secondary schools in the 1970s. The government has responded to the evolving drivers by updating and expanding the curricula and programs toward a comprehensive approach to sexuality, albeit not in a continuous or consistent manner. The government also recognized the potential benefits of delivering sexuality education to children and adolescents as a strategy to prevent adolescent pregnancy and to eliminate different forms of discrimination. Finally, the recent Supreme Court ruling offers promising opportunities for the defense and continuation of sexuality education in Mexico. Mexico's decentralized power structure, meanwhile, has influenced the degree to which sexuality education has been introduced and supported in each state. While federal authority defines the curricula of national textbooks and compulsory courses, which include sexuality education content as described previously, in order to ensure standards of quality in the country, state-level authorities control the content selected for the extra module in secondary school curriculum. To that end, state authorities have a degree of autonomy in meeting supplementary educational

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needs and administering educational services tailored to the specific demands of each state. It is important to note, also, that the varied degree of progress in implementing sexuality education at the state level is also related to the heterogeneous characteristics, political interests, and levels of influence of supporters and opposition in each state.

Support

The commitment of Mexico's secular government to include sexuality education in public school curricula and textbooks and to continuously review and expand the curricula has been instrumental in its longevity.

Support for delivery of school-based sexuality education has existed in Mexico since the 1930s. Government officials have championed many of the sexuality education initiatives, resulting in legal and policy changes and educational reforms. Additionally, growing evidence on the benefits of comprehensive sexuality education for positive sexual and reproductive health outcomes of young people has proven useful for pushing forward the agenda for national school-based sexuality education. Several organized civil society organizations and NGOs have been instrumental in advocating, promoting, and delivering sexuality education programs in Mexico. Since the 1990s, individual organizations have joined forces to support sexuality education as coalitions of organizations engaged in collaborative work.

For the most part, organizations opposing sexuality education have not completely rejected the concept but instead object to its place in schools.

Resistance

Resistance to delivery of school-based sexuality education was encountered during each historical time period from conservative parents' unions, the Catholic Church, and other faith-based organizations. From the review of 3 organizational websites for opposition groups (Figure 2), it is evident that organizations oppose sexuality education for distinct reasons, albeit with common threads. For the most part, they have not completely rejected the concept of sexuality education; instead they object to its place in schools and fight to uphold familial and parental authority in their children's education. These groups believe that school-based sexuality education could have harmful consequences for the lives of children and adolescents, such as the promotion of early and risky sexual activity, masturbation, or homosexuality. Most of the identified groups had ties to the Catholic Church and, thus, defended religious values.^{29–31} In recent years, resistance to sexuality education has been linked with movements against abortion and same-sex marriage. The organizations that resist these initiatives formed united coalitions, rallied thousands of people into massive demonstrations, led intensive lobbying

against related government initiatives, and used mass media to reach the population at large.³⁰

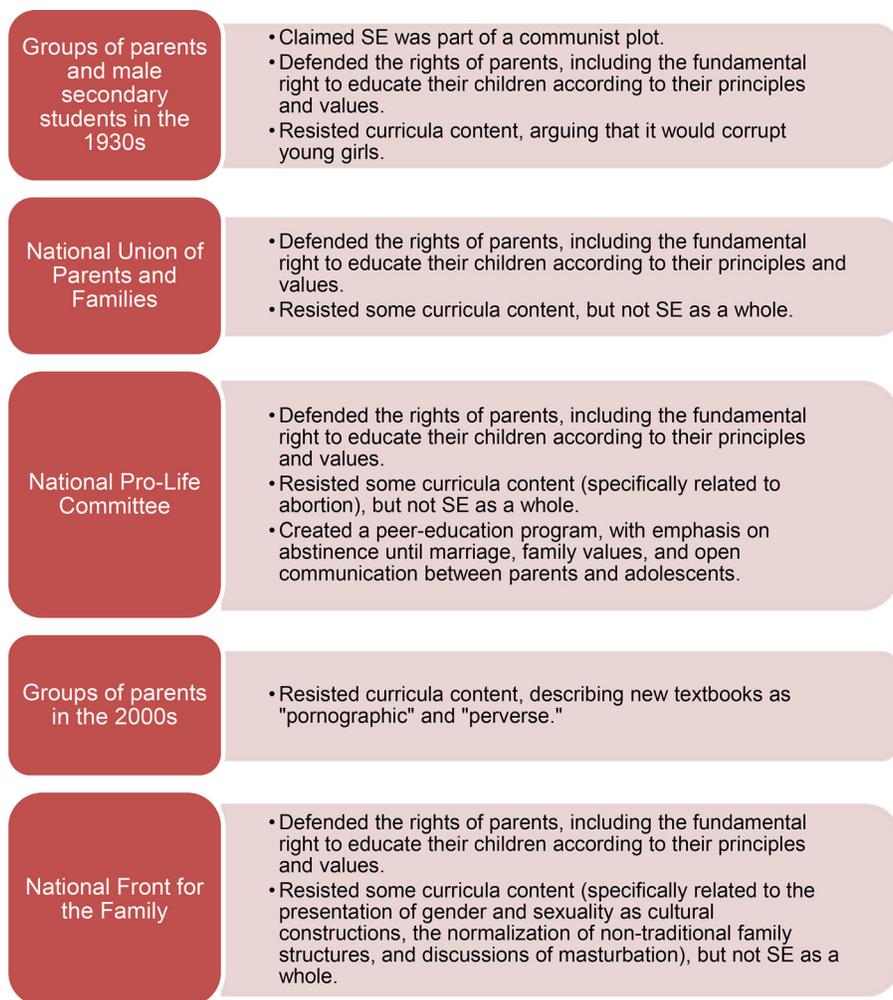
DISCUSSION

The chronologic and thematic analysis of the evolution of sexuality education in Mexico reveals determined support for school-based sexuality education from a range of players in the 4 historical time periods described in this article. Specifically, the commitment of Mexico's secular government to include sexuality education in public school curricula and textbooks and to continuously review and expand the curricula has been instrumental in its longevity. The findings also reveal that opposition to sexuality education has existed since its first introduction in schools and persists today, and that rationales for opposition have remained largely consistent. Some of the opposition's concerns are well-intended; parents, for example, are worried for their children and are concerned that sexuality education programs are sharing messages that conflict with their values. However, other opposition groups have included false accusations to discredit and slander efforts toward national implementation of quality school-based sexuality education. Opposition to sexuality education, but also to many human rights issues including abortion and LGBTI rights, rose steadily during the time period analyzed, with a growing range of more organized and well-financed actors. As sexuality education has become linked with these issues over time, it has attracted additional backlash and resistance.

Since the first implementation of sexuality education in Mexico, the government's response has been inconsistent and has not employed systematic strategies to build community support for sexuality education. Additionally, little dialogue has occurred between supporters of sexuality education and its opposition; what communication has occurred has been facilitated through the media. In particular, most of the organizations belonging to the FEMESS and DEMYSEX networks, which represent more than 100 organizations, prefer not to work directly with opposition groups, arguing that these groups are usually not willing to discuss or move from their extreme positions. Instead, supporters have focused on advocating with political stakeholders in order to attain further support for sexuality education within the government.

We found that the rationales used by organizations opposed to school-based sexuality education in Mexico are similar to those in other countries in

FIGURE 2. Opposition Groups and Their Rationale for Resistance to Sexuality Education



the region. In Panama, a draft law for establishing a normative baseline for safeguarding and promoting sexual and reproductive health was introduced in 2014 and backlash included protests by Catholic and Evangelical churches and other groups.⁵⁸ Similarly, in Colombia, conservative actors, including Red Familias and members of the Catholic Church, demonstrated against initiatives from the Ministry of Education, United Nations agencies, and NGOs to rid schools of discrimination. These initial protests ultimately resulted in massive protests in Bogota and other major cities. The emergence of coalitions of resistance to sexuality education in Mexico and other Latin American countries is a pattern that has been seen elsewhere, including in protests against numerous other movements such as LGBTI

rights, same-sex marriage and adoption, and abortion—that often include false accusations about the use of sexually explicit materials in school-based sexuality education curriculum. A common feature in these protests is the condemnation of the so-called "gender ideology," a term derived by conservative groups that is a misconstruction of gender theory. According to those who use the term, gender ideology proposes to eliminate the differences between men and women, including biological differences. These groups adhere to a rigid binary view of sex that male and female nature is set and that there is a "natural family," based in heterosexual marriage and the procreation of children. The influence of religious conservatism in the region is also illustrated in the case of Brazil, where conservatism

Alliances for sexuality education can and should be built between academic, government, civil society, and NGO champions.

has gained influence in government, endangering progress made by the country toward the protection and promotion of human rights in general, and women's sexual and reproductive health and rights in particular.⁵⁹ The similarities of rationales and strategies from a review of the coalitions' websites suggests their efforts are a supranational movement financed by substantial international funds.⁶⁰

While this research did not assess coverage and quality of sexuality education in Mexico, a survey of a nationally representative sample of almost 4,000 students ages 15 to 18 years in urban and rural areas identified that the proportion of adolescents receiving sexuality education varied greatly depending on grade level.⁵⁹ Furthermore, due to Mexico's decentralized government, the extent to which sexuality education has been included in extra modules, and the quality and fidelity with which it has been implemented, was found to be highly variable by state.⁵⁹ Students reported that the curricula were often incomplete and taught unevenly throughout the school year, and that the methodologies teachers used to facilitate better uptake of knowledge and skills should be improved.⁶¹ These findings indicate that alongside efforts to create an enabling environment for sexuality education, attention needs to also be given to ensuring quality and fidelity of sexuality education.

Limitations

While this article is largely based on the experience of an expert with more than 50 years in the field of sexuality education in Mexico, her testimonies were complemented with evidence from peer-reviewed literature and, given the limited number of peer-reviewed publications on this subject, numerous other data sources, including gray literature, periodic publications, and website content. Additionally, as described earlier, this analysis does not restate the evidence base for sexuality education, nor does it assess the program's coverage, quality, or fidelity, or the impact of the program on knowledge, behavioral, or health outcomes. While the article does not present recommendations on best programmatic practices, it does describe one country's experiences in implementing and sustaining sexuality education over time.

CONCLUSION

Sexuality education continues to be supported and resisted by different groups within Mexico's government, NGOs, and organized civil society.

In the last 2 decades, opposition to school-based sexuality education has become more organized and has gathered greater numbers of constituents and resources to target not only sexuality education but also sexual and reproductive health and rights in general. In response, a number of recommendations can be made to ensure the future delivery of school-based sexuality education in Mexico. Firstly, the review revealed that alliances for sexuality education can and should be built between academic, government, organized civil society, and NGO champions to organize efforts and work strategically and cohesively to respond to opposition. Advocates for school-based sexuality education must capitalize on the momentum of the recent Supreme Court victory that established children and young people's right to comprehensive sexuality education and contraception, while also building strategies to engage diverse communities of Mexico and confront resistance from well-organized opposition alliances and networks. Secondly, supporters must learn about the opposition and its networks, perspectives, and methods, and develop strategies tailored to specific groups and contexts. Thirdly, the defense of the secular state must be sustained, as it has proven to be one of the best safeguards to efforts to sustain sexuality education in a complex and diverse country such as Mexico. Lastly, greater attention could be given to employing systematic strategies to build community support for sexuality education.

This analysis of the evolution of sexuality education in Mexico shares one example of responses to resistance in a changing social and political context and can inform other countries' efforts to consider the drivers, response, support, and resistance to sexuality education that may be present in their own contexts. In particular, the movement for sexuality education in the entire Latin American region can learn from Mexico's experience due to the similarities in rationales and strategies of resistance, such as religious conservatism.

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ORIGINAL ARTICLE

Let's Stop Trying to Quantify Household Vulnerability: The Problem With Simple Scales for Targeting and Evaluating Economic Strengthening Programs

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Simple scales developed to measure broad constructs of household economic vulnerability in 3 countries did not accurately measure susceptibility to negative economic outcomes or generate valid classifications of economic status to use for targeting and monitoring and evaluation. We recommend designing tailored monitoring and evaluation instruments to capture narrower definitions of economic vulnerability based on characteristics that economic strengthening programs intend to affect and using separate tools for client targeting based on presence of context-specific "red flag" indicators.

ABSTRACT

Introduction: Economic strengthening practitioners are increasingly seeking data collection tools that will help them target households vulnerable to HIV and poor child well-being outcomes, match households to appropriate interventions, monitor their status, and determine readiness for graduation from project support. This article discusses efforts in 3 countries to develop simple, valid tools to quantify and classify economic vulnerability status.

Methods and Findings: In Côte d'Ivoire, we conducted a cross-sectional survey with 3,749 households to develop a scale based on the definition of HIV-related economic vulnerability from the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) for the purpose of targeting vulnerable households for PEPFAR-funded programs for orphans and vulnerable children. The vulnerability measures examined did not cluster in ways that would allow for the creation of a small number of composite measures, and thus we were unable to develop a scale. In Uganda, we assessed the validity of a vulnerability index developed to classify households according to donor classifications of economic status by measuring its association with a validated poverty measure, finding only a modest correlation. In South Africa, we developed monitoring and evaluation tools to assess economic status of individual adolescent girls and their households. We found no significant correlation with our validation measures, which included a validated measure of girls' vulnerability to HIV, a validated poverty measure, and subjective classifications generated by the community, data collector, and respondent. Overall, none of the measures of economic vulnerability used in the 3 countries varied significantly with their proposed validation items.

Conclusion: Our findings suggest that broad constructs of economic vulnerability cannot be readily captured using simple scales to classify households and individuals in a way that accounts for a substantial amount of variance at locally defined vulnerability levels. We recommend that researchers and implementers design monitoring and evaluation instruments to capture narrower definitions of vulnerability based on characteristics programs intend to affect. We also recommend using separate tools for targeting based on context-specific indicators with evidence-based links to negative outcomes. Policy makers and donors should avoid reliance on simplified metrics of economic vulnerability in the programs they support.

INTRODUCTION

Economic strengthening programs are intended to help vulnerable households achieve economic stability, often in support of child well-being outcomes in contexts of high HIV prevalence.¹ The language of economic strengthening is most commonly invoked in the context of projects funded by the United States Agency for International Development (USAID) and the U.S.

President's Emergency Plan for AIDS Relief (PEPFAR) for orphans and vulnerable children (OVC) affected by HIV, where interventions are designed to improve economic status in order to help households better access HIV-related services, reduce HIV risk, and improve child well-being. Donors are increasingly demanding that multisectoral programs with economic strengthening components reach the most vulnerable households. Interventions have historically failed to reach such households due to the costs associated with overcoming barriers of social and physical isolation. Donors are also emphasizing the use of "graduation" approaches in

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economic strengthening programs, where participants exit programs, once they have achieved a set of designated outcomes, making room for new participants. The idea of graduation stems from the need to prevent beneficiaries from depending indefinitely on programmatic inputs, but also the desire to generate sustainable resilience outcomes.

In response to these conditions, practitioners are increasingly seeking data collection tools that will help them target vulnerable households, classify them in terms of economic vulnerability and match them to appropriate economic interventions, monitor participants' status throughout the project, and determine readiness for graduation. To help meet this demand, the SPIRES (Accelerating Strategies for Practical Innovation and Research in Economic Strengthening) project, funded by USAID and PEPFAR and managed by FHI 360, has experimented with vulnerability assessment methods relevant for economic strengthening projects. Here, we discuss 3 different efforts to quantify and classify individual and household economic status: a large-scale survey in Côte d'Ivoire using rigorous psychometric methods and 2 validation exercises conducted with monitoring and evaluation (M&E) tools developed for different economic strengthening projects in Uganda and South Africa.

■ BACKGROUND ON VULNERABILITY ASSESSMENT

Across disciplines, vulnerability is generally understood as the risk of falling below an accepted benchmark of welfare. Economists typically analyze household survey data using econometric methods to predict economic vulnerability at a population level, answering questions such as²:

- What is the extent of vulnerability?
- Who is vulnerable?
- What are the sources of vulnerability?
- How do households respond to shocks?
- What gaps exist between risks and risk management mechanisms?

These data can generate indicators that are useful for policy makers to target resources to geographical regions or households with characteristics associated with economic vulnerability. Economic strengthening practitioners need vulnerability assessment tools that can help them target households and individuals and determine if their vulnerability has decreased during an intervention.

The most intuitive basis for targeting and monitoring economic strengthening interventions is to measure poverty levels. Household poverty, however, can be difficult to measure accurately. One popular tool for doing so is the Progress out of Poverty Index (PPI), a validated, 10-question scorecard that includes indicators derived from national survey data to predict the likelihood that a household falls beneath a given poverty line.³ The PPI is easy to use and transparent in its accuracy for targeting at the individual level, which varies depending on the poverty cutoff selected. However, it encompasses several indicators that are unlikely to change over time, such as household size, and may not be very sensitive to monitoring economic change over the time frame of an average project.⁴ Furthermore, OVC programs are multidimensional and require tools that measure an expanded definition of vulnerability that comprises several dimensions of household and child health and well-being in addition to poverty.

Several OVC programs have approached this challenge by developing short scorecards with indicators related to program objectives. Because data are usually collected by community volunteers acting as case managers, the tools must be simple and easy to use for data collectors with limited education. This need, in addition to the large scale of many programs, places a premium on streamlining data collection efforts, so implementers often prefer a single tool to serve the functions of targeting, M&E, matching households to appropriate interventions, and determining readiness for graduation.

When these types of tools are scored and aggregated as an index measure of vulnerability, they can give implementers a false sense of accuracy and result in failure to target the neediest households. An influential example of this kind of tool is the Vulnerability Assessment Tool (VAT) used by the Sustainable Comprehensive REsponses (SCORE) for Vulnerable Children and their Families project, implemented by AVSI, in Uganda.⁵ This tool includes questions on household assets and income, child protection, food security, parental status, basic services, and the enumerator's impression to classify households according to PEPFAR's categories of household economic status: destitute, struggling to make ends meet, or prepared to grow.¹ The VAT was also the basis of the Vulnerability Index (VI) officially adopted by the Government of Uganda for OVC programs. However, a test of the VI demonstrated that it was not sufficiently sensitive to identify

This article discusses 3 different efforts to quantify and classify individual and household economic status.

Economic strengthening implementers would prefer a single tool to serve the functions of targeting, M&E, matching households to interventions, and determining readiness for graduation.

households with the most critical needs, limiting its utility as a targeting tool.⁶

The Government of Uganda has since adapted an updated version of the VAT called the Household Vulnerability Assessment Tool (HVAT). The HVAT collects information on child and household well-being including questions on economic status, health, water and sanitation, education, psychosocial support and basic care (of children), child protection, and legal support. Like the VAT, it generates a classification of households according to the 3 levels of vulnerability described in PEPFAR guidance. However, these categories are based on an arbitrary set of cut-off points based on score quartiles, and there is no clear theoretical basis for the system of weighting scores for either tool.

ASPIRES attempted to develop more accurate measures of economic vulnerability that could be used for OVC program targeting on 3 different occasions. In 2014, ASPIRES conducted a vulnerability assessment to inform economic strengthening intervention targeting for OVC programs in Côte d'Ivoire. In a review of the literature on vulnerability assessment methods for economic strengthening projects, ASPIRES found that few tools used by OVC programs had undergone any formal validation process. As such, ASPIRES implemented a household survey with the objective of developing a validated scale that could be used to target households at the individual level. In 2 other instances, ASPIRES did not attempt to develop vulnerability scales, but used a programmatic approach to explore the validity of M&E tools developed for different economic strengthening programs in Uganda and South Africa. This article describes the results from those efforts.

■ THREE COUNTRY CASES: METHODS AND FINDINGS

Côte d'Ivoire Assessment

We used a rigorous psychometric approach to develop an economic vulnerability scale in Côte d'Ivoire based on the Sustainable Livelihoods approach.⁷ We conducted a cross-sectional survey of 3,749 households in 5 health regions of Côte d'Ivoire in an attempt to develop a measure of USAID/Côte d'Ivoire's broad definition of vulnerability as the degree of inability of households to provide for the health, education, and nutritional needs of household members with and without HIV infection to mitigate the economic and health impact of HIV, cope with infection, and reduce

their risk for acquiring HIV (for those without HIV).

The instrument was derived from existing survey tools to assess a comprehensive set of asset "capitals," including financial, social, natural, financial, and physical capital, country-specific indicators from national household surveys, and formative qualitative data. In the absence of an existing validated measure of the broad definition of vulnerability that we attempted to measure, we used validated food security and poverty measures, which we expected to correlate with economic vulnerability, to test the validity of our tool. We used the PPI to measure poverty and the Food Consumption Score (FCS) and Reduced Coping Strategies Index (rCSI) to measure food security. Additionally, data collectors trained on the PEPFAR classifications of household status provided their own subjective assessments of each household as a fourth validation measure. Indicators were reviewed by a stakeholder advisory group and the survey was pretested and refined before data were collected.

Using principal component analysis (PCA), we attempted to identify sets of correlated vulnerabilities and derive a small number of composite scores (components) to create an index for targeting vulnerable households for enrollment into an economic strengthening program and matching them to appropriate interventions. We compared the mean component scores from the PCA to data collector classifications of household economic vulnerability using ANOVA. We also classified the households into 4 different vulnerability categories using distributions derived from a participatory vulnerability ranking activity.

We selected 65 of 98 variables in the PCA based on completeness and variability. Based on scree plot data, we retained 4 components but these 4 components explained only 21% of the total variance among the items. **This means that our measure explained only 21% of what distinguished households as more or less vulnerable based on the variables we included in our measure.** Although there is no minimum accepted threshold, a rule of thumb proposed for multivariate analysis in the social sciences is that a solution should explain roughly 60% of variance to be considered satisfactory.⁸ The first (and largest) component, which captured food security and wealth measures, explained only 8% of the variance. In other words, households classified at the same level of vulnerability could have vastly different sets of responses to the questions in our survey, suggesting that very

different sets of variables could lead to the same economic status outcomes.

Overall, we were unable to reduce the variables for our broad construct of HIV-related economic vulnerability down to a scale. We concluded that there were many pathways to household economic vulnerability in our sample and that appropriate programmatic responses should be tailored to individual household needs using a case management approach rather than an economic classification based on a scale.

Uganda Assessment

ASPIRES' Family Care activity is managing 2 learning projects in Uganda to build evidence on how economic strengthening and social support can prevent unnecessary family-child separation and reintegrate separated families: Family Resilience (FARE), implemented by AVSI, and Economic Strengthening to Keep and Reintegrate Children into Families (ESFAM), implemented by ChildFund. In 2016, we worked with implementers to develop a short tool to assess the economic status of program beneficiaries for matching households to interventions and M&E purposes.

The HVAT is the basis for the tools used by both projects. Both programs modified the government tool to add indicators relevant to family-child separation and economic vulnerability: AVSI developing the FARE Household Vulnerability Assessment Tool (FARE HVAT) and ChildFund adapting the Family Status Vulnerability Index (FSVI) that it had developed for a related project. The scoring of these tools reflects these changes.

At the same time, Family Care developed a 9-item "Simple Economic Strengthening Tool" to generate common household economic classifications that could be used for cross-project comparison (Table 1). Family Care selected among existing economic indicators that were consistent across the FSVI and HVAT tools and that corresponded with the PEPFAR categories and LIFT (Livelihoods and Food Security Technical Assistance) livelihoods framework.⁹ An analysis of these frameworks showed 5 main domains of economic status:

1. Ability to pay for basic needs
2. Consistency/volatility of income
3. Availability of liquid assets and savings
4. Food security
5. Availability of assets to respond to shocks

To ensure that all domains were covered, Family Care had requested the 2 projects to add or harmonize some indicators across the FSVI and HVAT. A total of 9 questions were selected for the Simple Economic Strengthening Tool. Each was scored on a scale of 0–4, in accordance with the scoring systems already in place for the HVAT and FSVI. Individual question scores were used to generate a classification based on the PEPFAR descriptions of economic status (destitute, struggling, prepared to grow, or not vulnerable) for each domain. The 5 domain classifications were then used to determine the household classification based on an algorithm developed by Family Care. This complex scoring method was meant to account for the vulnerability dynamics implied by different combinations of scores across questions and domains.

Family Care then analyzed baseline data for 114 FARE target households using the Simple Economic Strengthening Tool. Due to poor correlation with the PPI, Family Care's selected validation measure, the scoring method was then revised based on implementer input so that each question was scored on a scale of 0–3, with scores corresponding to the PEPFAR categories as below:

- 0 points=not vulnerable
- 1 point=prepared to grow
- 2 points=struggling to make ends meet
- 3 points=destitute

Each question was weighted evenly, and final classifications were based on an unweighted average across all scores. The question on shocks originally had multiple responses with the same point value but was revised so that questions that previously had the same value now had different values. As such, Family Care was unable to convert the raw scores for this domain to the new scoring scheme and this domain was dropped from the revised tool. Four of the original 5 domains were retained, with 2 questions each, so domain scores were evenly weighted. FARE used the Simple Economic Strengthening Tool scoring method during baseline data collection among 114 households.

Because poverty likelihood, as measured using the PPI, was expected to vary in the same direction as economic vulnerability as measured by the Simple Economic Strengthening Tool, the PPI was conducted simultaneously with all households as a validation measure. Among the poverty line calculations provided by the PPI, Family Care selected the US\$2/day poverty line calculated at 2005 Purchasing Power Parity (PPP), which is

There are many pathways to household economic vulnerability, so programmatic responses should be tailored to individual household needs using a case management approach rather than an economic classification based on a scale.

TABLE 1. Simple Economic Strengthening Tool Developed for Cross-Project Comparisons in Uganda

| | | | | | | | | | |
|------------------------------------|--|--|---------------------|----------------------------|--|-------------------|----------------------|-----------------------|--------------------------|
| 1. | What is the MAIN source of household income? | | | | | | | | |
| Options | a) None | b) Remittances, pension, gratuity, donations | c) Casual laborer | d) Informal job/employment | e) Peasantry farming/hiring out labour on other farms/garden | f) Petty business | g) Formal business | h) Commercial farming | i) Formal job/employment |
| Score | 3 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 |
| 2. | What is the current monthly HH income? (express amount in Uganda Shillings, then score according to range) | | | | | | | | |
| Uganda Shillings | | | | | | | | | |
| Options | a) Less than 50,000 | | b) 50,000 – 100,000 | | c) 100,000 – 150,000 | | d) 150,000 – 200,000 | | e) Above 200,000 |
| Score | 3 | | 2 | | 2 | | 2 | | 0 |
| 3. | How much money does the household have in savings? | | | | | | | | |
| Uganda Shillings | | | | | | | | | |
| Options | a) Less than 30,000 | | b) 30,000 – 60,000 | | c) 60,000 – 90,000 | | d) 90,000 – 120,000 | | e) Above 120,000 |
| Score | 3 | | 2 | | 2 | | 1 | | 0 |
| 4. | In how many of the last three months have you consistently been able to pay for the following items without having to sell HH productive assets like land, bicycle or borrowing at very high rates of interest (more than 30%)? | | | | | | | | |
| Number of months (0–3) | | | | | | | | | |
| 1) Food, shelter, and water | | | | | | | | | |
| 2) Health care | | | | | | | | | |
| 3) Education | | | | | | | | | |
| Add total months (1 + 2+3)→ | | | | | | | | | |
| Options | a) Total=9 | | b) Total=8 | | c) Total=7 | | d) Total=4–6 | | e) Total=0–3 |
| Score | 0 | | 0 | | 1 | | 2 | | 3 |
| 5. | If you had an unexpected shock, like a death in the family, happen tomorrow, how would you handle the expenses? (tick all that apply) | | | | | | | | |
| Options | (Do not read the options below; wait for the response and then tick those that correspond.) | | | | Tick all that apply | | | Circle highest score | |
| | 1) Pay with cash on hand/savings | | | | | | | 0 | |
| | 2) Seek contributions/gifts from friends, relatives, community members, church help, etc. | | | | | | | 3 | |
| | 3) Request help from a charitable organization, CBO, NGO | | | | | | | 3 | |
| | 4) Borrow from a friend or relative or savings group and pay back later | | | | | | | 1 | |
| | 5) Look for another source of income near my home | | | | | | | 1 | |
| | 6) Reduce household spending a little | | | | | | | 1 | |
| | 7) Reduce household spending a lot | | | | | | | 2 | |
| | 8) Sell small livestock, household goods or items used in the household | | | | | | | 2 | |
| | 9) Migrate for work | | | | | | | 2 | |
| | 10) Borrow from money lender at high interest | | | | | | | 3 | |

Continued

TABLE 1. Continued

| | | | | | | | |
|-----------|---|---|---|---------------------------------------|--------------------------|-----------|------------|
| | 11) Sell bicycle, land, tools or other items that help produce income | | | | 3 | | |
| | 12) Break up the household— send children to others to care for | | | | 3 | | |
| | 13) Go without food | | | | 3 | | |
| | 14) Engage in transactional sex or illegal activities | | | | 3 | | |
| 6. | Over the past [12 months (baseline)/6 months (subsequent)], what has been the MAIN source of food consumed by your HH? | | | | | | |
| Options | a) Donated | b) Given in return for work only | c) Bought from the market | d) Home grown | | | |
| Score | 3 | 3 | 2 | 0 | | | |
| 7. | How many meals does the HH have in a day? | | | | | | |
| Options | a) Some days, no meal | b) One meal | c) 2 meals per day | d) 3 or more meals per day | | | |
| Score | 3 | 3 | 1 | 0 | | | |
| 8. | Do the following apply to this HH? Indicate (Yes/No) (observe for yourself where applicable) | | | | Yes | No | N/A |
| | 1) Does the HH have access to safe water within 30 minutes (half an hour) or harvest rain water for domestic use? | | | | | | |
| | 2) Does the HH have a clean compound? | | | | | | |
| | 3) Does the HH have access to a public health facility within 5 kilometers? | | | | | | |
| | 4) Does the HH have a drying rack for HH utensils? | | | | | | |
| | 5) Does the HH have a garbage pit or dust bin? | | | | | | |
| | 6) Does the HH have a separate house for animals? | | | | | | |
| | 7) Does the HH have clean water and soap for hand washing? | | | | | | |
| | 8) Do all HH members sleep under a mosquito net? | | | | | | |
| Options | a) If 4 or more are No | b) If 3 are No | c) If 2 are No | d) If 1 is No | e) If all are Yes or N/A | | |
| Score | 3 | 3 | 2 | 1 | 0 | | |
| 9. | Does the household have a stable shelter that is adequate, safe, and dry? (observe yourself) | | | | | | |
| Options | a) No stable shelter, adequate or safe place to live | b) Shelter is not adequate, needs major repairs | c) Shelter needs some repairs but is fairly adequate, safe, and dry | d) Shelter is safe, adequate, and dry | | | |
| Score | 3 | 2 | 2 | 0 | | | |

Abbreviations: CBO, community-based organization; HH, household.

the most updated measure of PPP. The correlation between the revised Simple Economic Strengthening Tool scores and PPI-calculated poverty likelihoods at the \$2/day level increased to a low, positive correlation ($r=.43$). Though there is no single accepted method for interpreting correlation coefficients, a common rule of thumb would suggest that a moderate correlation should reach at least .50.¹⁰

Although the Simple Economic Strengthening Tool contained useful indicators for program

monitoring, its ultimate output was only moderately correlated with our poverty measure, which also casts doubt on the validity of the economic vulnerability classifications it generated.

South Africa Assessment

Structural economic drivers at the household and individual levels play a major role in driving disproportionate rates of HIV infection among adolescent girls in South Africa.¹¹ PEPFAR program

implementers using economic strengthening interventions to address these drivers need to monitor progress with high-quality M&E tools. Although there are some existing measures of adolescent girls' vulnerability to HIV, none focus specifically on the pathway between individual economic status and HIV risk. The purpose of this assessment was to develop and validate M&E survey tools to assess economic vulnerability for households and individual girls participating in socioeconomic interventions offered by the South African NGO Children in Distress Network (CINDI) to enhance resilience against HIV.

Between October 20 and December 7, 2016, 87 individual interviews with girls and 93 household-level interviews were conducted among a sample of girls aged 10–19 participating in CINDI programs and their caregivers.

The household-level tool (Household Tool) was developed using the same domains derived from the PEPFAR guidance as the Simple Economic Strengthening Tool, with similar questions. Each question was scored 0–3 points and averaged to generate domain scores. Domain scores were then averaged to generate a total score, which was rounded to the nearest whole number to generate a classification. Validity measures included the PPI, household rankings derived from participatory exercises, and subjective classifications generated by the data collector and the respondent.

Thirteen items for the individual-level tool (Girl Tool) were derived from a review of the literature on the links between economic status and HIV for adolescent girls in sub-Saharan Africa based on an assessment of potential variability and on consultation with implementers and an outside expert in health and economic empowerment programs for adolescent girls. Each item was equally weighted, with each indicator scored at a range of 0–3, for an overall range of 0–39. The Vulnerable Girl Index, a measure of adolescent girls' HIV vulnerability validated in several Southern African countries,¹² was used as a validity measure for the Girl Tool. Structured interviews were conducted with 4 program staff members to assess the acceptability, feasibility, and perceived validity of the Household and Girl Tools.

Neither the Household Tool nor the Girl Tool could be validated using the selected validation measures, and both tools had low inter-item reliability ($\alpha=.45$ and $.21$, respectively). We also found that the VGI scores accounted for little variance in the data collected and had poor inter-item

reliability ($\alpha=.19$), where a typical benchmark for high inter-item reliability is at least $.70$.¹³

Table 2 summarizes the 4 ASPIRES vulnerability tools and assessments, including the definition of economic vulnerability, domains assessed, validation measures, and findings.

DISCUSSION

In Côte d'Ivoire, Uganda, and South Africa, ASPIRES hoped to develop simple, valid tools to measure economic vulnerability for economic strengthening program targeting, intervention matching, and M&E. Three of the 4 tools developed focused on classifying households according to PEPFAR categories, while 1 tool focused on measuring individual-level economic vulnerability among adolescent girls. The 3 country cases demonstrate the challenge in reducing broad constructs of economic vulnerability into simple indices to classify households in a way that accounts for a substantial amount of variance between households at locally defined vulnerability levels. None of the measures varied significantly with their validation items, which included poverty measures derived from country-specific PPI scorecards.

Quantifying and Classifying Economic Status

These findings do not mean that the tools cannot be useful for M&E of economic strengthening programs; each tool captures at least some element of a broader construct of economic vulnerability that is useful for measuring change. However, the Côte d'Ivoire and South Africa assessment measures did not explain most of the variation between households, and none of the measures explained what distinguishes households from one another according to validation measures, including community definitions of what makes a household less likely to withstand economic shocks. As such, these measures may be helpful for measuring some of the factors that make households and individuals economically vulnerable, but they are likely not able to capture most of the many pathways that lead to negative economic outcomes. **This means that the 3 measures are not predictive of negative economic outcomes, making them poor options for targeting tools.**

Other tools that have sought to quantify broad constructs of vulnerability have faced similar difficulties. For example, a validation study of MEASURE Evaluation's Child Status Index (CSI) concluded that the tool was not a valid measure of child-level vulnerability in rural Malawi,¹⁴

The 3 country cases demonstrate the challenge in reducing broad economic vulnerability constructs into simple indices.

The tools may be helpful for measuring some of the factors that make households and individuals economically vulnerable, but they are likely not able to capture most of the pathways that lead to negative economic outcomes.

TABLE 2. Summary of ASPIRES Assessments of Economic Vulnerability Tools

| Tool | Definition of Economic Vulnerability | Domains Assessed | Validation Measures | Findings |
|---|---|---|--|--|
| Côte d'Ivoire Vulnerability Assessment | The degree of inability of households to provide for the health, education, and nutritional needs of household members to mitigate the economic and health impact of HIV, cope with infection, and reduce their risk for acquiring HIV (for those without HIV). | <ul style="list-style-type: none"> Financial capital Physical capital Natural capital Social capital Human capital | Poverty likelihood <ul style="list-style-type: none"> Côte d'Ivoire Progress out of Poverty Index (PPI) Food Security: <ul style="list-style-type: none"> Reduced Coping Strategies Index (rCSI) Food Consumption Score (FCS) | <ul style="list-style-type: none"> The 4 components created using principal component analysis explained only 21% of the variance among items Component 1 was moderately correlated ($r=.69$) with the rCSI, FCS ($r=.55$), and PPI ($r=.46$) The 65 vulnerability measures examined did not cluster in ways that would allow for the creation of a small number of composite measures to develop a scale |
| Uganda Simple Economic Strengthening Tool | PEPFAR classifications of: <ul style="list-style-type: none"> Destitute Struggling to make ends meet Prepared to grow Not vulnerable | <ul style="list-style-type: none"> Ability to pay for basic needs Consistency/volatility of income Availability of liquid assets and savings Food security Availability of assets to respond to shocks | Poverty likelihood <ul style="list-style-type: none"> Uganda Progress out of Poverty Index (PPI) | <ul style="list-style-type: none"> Moderate, positive correlation with poverty likelihood ($r=.43$) |
| South Africa Household Tool | PEPFAR classifications of: <ul style="list-style-type: none"> Destitute Struggling to make ends meet Prepared to grow Not vulnerable | <ul style="list-style-type: none"> Ability to pay for basic needs Consistency/volatility of income Availability of liquid assets and savings Food security Availability of assets to respond to shocks | Poverty likelihood <ul style="list-style-type: none"> South Africa Progress out of Poverty Index (PPI) Local classifications <ul style="list-style-type: none"> Community rankings Self-classification Data collector classification | <ul style="list-style-type: none"> No significant association between poverty likelihood and tool classification ($P=.25$) No significant association between classifications generated during community ranking exercise and tool classification ($P=.77$) Modest association between self-classification and tool classification (weighted kappa=.32) Significant but non-linear association between data collector classification and tool classification ($P=.003$) |
| South Africa Girl Tool | The prevalence of economic factors that lead to transactional sex, and therefore increase risk for HIV. | <ul style="list-style-type: none"> Perception of needs met Pressure to contribute to the household Availability of cash Food security Shocks Safety nets Financial goals Control over assets Control over economic decision making Personal documentation Gender attitudes | Adolescent girls' HIV vulnerability <ul style="list-style-type: none"> Vulnerable Girls Index (VGI) | <ul style="list-style-type: none"> No statistically significant correlations between the Girl Tool and the VGI ($P=.25$) |

Abbreviations: ASPIRES, Accelerating Strategies for Practical Innovation and Research in Economic Strengthening; PEPFAR, U.S. President's Plan for Emergency AIDS Relief.

prompting MEASURE Evaluation to release documentation clarifying the role of the tool. MEASURE Evaluation recommends using the CSI for case management and monitoring, but cautions against aggregating scores across the indicators to generate a single score or using it for evaluation or targeting.¹⁵

For narrower definitions of vulnerability, the accuracy of existing tools may be highly context-dependent. As a validation measure for the Girl Tool in South Africa, the VGI was the only tool found in our literature review that measured HIV-related vulnerability at the individual level for adolescent girls. Though validated for several southern African countries, it had not been validated for South Africa. In our assessment, the VGI had very low inter-item reliability, meaning it did not explain much of the variance in our sample. Our experience with the VGI highlights the challenge of using validated instruments in contexts where they have not been validated.

Targeting for Program Inclusion

MEASURE Evaluation has developed a separate targeting tool for OVC programs in Uganda called the Household Vulnerability Prioritization Tool (HVPT), which has been adapted for several other country contexts. This approach essentially identifies "red flags" for negative outcomes, and prioritizes households with these characteristics. FARE used a version of this tool to identify and enroll beneficiaries. It does not assign a point value to these indicators like a scale. Rather, potential participants are selected into a program based on the presence of indicators that are divided into 3 tiers based on severity and what the program most intends to impact. The HVPT developed for Uganda uses a 3-step prioritization process. Households with a child protection issue are prioritized first. Next, the HVPT prioritizes households with "high vulnerability" indicators, including: (1) child-headed households, (2) households with any child not eating for a 24-hour period in the last month, (3) households with individuals living with HIV, and (4) households where at least 1 child is not in school. The third set of households prioritized is based on the number of vulnerability domains where the household is considered vulnerable. This tool was developed in consultation with stakeholders to define vulnerability and identify the most important characteristics associated with households in the greatest need of services.¹⁶

"Red flag" indicators can be identified by analyzing large datasets to identify which

characteristics are most associated with negative outcomes of programmatic interest. For example, UNICEF analyzed household survey data across 11 countries with a high HIV prevalence to identify factors most associated with negative outcomes for children.¹⁷ It found that poverty; not living with either parent; losing one or both parents; or living in a household with adults with no education were most associated with negative outcomes. These characteristics can serve as targeting criteria for vulnerable children.

Another way to identify red flags for targeting is to analyze poverty dynamics using national household survey data. There are several common econometric methods that can be used for this.² Recently, ACDI/VOCA's Leveraging Economic Opportunities (LEO) project used this approach to conduct a series of studies on "sustained poverty escapes" using panel data and life history interviews to identify characteristics associated with falling below the poverty line, hovering near the poverty line, or sustainably escaping poverty over several years.¹⁸ For example, in Bangladesh, households that had a higher dependency ratio, less livestock, and less cultivable land were more likely to experience only temporary escapes from poverty over time.¹⁹ These indicators shed light on characteristics that lead to vulnerability or resilience, and can be used to target vulnerable households and set program benchmarks. **Rather than aggregating scores across indicators associated with vulnerability, "red flag" approaches can be used to prioritize households with characteristics most associated with negative outcomes to make sure that households with the greatest need are included in a program.** This bypasses the problem of trying to capture many pathways of vulnerability in a single tool. As with any measurement tool, implementers should attempt to validate "red flag" indicators before using them to prioritize households for program enrollment.

Limitations

The 3 country cases included here have several limitations. Since there is no direct, "gold standard" measure of vulnerability available to validate any of the tools we tested, we used other validated measures we expected to vary in the same direction as economic vulnerability, including measures of poverty, food security, and local perceptions of vulnerability. Our poverty measure, the PPI, is an efficient and validated tool but subject to error at the individual level. Our food

A targeting tool developed by MEASURE Evaluation allows selection of program participants based on the presence of "red flag" indicators associated with negative economic outcomes, rather than assigning a point value to the indicators like a scale.

security measures, the rCSI and FCS, have both been shown to correlate with poverty measures but have sensitivity limitations.²⁰ Though local perceptions are commonly used in poverty targeting,²¹ we trained enumerators in Côte d'Ivoire and South Africa to classify households based on the PEPFAR categories of economic status, which have not been validated, and their perceptions were subjective.

In light of these limitations, although our Côte d'Ivoire study employed rigorous methods to develop a scale, the scale could not be fully validated. Our survey tool was based on a complex definition of economic vulnerability for which we did not have any direct measures that could be used to validate our measurement model. As a result, we relied on the face validity of the measures included in the PCA analyses to validate the measure, in addition to examining correlations of the components with the well-established indices mentioned above.

On the other hand, neither the Simple Economic Strengthening Tool in Uganda nor the South Africa assessment were developed using rigorous scale development methods, but rather were developed as programmatic tools to track participant progress. As such, the household-level tools used in Uganda and South Africa equally weight the domains analyzed, which assumes each domain has an equal effect on vulnerability. Additionally, although the Côte d'Ivoire study enjoyed a robust sample size, the Uganda and South Africa assessments had very low sample sizes, which limits our ability to statistically analyze and draw conclusions from them.

The South Africa assessment was also affected by problems with the participatory ranking exercises. To get a good representation of participant households in our ranking data, we planned to survey girls where program participants were concentrated in a single neighborhood of 50 households that knew each other, then conduct participatory wealth ranking exercises in the same communities. Instead, households on the participant rosters were spread across communities, making it difficult to conduct focus groups with a large number of participant households represented. Only 14 participant households received rankings in the focus groups, limiting our ability to draw any conclusions by comparing the Household Tool rankings to the rankings generated in the focus groups for these households.

CONCLUSION

Economic strengthening programming addresses the economic drivers of HIV and negative child

well-being outcomes, so economic status is an important intermediate outcome that implementers must measure. At the same time, programs implementing economic strengthening interventions are under pressure to identify and intervene with the most vulnerable households. Many have attempted to combine the functions of targeting, monitoring, and evaluation into a single tool by quantifying broad constructs of vulnerability into a simple index. ASPIRES' recent experiences in Côte d'Ivoire, South Africa, and Uganda suggest that such simple indices may not accurately capture a broad construct of vulnerability and are not accurate for targeting. While the sample sizes for the South Africa and Uganda assessments are insufficient to draw firm conclusions, the trends in our analysis across the 3 country cases demonstrate that although several tools are used by implementers to measure household-level economic vulnerability, there is little evidence that these tools are measuring what they are intended to measure—that is, a household's susceptibility to negative economic outcomes. We recommend that researchers and implementers focus on developing M&E instruments to capture narrower definitions of vulnerability based on characteristics their programs intend to affect. We also recommend using separate tools for targeting based on context-specific "red flag" indicators with evidence-based links to negative outcomes, rather than potentially specious scales that attempt to summarize broad constructs of vulnerability. Finally, policy makers and donors should avoid reliance on simplified metrics of economic vulnerability in the development programs they support, as these may falsely categorize participants and leave the most vulnerable out of an intervention.

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ORIGINAL ARTICLE

Using Program Data to Improve Access to Family Planning and Enhance the Method Mix in Conflict-Affected Areas of the Democratic Republic of the Congo

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Analysis of program data and a formative assessment informed several program changes, including improved coaching and supportive supervision, introduction of postpartum IUDs and the levonorgestrel-releasing intrauterine system, and enhanced behavior change communication. These changes substantially increased family planning adoption, from a monthly average of 14 adopters per facility to 37 per facility. Implants continued to be the most popular method, but the percentage of adopters choosing the IUD increased from 2% in 2012 to 13% in 2016, and it was the most popular method among postabortion care clients.

ABSTRACT

Unmet need for family planning in the conflict-affected area of eastern Democratic Republic of the Congo (DRC) has been reported to be as high as 38%, and women in such conflict settings are often the most at risk for maternal mortality. The International Rescue Committee implements the Family Planning and Post-Abortion Care in Emergencies program in 3 provinces of eastern DRC to provide women and couples access to family planning, including long-acting reversible contraceptives (LARCs). This article presents routine program data from June 2011 through December 2013 from 2 health zones as well as results from a qualitative assessment of family planning clients and of male and female non-users, conducted in 2013. It then describes how these findings were used to make program adjustments to improve access to family planning services and client informed choice and assesses the effects of the program design changes on family planning uptake and method mix using routine program data from January 2014 through December 2016. Between 2011 and 2013, 8,985 clients adopted family planning, with an average 14 clients adopting a method per facility, per month. The method mix remained stable during this period, with implants dominating at 48%. Barriers to uptake identified from the qualitative research were both supply- and demand-related, including misconceptions about certain modern contraceptive methods on the part of providers, users, and other community members. The program implemented several program changes based on the assessment findings, including clinical coaching and supportive supervision to improve provider skills and attitudes, introduction of immediate postpartum insertion of the intrauterine device (IUD) and the levonorgestrel-releasing intrauterine system (LNG-IUS), and behavior change communication campaigns to raise awareness about family planning. After these program changes, the mean number of clients adopting modern family planning per facility, per month increased from 14 to 37 and the percentage of family planning adopters choosing LARCs increased from 50% to 66%. While implants continued to be the most dominant method, reaching 60% of the method mix in 2016, the percentage of clients adopting IUDs increased each year, from 3% in 2014 to 13% in 2016. In total, 39,399 clients started family planning methods during the post-program design change period (2014–2016). Our experience in eastern DRC demonstrates that women and their partners affected by conflict want family planning, and that it is feasible to deliver the full range of modern contraceptive methods when programs are adapted and sensitive to the local context.

BACKGROUND

All too often, the humanitarian sector marginalizes family planning as impractical or unimportant in humanitarian crises. An analysis of humanitarian funding appeals over a 10-year period found that less than 15% of health and protection proposals included family planning—the second lowest percentage among all

reproductive health services.¹ This lack of investment is evident in family planning service availability. A study of the availability of reproductive health services in 3 crisis-affected settings in sub-Saharan Africa found that only 16% of 63 health facilities assessed were capable of providing comprehensive family planning services.²

Unintended pregnancies can have a negative impact on the lives of women and girls living in under-resourced, conflict-affected countries such as the Democratic Republic of the Congo (DRC), where maternal mortality increased from an estimated 543 deaths per

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Unmet need for family planning in conflict-affected areas such as eastern DRC is as high as 38%.

100,000 live births to 846 deaths per 100,000 live births between 2007 and 2013.³ Unmet need for family planning in conflict-affected areas such as eastern DRC is as high as 38%.³ While fertility desires among crisis-affected populations may be affected in the short-term by acute conflict, the determinants of fertility in these settings tend to be similar to those in stable, low-resource settings.⁴

The protracted conflict in eastern DRC began during the 1994 Rwandan genocide and has continued beyond the First and Second Congo Wars from 1996 to 2003. Decades of violence involving dozens of armed groups have led to periodic large-scale population displacement. In 2012, the rebel group M23 destabilized both North and South Kivu until their defeat in 2013.^{5,6} More recently, political turmoil caused by the delayed 2016 presidential elections and accompanying economic crisis have exacerbated tensions and conflict in eastern DRC.⁷ In 2017, 4.1 million people were displaced across the country.⁸ Civilians have frequently been targeted by rebel and government armed groups, whose human rights abuses are well-documented.⁹

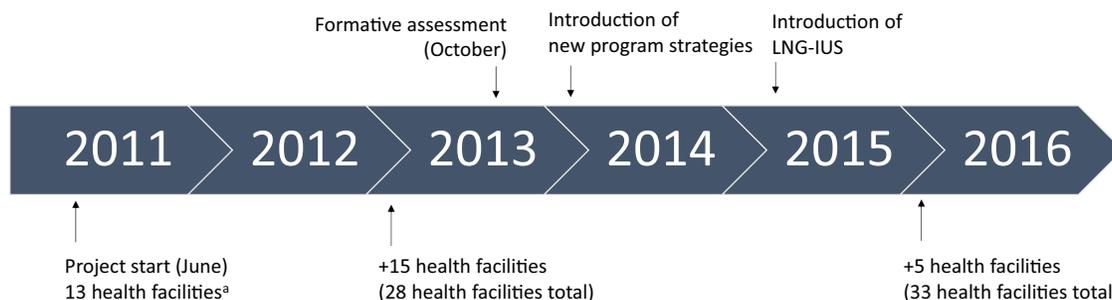
The complex emergency combined with poor governance has led to a weak health system, a vulnerable population, and high fertility and poor health outcomes among women. The total fertility rate in the country is 6.6 children per woman. In South Kivu, 22% of women have an unmet need for family planning, only 7.9% of women use a modern method of contraception, and less than half of those using modern methods use long-acting or permanent methods, while in Bas Congo 17.2% of women use a modern method.³

Across the DRC, long-acting reversible contraceptives (LARCs) usually make up less than half of modern methods used.

Since 2011, the International Rescue Committee (IRC) has been implementing a project in the DRC to increase access to voluntary contraception, in particular LARCs, and postabortion care (PAC). At the start of the project in June 2011, IRC supported 42 Ministry of Public Health (MoPH) facilities in North Kivu, South Kivu, Kasai Occidentale, and Province Orientale. As of December 2017, the project supported 61 MoPH facilities in 6 health zones in North Kivu, South Kivu, and Tanganyika provinces. In South Kivu, the project supported 13 MoPH facilities in 2 health zones from June 2011 to December 2012, 28 MoPH facilities from January 2013 to December 2015, and 33 MoPH facilities from January 2016 to present (Figure 1). The project supports the MoPH to provide a range of contraceptive methods, including long-acting, short-acting, and permanent methods, to people living in areas affected by conflict. Support includes competency-based training, supportive supervision, procurement and supply chain management, data management and use, and community mobilization. Family planning commodities are subsidized so that they are free to users and consistently available.

Family planning experts have not defined an ideal method mix but agree that it can be a useful indicator of program quality. If one method makes up a disproportionately high or low percentage of the method mix, this may be an indication of poor quality of counseling or provider preference for a particular method, thereby excluding some

FIGURE 1. Project Timeline, Health Zones A and B in South Kivu, Democratic Republic of the Congo



Abbreviation: LNG-IUS, levonorgestrel-releasing intrauterine system.

^a Includes 2 facilities from a different health zone in South Kivu than the other health facilities reported in this article.

methods from equal consideration by clients and limiting practical availability of all methods. Evidence demonstrates that provider attitudes and skills influence which contraceptive methods are offered and to whom.^{10–14} Sullivan and colleagues defined a skewed method mix among current users of contraception as one in which a single method is used by 50% or more of women using contraception.¹⁵ While this definition was developed for population-level data, it is a useful standard that contraception programs can apply to service statistics to determine when further attention to program quality and client informed choice may be needed.

From June 2011 to May 2013 in the 2 health zones in South Kivu supported by IRC, 48% of clients who adopted family planning methods chose an implant while just 2% of clients chose an intrauterine device (IUD). This same trend toward implants was also noted by Curry and colleagues, who analyzed a similar program in the DRC.¹⁶ This method skew among adopters led us to conduct an investigation in 2013 to better understand the program factors influencing both family planning uptake and method mix so that we could identify and implement targeted activities to improve program quality. In particular, we wondered why, given the clear preference for long-acting methods, so few clients accepted IUDs in our program while other programs in eastern DRC demonstrated higher IUD uptake.¹⁶ This investigation included more robust analysis of existing facility-level data and formative research on knowledge, perceptions, and attitudes toward family planning among users and non-users. The purpose of this article is to describe: (1) the results of this investigation, (2) the changes in program design implemented based on these results, and (3) the effects of this improved program design on project indicators in the 2 health zones in South Kivu.

METHODS

Analysis of Program Monitoring Data

The project collected data on family planning and PAC clients, including the number of women and men adopting family planning (defined as those who start a method of contraception for the first time, who start a method after 6 months of non-use, or who switch to a new method of contraception) disaggregated by method, month, and facility. The methods reported are IUDs, implants, oral contraceptive pills, injectables, tubal ligations, and vasectomies. The number of clients adopting

traditional methods and condoms is not collected by the project. An important component of PAC is counseling on and receipt of family planning. The definition used for PAC clients who adopted family planning varied between 2011 and 2016. From June 2011 to March 2015, those PAC clients who adopted a contraceptive method up to 2 weeks after PAC were included in the number of PAC clients who adopted family planning. From April 2015 to December 2016, however, only those PAC clients who adopted family planning before discharge were counted.

The data collected and analyzed were from MoPH registers and monthly reporting forms. Health facility staff completed a monthly reporting form, which was submitted to the Health Zone Management Team and to IRC. Until 2015, IRC staff at the provincial level would then enter these data into Microsoft Excel spreadsheets, which were then aggregated into a country-level Excel database for analysis at the national and global level. In 2015, the organization introduced a DHIS 2 platform for staff to enter data directly into the global project database for analysis at the country and headquarters levels.

Over the project period, project staff coached MoPH providers to ensure accurate recording of service delivery data and together conducted regular reviews of both data quality and trends. From 2012 to 2015, a third-party evaluator conducted annual program reviews, which further validated the accuracy of the data and fostered an environment of data use. The data presented here are from 2011 to 2016 from the 2 health zones where qualitative data collection took place.

Formative Research to Design Program Strategies

We conducted formative research to inform program design in October 2013. Based on analysis of program data, 6 health facilities from the 2 health zones were purposively selected to represent relatively higher and lower uptake of family planning in general and IUDs in particular (Table 1). At least 2 providers at each of the selected facilities had received competency-based training on family planning service provision, including IUD insertion and removal, and had placed at least 2 IUDs in the 6 months preceding data collection, suggesting that the providers had minimum capacity to do so.

Data collection included 23 semi-structured interviews with clients who had adopted short-acting or long-acting methods (both implants and

From 2011 to 2013, 48% of clients in South Kivu who adopted family planning methods chose implants while just 2% chose IUDs.

TABLE 1. Sampling of Health Facilities for Formative Research

| Health Zone | Facility | Reason for selection |
|-------------|----------|--|
| A | 1 | Relatively high proportion of clients accepting IUDs |
| | 2 | Relatively low proportion of clients accepting IUDs |
| | 3 | High number of clients accepting contraceptive methods, relatively low proportion of clients accepting IUDs |
| B | 4 | High number of clients accepting contraceptive methods, relatively high proportion of clients accepting IUDs |
| | 5 | High number of clients accepting contraceptive methods, relatively low proportion of clients accepting IUDs |
| | 6 | High number of clients accepting contraceptive methods, relatively low proportion of clients accepting IUDs |

Abbreviation: IUD, intrauterine device.

IUDs) at one of the purposively selected health facilities. In total, 24 women were purposively selected for interviews, 4 at each facility, but 1 did not appear at the planned time of the interview. We also conducted 5 focus group discussions with 40 male non-users of contraception and 5 focus group discussions with 38 female non-users of contraception, which included free-listing exercises.

Inclusion criteria for users by facility consisted of:

- Two women who had adopted an IUD within the previous 6 months
- One woman who had adopted an implant within the previous 6 months
- One woman who had adopted an injectable within the previous 6 months

Inclusion criteria for non-users consisted of:

- Women who were non-users of family planning in the previous 5 years and had at least 5 children
- Partners of women meeting the above criterion

Users were purposively selected from registers, whereas non-users were recruited through community-based organizations in the facility catchment areas.

Data were collected from October 2–10, 2013. The lead author and 1 local staff member trained 4 data collectors with previous qualitative research experience and supervised the data collection; the training lasted 2.5 days. Interviewers obtained oral informed consent prior to each interview. IRC also received approval for the activities from the Health Zone medical directors. Interviews were conducted in Kiswahili or Mashi, transcribed by the interviewers, and translated into French.

The trainers conducted preliminary analysis of field notes immediately after data collection through multiple readings and discussion with data collectors to identify immediate remedial actions. The lead author conducted additional analysis in Atlas.ti using open coding to generate themes. At the same time, the project staff member used Microsoft Word to categorize passages according to emerging themes. The lead author and the project staff member then shared their findings to harmonize analyses. During the focus group discussions, reasons for using or not using family planning were listed and ranked by group consensus. In order to understand which reasons were more important than others, salience scores were calculated by averaging the percentile ranks for each reason across the groups. The percentile rank for items listed by each group were calculated using the formula (total number of items in list-rank order of A)/(total number of items in list).¹⁷

■ RESULTS FROM THE 2013 INVESTIGATION

Quantitative Data on Contraceptive Users

From June 2011 through December 2013, the average number of clients who adopted family planning methods per facility, per month was 14 in the 2 health zones, with 8,985 clients in total adopting family planning methods during the 30-month period (Figure 2). Among 1,100 clients who received PAC, 29% adopted a family planning method. The organization conducted 2 large social and behavior change communications (SBCC) campaigns toward the end of the period, during which time spikes in clients starting family planning methods were observed.

The contraceptive method mix among all clients adopting modern family planning methods as well as PAC clients who adopted family

On average, 14 clients adopted family planning methods per facility, per month between 2011 and 2013.

FIGURE 2. Number of Clients Adopting Family Planning Methods, Health Zones A and B in South Kivu, Democratic Republic of the Congo, June 2011 to December 2013

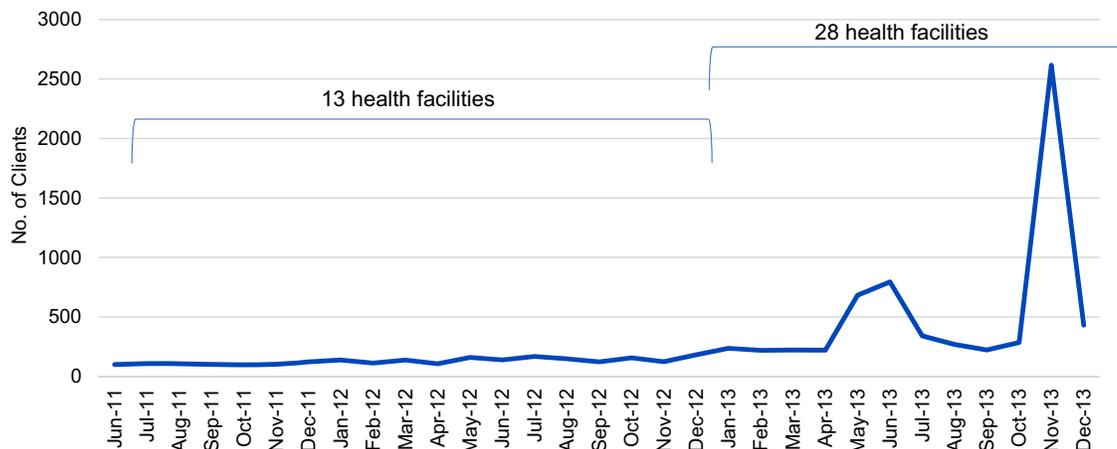
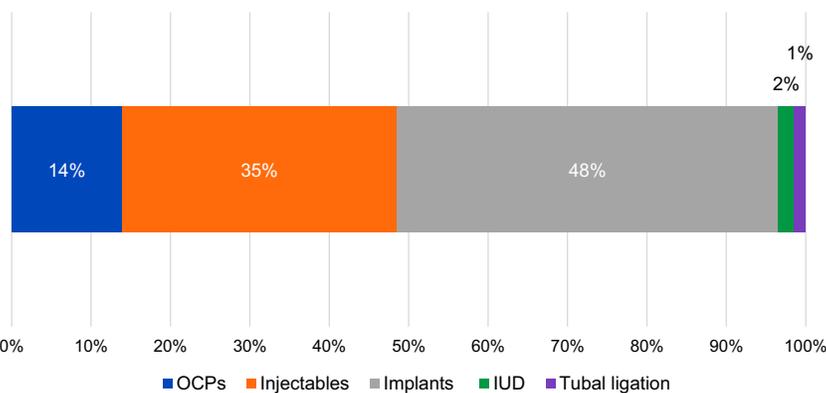


FIGURE 3. Contraceptive Method Mix Among Clients Adopting Family Planning Methods, Health Zones A and B in South Kivu, Democratic Republic of the Congo, June 2011 to December 2013



Abbreviations: OCP, oral contraceptive pill; IUD, intrauterine device.

planning remained stable during the period, with contraceptive implants and injectables most frequently chosen in both zones, followed by pills, IUDs, and tubal ligation (Figure 3).

Qualitative Data From Contraceptive Users

The 23 respondents who had adopted family planning methods ranged in age from 21 to 53 and had 3 to 11 children.

Factors and People That Influence Family Planning Decisions

The primary reasons for choosing to adopt family planning were respondents' own health and the economic burden of raising multiple children. Several respondents spoke about being able to space pregnancies, provide better care for their existing children, and be healthy so that they could continue working. One respondent explained:

Husbands were the most influential in deciding whether a couple adopted family planning, followed by health care providers.

I saw that in giving birth each time, we never accomplished a project because even if we save a bit of money today and the mother gets pregnant, we're obliged to prioritize the pregnancy and let everything else fall to the wayside.

Husbands were the most influential in deciding whether a couple adopted family planning, followed by health care providers. One woman reported:

It was only at the 8th birth that I conceived 6 months after giving birth [to my 7th child] . . . and then I was poisoned. My body with many weaknesses required rest. That's when my husband adopted the idea of accessing family planning.

Many women discussed family planning with their friends and supported other women in deciding to use family planning after adopting a method themselves. Although a number of women reported having side effects from family planning, these were not significant enough to prevent them from continuing to use family planning.

Sources of Information

Women most often cited health centers as their primary source of information on family planning, including during antenatal and well child visits. According to one woman:

I learned about family planning during antenatal care at the health center. The nurse spoke about the benefits of family planning. I was interested during my 12th pregnancy; in the 9th pregnancy I had a still birth and almost died.

Next, women followed the advice of their friends or other women in the community. Other sources of information mentioned were sensitization sessions in community-based organizations or by community health workers, or information shared by the church. Often women received information from multiple sources before choosing to adopt family planning.

Quality of Services

As described earlier, health centers are the principal entry point for family planning services. Descriptions of care received suggested variation in the quality of services provided. Even if the majority of users were informed about all the methods available, some of the information the clients reported receiving revealed either gaps in or misunderstanding about the counseling provided.

For instance, one respondent said that she had heard of an IUD but had never seen one, despite the fact that all providers had been provided with displays of all methods to be used during counseling sessions. Another reported that the nurse had told her to return to the health center to insert a new IUD after 5 years of using her current IUD, when in fact at the time all IUDs provided by the project were copper-T IUDs, which are effective for at least 10 years.

In addition, it seemed that in some cases providers were selecting methods for clients, while they had been trained to provide counseling that supported informed choice by the client. Women reported being told that young women who had not yet had a child could not use an IUD. Another was counseled to use an injectable method rather than a LARC or permanent method even though she wanted no more children. One provider refused a respondent's request to switch from a short-acting method to a LARC, stating that since she did not have side effects it was not necessary.

Method Choice

Women reported a variety of experiences that led them to their choice of method. Some were first-time users, while others had tried a variety of methods before settling on their current one. This could be because of failure of a natural method or undesirable side effects with some hormonal methods.

IUD users appreciated that they were long-acting. Users who had chosen other methods appeared to have been dissuaded from choosing an IUD because of misinformation, and believed incorrectly that side effects of IUDs could include infections or cancer. One thought that an IUD would make her sterile or get lost inside her body. The method of insertion via the vagina and cervix discouraged other women from choosing an IUD over other methods.

Respondents reported that "Depo" was the most known method of contraception. It should be noted that several respondents spoke about "Depo" that was injected, "Depo for 3 years or 5 years that you put under the skin," and that of 6 months that was injected in the neck, suggesting that the term "Depo" was loosely used to describe contraception in general and not just the injectable method of Depo-Provera. Nevertheless, several women stated they preferred the short duration of "Depo" because it allowed them to stop using it whenever they did not want to get pregnant again. For others, they chose an

Some of the information the clients reported receiving from providers revealed either gaps in or misunderstandings about the counseling provided.

injectable method as a "test" before deciding to use a LARC.

Implant users appreciated the effectiveness and long-acting nature of the method, as well as that it could be removed at any time. A few noted its side effects. A few women also mentioned that they had not chosen CycleBeads because they were illiterate and would therefore find it difficult to use.

Secret Use

The vast majority of users did not want to share with other people that they were using family planning. They feared that other people would reveal their secret to the rest of the community. Some reported that only their family members, their neighbors, and friends knew. One woman explained, "It's a secret for me, my husband, and the nurse." Others were open about their use and served as models in their community to sensitize others about family planning.

Qualitative Data From Non-Users of Contraception

As explained in the Methods section, data in the following figures are salience index scores,

which range from 0 to 1 and indicate the relative percentile rank of items within each topic area across the focus groups with male and female non-users.

Reasons for Adopting Family Planning

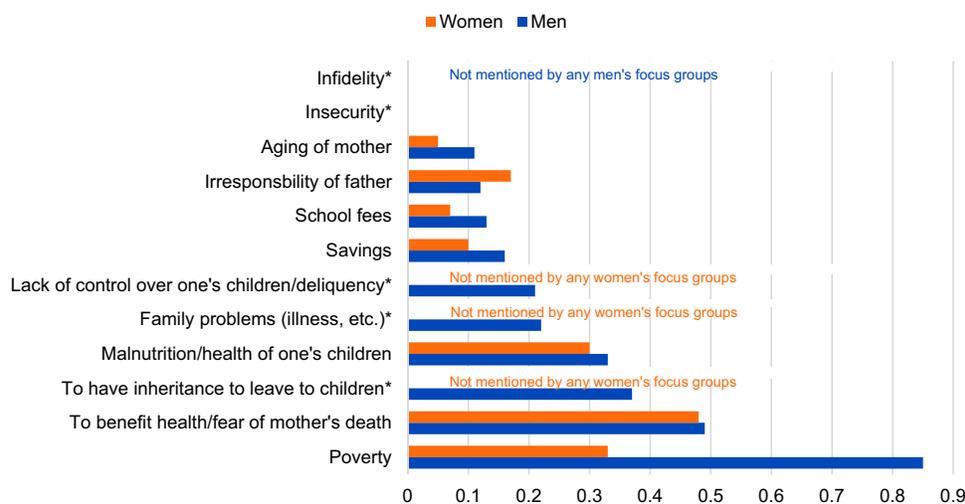
Non-users cited several reasons why they thought people might choose to adopt family planning. Similar to users, poverty, health of the mother and risk of maternal mortality, as well as the health of existing children emerged among the most important reasons (Figure 4).

Reasons for Not Adopting Family Planning

For non-users, the lack of knowledge and perceived risk of side effects were cited as the primary obstacles to adopting modern methods of family planning (Figure 5). Myths about family planning, such as the risk of sterility or cancer and the need to have a cesarean section for subsequent pregnancies, were reported. Women also mentioned disagreements between spouses as an important barrier to family planning uptake. The participants discussed at length the paradox that children were extremely valued but at the same time acknowledged they were a financial burden.

The vast majority of users did not want to share with other people that they were using family planning, but others were open about their use.

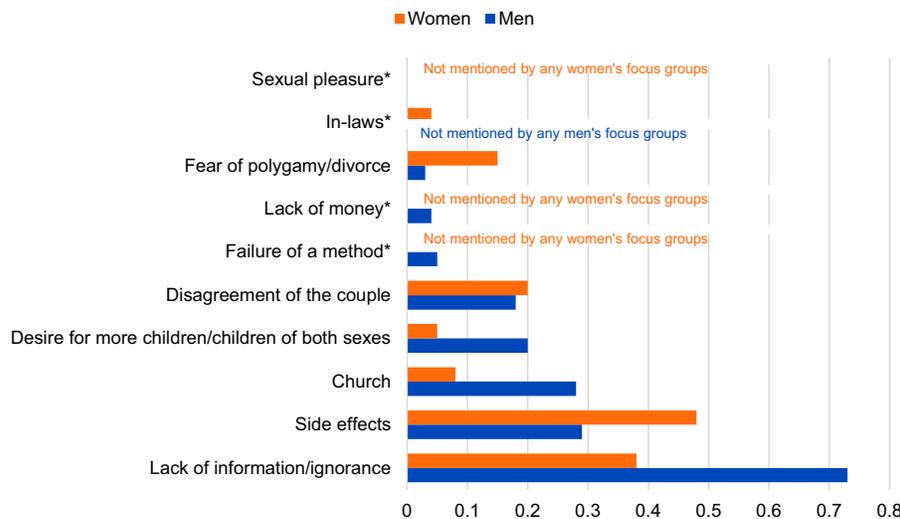
FIGURE 4. Salience Index Scores for Reasons People Might Accept Family Planning Cited by Male and Female Non-Users of Contraception



Note: Salience index scores range from 0 to 1 and indicate the relative percentile rank of items within each topic area across the focus groups with male and female non-users.

* Asterisked items indicate categories that were either not mentioned at all by the men's and/or women's focus groups or mentioned by at least one focus group but the salience scores approached zero. In this instance, inheritance, family problems, and lack of control over one's children were not mentioned by any of the women's focus groups, and infidelity was not mentioned by any of the men's focus groups.

FIGURE 5. Salience Index Scores for Reasons People Might Not Adopt Family Planning Cited by Male and Female Non-Users of Contraception



Note: Salience index scores range from 0 to 1 and indicate the relative percentile rank of items within each topic area across the focus groups with male and female non-users.

* Asterisked items indicate categories that were either not mentioned at all by the men's and/or women's focus groups or mentioned by at least one focus group but the salience scores approached zero. In this instance, failure of a method, lack of money, and sexual pleasure were not mentioned by any of the women's focus groups, and in-laws was not mentioned by any of the men's focus groups.

Sources of Information

According to non-users, health centers and collective activities such as antenatal care sessions were the primary sources of information about family planning services (Figure 6). Community sensitizations with megaphones and flipcharts were also important sources of information. The church played a prominent role in the diffusion of messages. Female non-users also mentioned local organizations or associations, religious communities, female leaders of associations, and discussions between women, including between friends while working in the fields or at the river. Although many women keep their family planning use secret, as noted earlier, the non-users expressed a desire for users to share their positive experiences with other women in the community. For men, the radio was an important source of information that could be used to share information on family planning.

Non-users expressed a desire for users to share their positive experiences with family planning with other women in the community.

Many rumors and misconceptions about family planning surfaced during the interviews and focus group discussions.

Influential People in Decision Making

Respondents reported that decision making about family planning was done first between the man

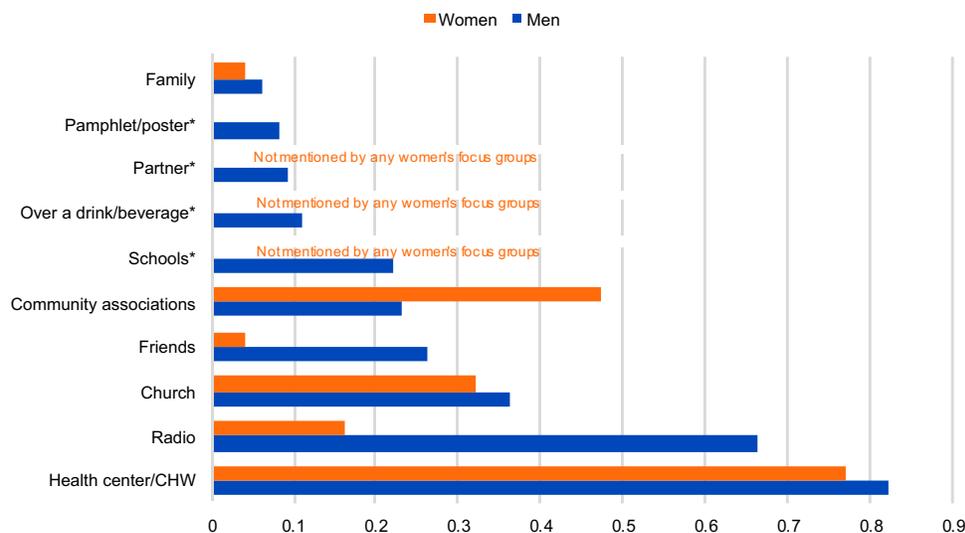
and the woman in the couple affected (Figure 7). In the majority of cases, it was the husband who made the final decision about using family planning, including the type of method if the decision was to use family planning. Cases where the woman made the decision alone were reportedly rare. If the woman chose a method that was not approved by her partner, respondents expressed that the woman should change the method or stop using it. Family members, including the children and friends, could also negatively or positively influence the decision of a woman.

Misconceptions, Rumors, and Misunderstandings

As noted earlier, many rumors and misconceptions about family planning surfaced during the interviews and FGDs. These included:

- A woman using an implant cannot work in the fields
- Contraception can cause permanent infertility, cancer, or epilepsy
- After using family planning, deliveries must be by cesarean section

FIGURE 6. Salience Index Scores for Sources of Information About Family Planning According to Male and Female Non-Users of Contraception



Abbreviation: CHW, community health worker.

Note: Salience index scores range from 0 to 1 and indicate the relative percentile rank of items within each topic area across the focus groups with male and female non-users.

* Asterisked items indicate categories that were either not mentioned at all by the men's and/or women's focus groups or mentioned by at least one focus group but the salience scores approached zero. In this instance, schools, over a drink/beverage, and partner were not mentioned by any of the women's focus groups.

- The second dose of an injectable contraceptive is long acting and a third dose is not needed
- Contraception is only for women living alone and condoms are only used by prostitutes
- Products such as aspirin, salty water, quinine, or strong liquor can be used as contraceptives
- Contraceptives reduce sexual pleasure
- An implant must be removed by the same provider who inserted it

Myths about IUDs in particular included that:

- IUDs cause infections that turn into cancer
- IUDs cause diabetes
- IUDs can get lost in the body, requiring surgical intervention
- IUDs are for permanent contraception
- An IUD is an injection in the vagina

PROGRAM MODIFICATIONS

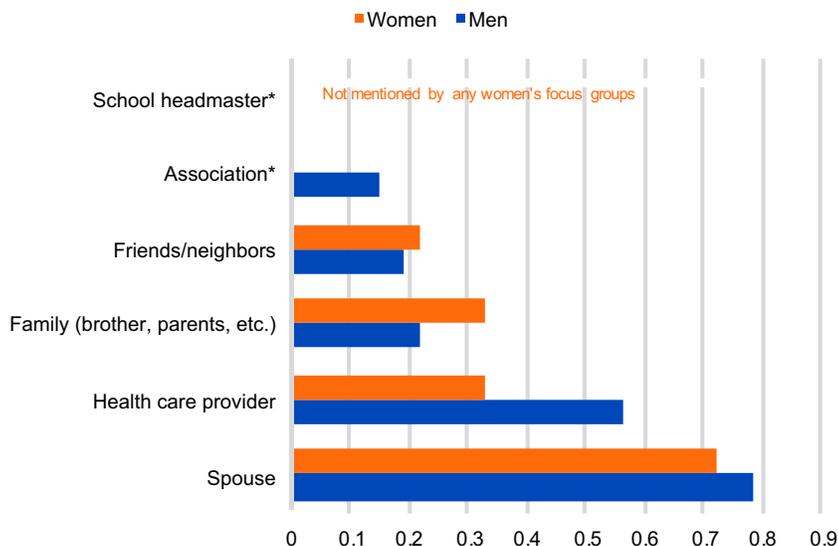
As a result of our analysis of quantitative and qualitative data in 2013, we developed a set of recommendations and revised program activities

(Table 2). The revised activities began in the 2 health zones in January 2014. Most of the supply-side activities targeting service quality issues identified in the formative research were based on findings that although health care providers were a primary source of information on family planning, there were gaps in provider knowledge and possibly in their competency. On the demand side, new activities targeted key influencers, information channels to address the gaps in knowledge, misconceptions, and rumors identified by the formative research.

Supply-Side Activities Analysis and Discussion of Program Data at the Health Facility and Community Levels

The MoPH and IRC began analyzing family planning data and identifying community-specific program improvements alongside health care providers and community members in 2014. This enabled stronger ownership of program results at the health facility and community levels, which empowered community members and providers to increase uptake of family planning through several of the strategies described below.

FIGURE 7. Salience Index Scores for Influential People in Making Decisions About Family Planning According to Male and Female Non-Users of Contraception



Note: Salience index scores range from 0 to 1 and indicate the relative percentile rank of items within each topic area across the focus groups with male and female non-users.

* Asterisked items indicate categories that were either not mentioned at all by the men's and/or women's focus groups or mentioned by at least one focus group but the salience scores approached zero. In this instance, school headmaster was not mentioned by any of the women's focus groups.

Providers who were highly competent in IUD insertion and removal were empowered to coach other providers at their facility and within their health zone.

Values Clarification Activities for Providers

The experiences of clients described during the key informant interviews revealed many misconceptions about IUDs among providers as well as a lack of high-quality family planning counseling. IRC's clinical supervisors integrated values clarification activities into routine supportive supervision visits and provider meetings in order to correct misconceptions and improve provider attitudes about IUDs. These activities included discussions meant to encourage provider reflection on the attitudes they held toward some family planning methods and the women and girls who use them.

Clinical Coaching by IRC and MoPH Supervisors

Prior to the formative research, clinical coaching of individual providers on key family planning competencies was ad hoc. In 2014, IRC improved the supportive supervision system so that providers received systematic, individual clinical coaching on each competency relevant to family planning using standardized checklists. The results of these coaching visits and provider competency scores were tracked over time and those providers

with lower competency were prioritized for more intensive clinical coaching, and in some cases refresher training, as needed.

Peer Supervision with Higher-Performing Providers

During supportive supervision visits, IRC supervisors also identified clinical competency in IUD insertion and removal as a barrier to high-quality service delivery, which mirrored the formative findings on some providers' lack of knowledge about IUDs. We identified providers highly competent in IUD insertion and removal and empowered them to coach other providers at their facility and within their health zone to improve their skills. Supervisors reported that this system motivated both the peer supervisors as well as other providers to improve their skills in IUD insertion and removal.

Introduction of Immediate Postpartum IUDs

To increase opportunities for adoption of family planning, IRC also began training and supporting providers to insert IUDs immediately postpartum in 2014. The introduction of this service further

TABLE 2. Key Program Strategies Before and After the Formative Assessment (New Activities in Bold)

| | 2011–2013 | 2014–2016 | Formative Assessment Themes Addressed |
|------------------------|--|--|--|
| Supply-side activities | <ul style="list-style-type: none"> Competency-based clinical training Provision of commodities and equipment Supportive supervision Support for data collection and use | <ul style="list-style-type: none"> Competency-based clinical training Provision of supplies and equipment Supportive supervision Support for data collection and use Systematic clinical coaching and tracking individual provider competence Peer supervision by high-performing providers Values clarification activities with providers Introduction of LNG-IUS Introduction of Population Council's Balanced Counseling Strategy | <ul style="list-style-type: none"> Quality of services Side effects |
| Demand-side activities | <ul style="list-style-type: none"> Large community meetings on the benefits and availability of family planning Home visits by community health workers that include discussion of family planning | <ul style="list-style-type: none"> Large, multichannel SBCC campaigns on family planning Community mobilization by satisfied users Targeted outreach to male partners Actively dispelling rumors about certain methods Home visits by community health workers that include discussion of family planning | <ul style="list-style-type: none"> Lack of knowledge; misconceptions, rumors, misunderstanding; sources of information Influential people in decision making |

Abbreviations: SBCC, social and behavior change communication; LNG-IUS, levonorgestrel-releasing intrauterine system.

demonstrated the advantages of the IUD to both providers and clients. Anecdotally, training on postpartum IUD insertion indirectly improved provider perceptions of the method and the quality of counseling offered about the IUD.

Training on Population Council's Balanced Counseling Strategy Plus Approach

From 2011 to 2013, supportive supervision visits revealed that the content of family planning counseling primarily focused on the duration of efficacy of the methods and did not emphasize other important method characteristics, such as effectiveness, convenience of use, side effects, and hormone content. Providers often encouraged, directly or indirectly, clients to choose the method whose duration of efficacy matched their desired birth spacing duration, without adequately informing them of the ability to remove long-acting methods whenever the clients

wished. This practice may have made clients less likely to choose the IUD because they wanted to space for fewer than 10 years. To improve the quality of family planning counseling, the organization trained all providers on Population Council's Balanced Counseling Strategy Plus approach.¹⁸ This strategy uses a standardized algorithm and job aids to guide family planning counseling sessions to ensure that clients receive all information that is relevant to their experience and needs, have an opportunity ask questions, and are referred to other reproductive health services, as needed.

Introduction of the Levonorgestrel-Releasing Intrauterine System

In 2015, IRC introduced the levonorgestrel-releasing intrauterine system (LNG-IUS), in addition to copper-bearing IUDs, to expand client choice of LARCs. IRC-trained providers offered

Providers often encouraged clients to choose a method whose duration of efficacy matched their desired birth spacing duration.



A Ministry of Public Health doctor demonstrates the postpartum IUD insertion technique to nurses and midwives in eastern DRC. © 2016/Mirindi Munyangura John/International Rescue Committee.

counseling on both types of IUDs, in addition to the other methods, and emphasized the important attributes of each method.

Demand-Side Activities Family Planning SBCC Campaigns

To increase demand for family planning services, we had already in 2013 begun conducting periodic, intensive SBCC campaigns to raise awareness about the availability and benefits of modern contraception. These 2-week SBCC campaigns were conducted twice each year in each health zone. IRC staff and volunteer community health workers conducted community events focused on family planning education, shared key family planning messages via motorized caravans and radio spots, and intensified home visits. These activities inundated the health zones with positive messages about modern contraception and available family planning services. The information from the formative research allowed further adaptation of the messaging and targeting during these SBCC campaigns, amplifying positive messages that resonated with beneficiaries such as the health of the mother and dispelling common myths such as the inability to reverse certain methods of contraception. The results of these SBCC campaigns are evident in the service statistics—the number of clients starting family planning methods increased an average of 2.5-fold during the months of the campaigns from 2014 to 2016, although the method mix did

The number of clients starting family planning methods increased an average of 2.5-fold during the months of behavior change communication campaigns between 2014 and 2016.

not change significantly during the months of the campaigns.

Dispelling Rumors

IRC worked closely with the community health workers from the beginning of the project in June 2011, but we intensified our support for their activities beginning in 2014. Specifically, based on findings from the formative research IRC trained community health workers to actively identify rumors about specific methods, IUDs in particular. The community health workers then worked with IRC and the MoPH to create focused messages to dispel these rumors and integrated these messages into routine home visits conducted in supported health zones. Additionally, specific radio spots were developed and routinely aired to correct identified myths.

Community Mobilization by Satisfied Couples

Based on the desire of non-users in the formative research to hear the experiences of users firsthand, IRC identified couples who were happy with the method they chose and who were also willing to share their experience during community events. Recognizing that many clients were still unfamiliar with the IUD, those satisfied couples using the IUD were prioritized. These couples described their positive experience with the health facility and their method and encouraged others to seek family planning services during periodic community mobilization sessions and on the radio.

Outreach to Male Partners

Recognizing that male partners sometimes act as barriers to women's adoption of family planning and were identified as influential in decision making around family planning, IRC began targeting men with community mobilization activities in 2014. Specifically, IRC invited male partners to participate in community mobilization activities related to family planning at the maternity waiting homes (*binyolas*) and conducted family planning education activities at football games and local bars.

RESULTS OF PROGRAM DESIGN CHANGES

Quantitative Data on Users

A total of 39,399 clients started family planning methods at IRC-supported health facilities in South Kivu from January 2014 to December

2016, compared with just 8,985 from June 2011 to December 2013 (Figure 8). The mean number of clients who adopted family planning methods per month, per facility increased from 14 during the initial program period (June 2011 to December 2013) to 37 after the program was modified (January 2014 to December 2016)—representing a 64% increase. Peaks in uptake were observed at certain points—April 2014, May 2014, November 2014, October 2015, June 2016 and November 2016—as a result of extensive SBCC campaigns conducted during these months (Figure 8). The annual number of clients adopting family planning methods peaked in 2014 at 14,410, but declined to 12,590 in 2015 and 12,399 in 2016. Among 2,034 PAC clients treated from January 2014 to December 2016, 58% adopted family planning, compared with 29% of 1,100 PAC clients from June 2011 to December 2013.

The percentage of clients adopting LARCs increased in both zones from 50% to 66% between the initial program period and the post-program design period. Implants continued to be the most popular method in both zones, reaching 61% of the method mix in 2015 and 60% in 2016 (Figure 9). While IUDs remained less popular than implants, 8% of clients in total adopted this method between 2014 and 2016. Notably, the percentage of clients adopting IUDs increased each year, from 3% in 2014 and reaching 13% of the method mix in 2016.

Among PAC clients, IUDs became the most popular method. Between 2014 and 2015, 45% of PAC clients who adopted family

planning chose to use the IUD. Implants were the next most commonly adopted family planning method among PAC clients, followed by injectables, pills, and tubal ligation. This is in contrast to the June 2011 to January 2013 period, when implants were most popular method among PAC clients, followed by injectables, pills, IUDs, and tubal ligation.

DISCUSSION

Through the Family Planning 2020 (FP2020) initiative, 38 countries to date have made ambitious commitments to increasing access to and use of family planning, with financial commitments expected to reach US\$2.5 billion.¹⁹ The DRC has pledged to increase modern contraceptive prevalence from 6.5% to 19.0% by 2020, reaching an additional 2.1 million women with contraceptive services.²⁰ As investment in providing access to contraception increases, it is important to understand how to deliver high-quality services most effectively and in a responsive way, particularly in conflict-affected areas where family planning is less likely to be prioritized or access to services may be disrupted. By using formative research and analysis of routine monitoring data, we were able to adapt our programming approach to address barriers to family planning uptake and client informed choice, such as provider bias, low clinical competency, lack of knowledge among users, and the influence of partners and other family members in family planning decision making. Our results challenge the frequent assumption that method mix reflects only client

The average number of clients who adopted family planning methods in each facility increased from 14 per month during the initial program period to 37 per month after the program was modified.

Our results challenge the frequent assumption that method mix reflects only client preference and demonstrates that program quality also plays an important role.

While IUDs remained less popular than implants, the percentage of clients adopting IUDs increased each year, from 3% in 2014 to 13% in 2016.

FIGURE 8. Number of Clients Adopting Family Planning Methods, Health Zones A and B in South Kivu, Democratic Republic of the Congo, Post-Program Design Changes, January 2014 to December 2016

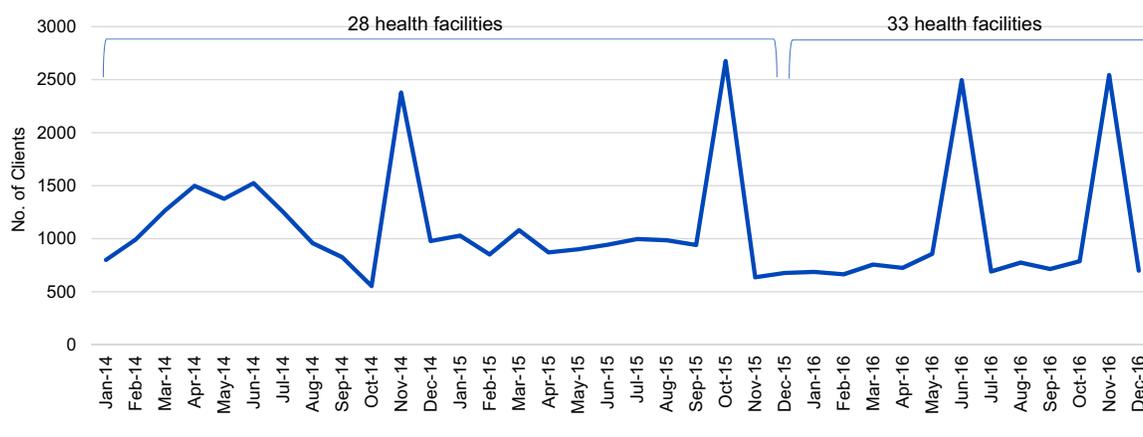
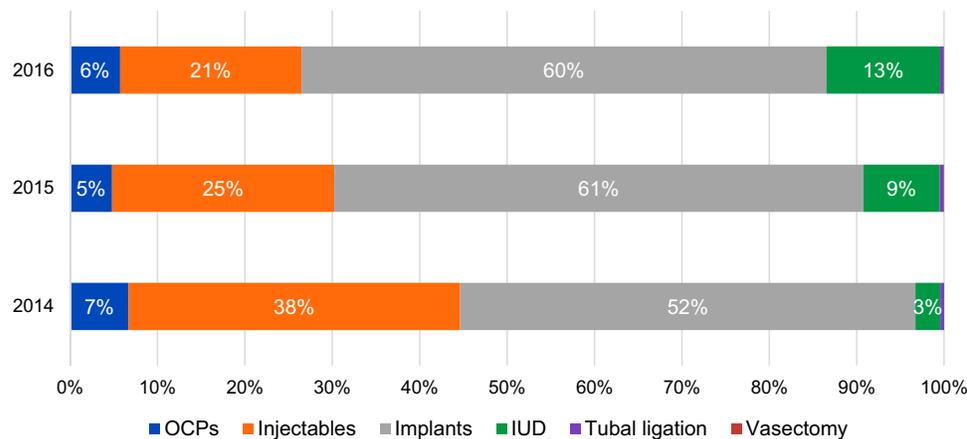


FIGURE 9. Trends in Contraceptive Method Mix Among Clients Starting Family Planning Methods, Health Zones A and B in South Kivu, Democratic Republic of the Congo, 2014–2016



Abbreviations: OCP, oral contraceptive pill; IUD, intrauterine device.

preference and demonstrates that program quality also plays an important role. Ensuring practical availability of a wide range of contraceptive methods through high-quality services not only increases choice but also increases overall uptake of family planning.²¹

The surges in family planning uptake seen after large SBCC campaigns—using communication channels suggested by study participants—are in line with the finding that lack of information may be an important reason why people are not using family planning. The widespread dissemination of positive messages about family planning during these campaigns may also have encouraged more discussion between couples and within the community, prompting women who had been considering using family planning to finally adopt a method. The large number of women adopting family planning during the SBCC campaigns also challenged the notion that the low number of clients adopting family planning each month in 2011 through 2013 reflected a lack of demand for services, a reason cited by some stakeholders at the time. Indeed, each SBCC campaign continued to demonstrate the high latent demand for family planning services in IRC-supported health zones. The experiences of family planning users suggested that women were often motivated to seek family planning to protect their own health and improve their economic situation after having multiple previous pregnancies.

A key component of improving informed choice for clients, along with increasing

knowledge about family planning, was dispelling rumors and misconceptions that may have prevented users from adopting family planning and providers from offering the full range of methods. Furthermore, the increased frequency and quality of clinical coaching on family planning skills during supportive supervision beginning in 2014 played an important role in increasing provider confidence to offer long-acting methods, particularly the IUD. This experience suggests that formal, competency-based training alone is not sufficient to ensure provider competency, particularly in contexts where beneficiaries are unfamiliar with certain methods, such as the IUD in South Kivu. This unfamiliarity with certain methods results in low initial client load so that providers do not receive sufficient practice with real clients during or after trainings, perpetuating a lack of confidence and clinical quality that inhibits client informed choice.

We can see that uptake of family planning increased after the new program strategies were introduced—fewer than 9,000 clients adopted family planning methods during the first 2.5 years of the program while nearly 15,000 clients started family planning in 2014 alone. While this increase was in part due to an increase in the number of facilities supported by the project, the average number of adopters per facility, per month more than doubled, suggesting that the new program strategies also played an important role. Importantly, the percentage of PAC clients adopting family planning also doubled during the

2014–2016 period as compared with the 2011–2013 period. It is important to note that the definition used for the number of PAC clients adopting family planning did vary, which limits the comparability of these data over time. However, the annual number of clients starting family planning declined somewhat in both 2015 and 2016. This decline suggests that additional strategies are needed to sustain annual increases in clients adopting family planning methods.

The percentage of clients adopting long-acting methods also increased after implementation of new program strategies. Notably, the percentage of clients who adopted IUDs increased from just 2% in 2011 through 2013 to 13% in 2016. This increased uptake of IUDs was particularly notable among PAC clients who adopted family planning, among whom the percentage who adopted IUDs increased from 9% during the 2011–2013 period to 45% during the 2014–2016 period. Efforts to improve the quality of services may have both improved client informed choice and increased uptake by giving women more options. It is likely that the introduction of the LNG-IUS and the option of postpartum IUD insertion also contributed to the increase in uptake of IUDs. Anecdotally, clients appreciated how the LNG-IUS reduced bleeding and that it is shorter acting than the copper-bearing IUD. Though all clients are informed that they can remove their method any time, many clients continue to associate length of action with their desired duration of birth spacing. These results suggest that the low percentage of clients adopting IUDs early in the project was due, at least in part, to gaps in program quality rather than only client preference.

Despite increases in adoption of IUDs, the skew toward implants increased, reaching 60% of the method mix in 2015 and 2016. Given the enhanced program interventions implemented to improve client informed choice, these results suggest that the trend toward implants may not have been due to issues with program quality. One explanation for these results is that method skew may be self-reinforcing once a particular method becomes dominant within a population. While not rated most salient, both men and women reported that friends and family were important sources of information as well as influential in decision making about family planning. Our results and previous research^{22–26} demonstrate that women and couples are indeed influenced by the opinions of friends and family when deciding whether to use contraception and which method

to choose. In places where most women are adopting one particular method, these women may influence the contraceptive choices of their peers and family members, further reinforcing adoption of the dominant method. Supply-side barriers may continue to play a role, as well. In particular, frequent provider turnover is a constant challenge for the program as new providers must receive intensive support to ensure their competency and unbiased service provision.

The number of clients adopting family planning is an important indicator of service access.²⁷ However, research demonstrates that, on average, nearly 40% of women discontinue use of their method within 12 months, many for reasons other than the desire to become pregnant. This "leaking bucket" phenomenon increases unmet need for family planning.^{28–30} Notably, contraceptive discontinuation rates tend to be much lower for women who adopt the IUD.³⁰ These results from the DRC do not include data on contraceptive continuation and the contraceptive continuation rate for the program is unknown. This gap, as well as the fact that these data are not representative of the population, limit our ability to speculate about whether the program reduced unmet need for contraception.

Limitations

The data presented are from routine program monitoring activities and were not intended as research. Therefore there are no control groups or population-based survey data that can show changes in contraceptive prevalence specifically in the organization's program area. Data on prevalence and method mix in other parts of DRC since 2013 are not readily available for purposes of comparison. In addition, the qualitative data come from a limited number of facilities in only 1 province in the DRC. For the non-users, the inclusion criteria of having at least 5 children meant that younger non-users were often not included, although our monitoring data show that uptake was in general lower among older women, which is why we chose these criteria. In addition, the selection of non-users may not have been representative even within that age range because they were purposively selected from community groups. This limits the conclusions that can be drawn about the impact of the project activities, although we believe the description of the processes can be transferable to similar programs in other areas. No other actors were supporting family planning or general primary health care

The increased uptake of IUDs was particularly notable among postabortion care clients.

programming in the 2 health zones that might have meaningfully contributed to the increases observed. We have observed similar improvements in uptake and client informed choice in other project-supported health zones across the DRC after implementation of the recommendations of the formative research.

CONCLUSION

Although there has been increased attention to improving access to voluntary contraception globally, it is often overlooked in conflict-affected settings. Our experience in eastern DRC demonstrates that women and their partners affected by conflict want family planning, and that it is feasible to deliver the full range of modern contraceptive methods when programs are adapted and sensitive to the local context. Program monitoring data combined with formative research can identify areas for program improvement and strategies to address barriers to uptake in general and ensure client informed choice. Barriers are often found on both the demand and supply side, so programs should include components to address both.

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ORIGINAL ARTICLE

Effective Collaboration for Scaling Up Health Technologies: A Case Study of the Chlorhexidine for Umbilical Cord Care Experience

Patricia S Coffey,^a Steve Hodgins,^b Amie Bishop^c

Facilitating factors for the Chlorhexidine Working Group: (1) strong, transparent leadership by a neutral broker, promoting shared ownership among all members; (2) reliable internal and external communication; (3) well-defined terms of reference building on common interest around a simple, effective health intervention; (4) clear benefits of participation, including access to evidence and technical assistance; and (5) adequate resources to support the secretariat functions.

ABSTRACT

The global health field is replete with examples of cross-organizational collaborative partnerships, such as networks, alliances, coalitions, task forces, and working groups, often established to tackle a shared global health concern, condition, or threat affecting low-income countries or communities. The purpose of this article is to review factors influencing the effectiveness of a multi-agency global health collaborative effort using the Chlorhexidine Working Group (CWG) as our case study. The CWG was established to accelerate the introduction and global scale-up of chlorhexidine for umbilical cord care to reduce infection-related neonatal morbidity and mortality in low-income countries. Questions included: how current and past CWG members characterized the effectiveness, productivity, collaboration, and leadership of the CWG; what factors facilitated or hindered group function; institutional or individual reasons for participating and length of participation in the CWG; and lessons that might be relevant for future global collaborative partnerships. Data were collected through in-depth, semistructured individual interviews with 19 group members and a review of key guiding documents. Six domains of internal coalition functioning (leadership, interpersonal relationships, task focus, participant benefits and costs, sustainability planning, and community support) were used to frame and describe the functioning of the CWG. Collaboration effectiveness was found to depend on: (1) leadership that maintained a careful balance between discipline and flexibility, (2) a strong secretariat structure that supported the evolution of trust and transparent communication in interpersonal relationships, (3) shared goals that allowed for task focus, (4) diverse membership and active involvement from country-level participants, which created a positive benefit-cost ratio for participants, (5) sufficient resources to support the partnership and build sustainable capacity for members to accelerate the transfer of knowledge, and (6) support from the global health community across multiple organizations. Successful introduction and scale-up of new health interventions require effective collaboration across multiple organizations and disciplines, at both global and country levels. The participatory collaborative partnership approach utilized by the Chlorhexidine Working Group offers an instructive learning case.

INTRODUCTION

The global health field is replete with examples of cross-organizational collaborative partnerships, such as networks, alliances, coalitions, task forces, and working groups, often established to tackle a shared global health concern, condition, or threat affecting low-income countries or communities. These efforts generally bring together expertise drawn from a range

of entities such as NGOs, universities, donors, private-sector companies, government, United Nations (UN) agencies, and communities. Common goals of these collaborative efforts include resource mobilization, policy change, knowledge generation and dissemination, research, creation of new technologies/approaches, or the introduction and scale up of evidence-based interventions.

A variety of disciplines, such as sociology, public policy, economics, and political science, have examined the effectiveness and impact of collaborative partnerships and collective action. The examination of whether, how, and why coalitions work has employed social network theory,^{1,2} relational theories of coordination,³⁻⁵

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group dynamics/teaming,⁶ and organizational development theory.^{7,8} In public health, there is a well-developed literature on community coalitions. Zakocs et al.⁹ found that factors that enhance community coalition effectiveness include having formal governance procedures, encouraging strong leadership, fostering active participation, and cultivating diverse membership. Other investigators have highlighted the importance of balancing the autonomy of individual members with the need for collective action and accountability. This balance can be accomplished by creating a shared culture and mindset that allows for members to both protect and advance the interests of their own organizations and those of the partnership as a whole. Essential to success is the need to be "relentlessly explicit about values, principles, and practices"¹⁰ so that tensions over visibility and credit attribution can be superseded by a shared recognition of the need to focus on common purpose. Because collaborative networks bring disparate groups together to work toward a common cause, the role of individuals who facilitate the flow of information between such groups is key. These individuals, known as "bridges," "brokers," or "boundary spanners,"¹¹ must be seen as trustworthy intermediaries to be effective in closing gaps between perspectives and thus increasing understanding, cooperation, and information sharing across groups.

The purpose of this article is to investigate factors affecting the effectiveness of a multi-agency collaborative effort, as perceived by participants, using the Chlorhexidine Working Group (CWG) global collaboration as our case study. Although ad hoc collaboration around this topic had been functioning since 2002, the CWG was formally established in 2012 to accelerate the introduction and global scale up of chlorhexidine for umbilical cord care to reduce infection-related neonatal mortality and morbidity in low-income countries.

METHODS

Theoretical Model

The theoretical model of coalition functioning developed by Brown and colleagues serves as a helpful framework for investigating the experience of the CWG.¹² In this model (Figure 1), health outcomes are mediated by program or policy implementation, which is supported by effective collaborative partnerships. We selected this model because it aligns with the strategy of the CWG, and the domains in the framework have

been empirically validated and can be used to measure the relative effectiveness of a successful collaborative effort to implement a new program or policy.

In this model, the 6 domains of internal coalition functioning that may affect the effectiveness of program implementation in a collaborative effort are:

1. Leadership
2. Interpersonal relationships
3. Task focus
4. Participant benefits and costs
5. Sustainability planning
6. Community support

In this model, leadership is vital to creating a collective force that can achieve common goals. Interpersonal relationships promote trust and commitment and are the pathways that allow effective collaboration to occur. Task focus is important because it maintains focus on the issues at hand and minimizes peripheral efforts. Perceived costs and benefits of participation in a collaborative effort is often related to level of participant involvement. Sustainability planning is characterized both in terms of planning for financial viability over the life of the collaborative effort and the establishment of independently sustainable programs. Community support is defined as strong community relations that support program implementation and avoid resistance to collaborative goals.

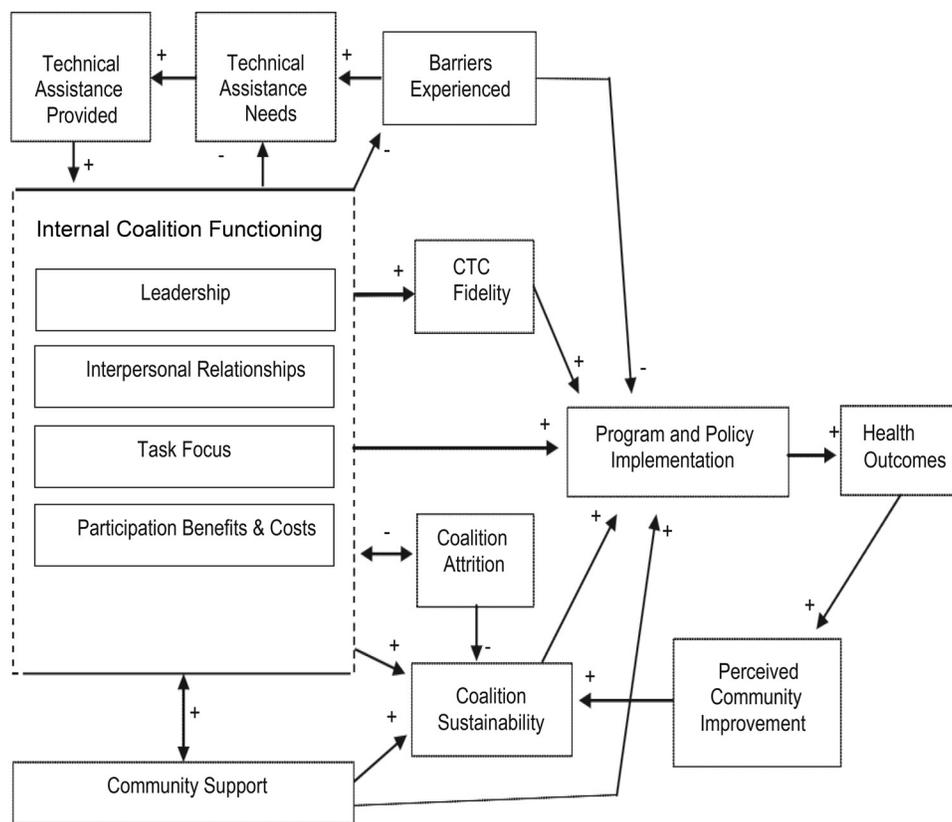
In this case study of the CWG experience, we attempted to answer the following questions, which correspond to the domains of internal coalition functioning noted above:

1. How do current and past CWG members characterize the effectiveness, productivity, collaboration, and leadership of the CWG, and what factors do they identify that facilitate or hinder group function (domains of leadership, task focus, and community support)?
2. What are the institutional or individual reasons for participating and the length of their participation in the CWG (domains of interpersonal relationships, task focus, and participant benefit and costs)?
3. What factors appear to contribute to more effective functioning of a global partnership, and what transferable lessons, if any, can be drawn from the collaboration experience of

6 domains of internal coalition functioning may affect the effectiveness of collaborative implementation efforts: leadership, interpersonal relationships, task focus, benefits and costs, sustainability planning, and community support.

The purpose of this article is to investigate factors affecting the effectiveness of a multi-agency global collaboration.

FIGURE 1. Theoretical Model of Coalition Functioning



Abbreviation: CTC, Communities That Care.

Source: Brown, Feinberg, and Greenberg.¹²

the CWG that can be relevant for future global collaborative partnerships (domains of sustainability planning and community support)?

Data Collection and Analysis

We conducted this case study using a mixed-methods approach that included in-depth, semi-structured individual interviews with members; a review of key guiding documents such as the CWG Terms of Reference and externally facing descriptions of the CWG's scope and purpose; and participant observation by 2 of the authors who were active members in the group. An independent consultant was engaged to develop and refine the questions, conduct the interviews, and analyze the findings. In total, the consultant interviewed 19 current and past members of the CWG—out of 21 originally identified—over a 6-month period.

Nine open-ended questions were formulated, pre-tested, revised, and reordered based on the pretest results.

With respondent consent, interviews were digitally recorded and reviewed for clarity and accuracy. Text from the responses was entered in a Microsoft Excel spreadsheet by respondent name and affiliation and by question, and then coded. Key commonalities were identified and consolidated into categories and themes for each domain. The authors also conducted a retrospective analysis of key events that shaped the evolution of the CWG and global scale of the chlorhexidine intervention.

Ethical Approval

The PATH Research Determination Committee (RDC) reviewed this activity and determined it is not human subjects research as it does not meet

the definition of research provided by the U.S. government [45 CFR 46.102(f)] and the Centers for Disease Control. Respondents consented to participate in the interview prior to scheduling the interview and again at the time of the interview prior to answering any questions. The interviewer explained the purpose of the case study, how long the interview would take, and how the results would be used. Respondents were able to refuse to answer any question and/or discontinue the interview at any time.

FINDINGS

The Table describes respondent affiliations and when they joined the CWG. Of the 19 interviewees, 9 were affiliated with international NGOs, 4 were from pharmaceutical companies, 1 was from academia, 3 were from either bilateral or foundation donors, and 2 represented UN agencies. Professional backgrounds included pediatrics and medicine; maternal and child health program implementation; epidemiology; social science research; public health advocacy; product development, manufacturing, commercialization, and introduction; and global and national policy and advocacy. Seven of the 19 respondents were based in a developing country and the others were based in either the United States or Europe. Just over half the respondents were part of the CWG from its early, more informal start.

Background of the CWG

Between 2002 and 2005, chlorhexidine digluconate (7.1% chlorhexidine digluconate, which delivers 4% free chlorhexidine) was evaluated for

umbilical cord care for the first time in a large community-based cluster randomized controlled trial in Nepal (Figure 2). The study, published in 2006,¹³ showed a 75% reduction in severe cord infection in the chlorhexidine clusters compared with the dry cord care group and 34% fewer deaths among infants receiving the intervention within the first 24 hours compared with the control arm. These findings drew marked interest and prompted several replication trials.

Between 2002 and 2012, the CWG operated on an intermittent, informal basis with a small core group of interested individuals maintaining momentum for further efficacy studies, implementation research, global advocacy, and programmatic effort. Like the more formalized CWG that developed later, these individuals represented international NGOs, donors (primarily the United States Agency for International Development [USAID] and the Bill & Melinda Gates Foundation), academia, UN agencies, and pharmaceutical companies, although the diversity and breadth of membership was more limited. In 2005, after completion of the Nepal trial but before the results were published, USAID convened a group of neonatal health experts and researchers in Washington, DC to review the results and other evidence for the efficacy and safety of chlorhexidine to prevent newborn infection in low-income countries and to discuss programmatic implications of the findings.¹⁴ The group determined that, although certainly further replication trials were needed to confirm effectiveness, an accelerated effort to prepare for introduction of chlorhexidine should be undertaken in parallel (Box). The group outlined a multipronged approach to move forward simultaneously with research and program and product planning. This meeting catalyzed momentum around applying an accelerated research-to-use process, conceived by USAID, to chlorhexidine for umbilical cord care in low- and middle-income countries, and it established USAID in a prominent role as funder and visionary of this effort. By 2012, 2 additional randomized controlled trials in Bangladesh and Pakistan had demonstrated the efficacy of chlorhexidine for reducing risk of cord infections and newborn deaths.^{15,16} A subsequent meta-analysis found a 23% reduction in risk of death.¹⁷

The advent of the United Nations Commission on Life-Saving Commodities for Women and Children (UNCoLSC)¹⁸ in 2012 transformed an ad hoc group of individuals and agencies interested in advancing use of the chlorhexidine intervention into a formalized component of a global

Between 2002 and 2012, the Chlorhexidine Working Group operated on an intermittent, informal basis.

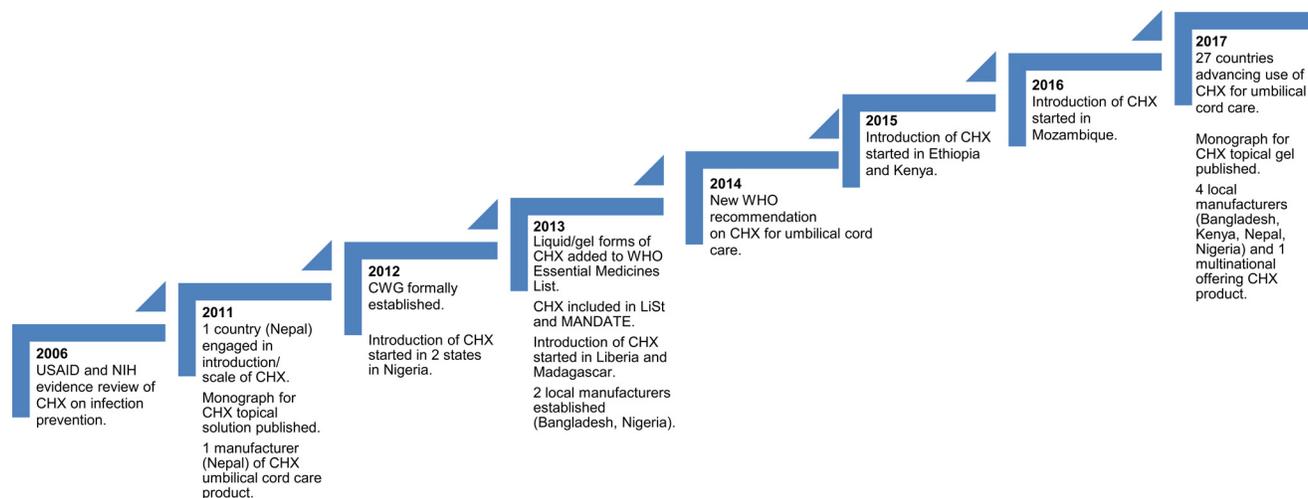
The working group applied an accelerated research-to-use process to chlorhexidine for umbilical cord care.

TABLE. Respondent Profiles, by Year of Joining the Chlorhexidine Working Group^a

| Affiliation | Joined Between 2002 and 2011 | Joined in 2012 or Afterward | Total |
|-------------------------|------------------------------|-----------------------------|-------|
| NGOs | 6 | 3 | 9 |
| Donors | 2 | 1 | 3 |
| Academia | 1 | 0 | 1 |
| Pharmaceutical | 1 | 3 | 4 |
| United Nations agencies | 0 | 2 | 2 |
| Total | 10 | 9 | 19 |

^aThe working group was formalized in 2012, but ad hoc collaboration had been ongoing since 2002.

FIGURE 2. Timeline of Key Milestones Related to the Chlorhexidine Working Group, 2006–2017



Abbreviations: CHX, chlorhexidine; CWG, Chlorhexidine Working Group; LiST, Lives Saved Tool; MANDATE, Maternal and Neonatal Directed Assessment of Technologies; NIH, National Institutes of Health; USAID, United States Agency for International Development; WHO, World Health Organization.

BOX. Characteristics of Chlorhexidine for Cord Care Conducive to Wide Uptake

Everett Rogers¹⁹ has drawn attention to the characteristics of an innovation that can influence probability of widespread uptake or diffusion, notably: relative advantage compared to current practice; compatibility with existing values, needs, etc. (also can be understood as "acceptability"); complexity/simplicity (with regard to understandability and use); trialability (i.e., feasibility of initially using on a limited basis); and observability of results or benefit. As intervention or innovation characteristics that favor effective delivery at scale, Shelton²⁰ adds: how significant a population health burden the innovation could avert; cost; individual efficacy; compatibility with provider attitudes, medical culture, and organization of work; ease of integration within current practices or services; regulatory and policy barriers or facilitators; logistical requirements; commercial-sector compatibility; and single versus multiple benefits. On most of these counts, conditions have been relatively favorable for widespread uptake of chlorhexidine for umbilical cord care. Specific characteristics of the innovation that are conducive to wide uptake include:

- This antiseptic is relatively inexpensive.
- It has long been used in health care, particularly for skin asepsis.
- In many country settings, families and providers conform to an established practice of using substances on the umbilical cord to protect the infant.
- Dramatic early data around the lifesaving potential made the need for the product easily understood and helped create an emotional connection to the intervention.
- The application is straightforward and easy to understand, and it requires minimal training.
- The intervention can be easily integrated into existing essential maternity care and newborn care programming.
- Manufacturing requirements of the product are amenable for local production.

There have, however, been certain innovation characteristics that have created challenges in achieving wider uptake, notably:

- Ambiguity in the evidence base with regard to the most effective application regimen (1 versus 7 days) as well as conditions under which a mortality reduction benefit could be expected. There has been some variability in how partners have dealt with this ambiguity and, at times, this has undermined collaboration effectiveness.
- Lack of a conventional drug development process meant that dose-response data were not available to assist in determination of the exact drug concentration in the product, which means that it is difficult to explain the rationale for the 7.1% level of active ingredient.
- Lack of comparative efficacy data with alcohol, which is used customarily in many countries at facility and home to cleanse the cord after cutting.

effort to expand availability and access to 13 life-saving commodities. Funding from the UNCoLSC and USAID supported the establishment of a chlorhexidine secretariat and mandated the group as a technical resource team under the auspices of the UN effort. The CWG Secretariat, housed at PATH, an international NGO focusing on global health, sought to encourage a participatory leadership model to support introduction and scale up of chlorhexidine for umbilical cord care. Functioning as a global uptake coordinator and market manager, the CWG has worked across the domains of policy advocacy, coordination, knowledge management, and technical assistance, with participation from more than 30 civil society organizations, universities, ministries of health, pharmaceutical manufacturers, and multi-lateral organizations. Its composition has brought together individuals and agencies with expertise in product development, manufacturing, supply chain, policy, regulatory requirements, program design and implementation, quality assurance, training, demand creation, behavior change communication, and monitoring and evaluation. The global reach and the collective expertise of the CWG members and their institutions have helped enable the CWG to offer a broad range of tailored technical assistance, in response to requests from country-level partners.

The CWG has been singled out repeatedly within the global maternal-newborn health community as an exemplary case of a collaborative effort that has accelerated scale up of a new intervention.²¹ In order to understand how these outcomes have been achieved, we categorized findings on factors influencing the performance of the CWG across the 6 domains of internal functioning of coalition effectiveness described earlier.

Leadership

Overall, respondents felt that—in general—the CWG provided strong leadership with genuinely shared ownership. An important theme emerging from the interviews was the value of technically strong, accountable leadership coupled with transparency and openness, leading to a sense of shared mission and ownership. Particularly, respondents emphasized the benefit of having a neutral "honest broker," serving in a secretariat role for the working group, creating conditions for collaboration rather than competition. Said one respondent from an NGO:

The CWG takes into consideration everyone's contribution—everyone contributes. There is no sense

of competition. If a country expresses an interest, the CWG provides information on who is working in that country. This is very useful and makes everyone more open to sharing information and helping each other in implementation.

Such an approach allowed all organizations to share leadership equitably, thus creating a genuine noncompetitive, collegial environment. While the organization responsible for the secretariat function (PATH) also had a specific *technical* role as a *member* of the CWG, it managed to keep this member role separate from its "honest broker" *facilitating* role in support of the operation of the CWG, which was deemed essential to the effective functioning of this partnership. According to an NGO staff person:

The terms of reference really set the stage for how open the working group would be. We [the Secretariat] really encouraged participation and broad ownership.

Other words used to describe the functioning of the secretariat included "openness," "transparency," "dedication," "trustworthiness," "reliability," and "integrity." In this regard, PATH, as the convener of the secretariat, formally managed and supported the CWG while at the same time, as a member, shared technical leadership with the various member organizations.

Both during the period before 2012, when the group operated on a less formal basis, and later, when supported by a more formal secretariat, almost every member/organization was considered a leader in some specific aspect of the overall effort. An atmosphere of trust and respect that allowed for open, clear, reliable, and timely communication proved critical to support the investment of time, energy, and resources by group members. When funding allowed, biweekly CWG teleconferences and quarterly face-to-face meetings were convened and facilitated by the secretariat. These meetings offered an opportunity for members to participate directly by presenting their current work, updating their peers on new initiatives, and discussing any issues related to product supply and/or implementation. The meetings also provided opportunities to disseminate lessons, identify and facilitate synergies between partners, and advocate for and collaborate on the acceleration of chlorhexidine introduction and scale up. Direct participation, particularly in the face-to-face meetings, offered group members a way to strengthen relationships and build trust, even though using valuable meeting time to report out what could be read is often not

Funding from the UN and USAID formalized establishment of the working group in 2012.

The Chlorhexidine Working Group has been singled out within the maternal-newborn health community as an exemplary case of a collaborative effort that has accelerated scale up of a new intervention.

Strong, transparent leadership led to a sense of shared mission and ownership.

considered a good use of meeting time.²² Shared leadership was also seen in ongoing informal collaboration, with members in regular communication by phone or electronically, partnering on specific tasks.

Clear terms of reference helped the group coalesce around defined goals and targets.

Interpersonal Relationships

As the operations of the CWG became more formalized, clear terms of reference were developed, which helped the group coalesce around defined goals and targets. The group produced governance documents and made them publicly available. The CWG Terms of Reference, jointly created by its membership, clearly delineated purpose, membership, structure, and objectives, with explicit statements on the importance of transparent collaboration and on expectations for its members.²³ The accompanying Strategy Statement described the health need being addressed, as well as the CWG's vision, purpose, strategic goals, values, and leadership. The Capacity Statement summarized the CWG's intent, activities, membership, and available resources. Taken collectively, these documents covered a full range of governance, strategy, and purpose issues and provided a framework for CWG functioning.

All participants were invited to attend face-to-face meetings and regular teleconferences and were encouraged to use the information they obtained through these communications to achieve wider availability, accessibility, and affordability of the product. Country point people updated the group regularly about progress and/or barriers to introduction at the country level and were responsible for representing the CWG to national stakeholders, which contributed to the sense that each member was a valued part of a bigger effort. This served to complement their ongoing organizational effort and fostered collaborative rather than competitive norms. Further, this type of participatory leadership model helped to assure CWG members that the secretariat was a trusted partner that willingly shared both financial resources and technical credit with all members.

Good interpersonal communication engendered a sense of collegiality, which was evident in the numerous side interactions that took place among CWG members outside of formal meetings. Members communicated and collaborated beyond the formal meetings in an intentional yet informal way, whether about research, policy, supply, or other issues. These less formal interactions were pivotal in that most key decisions beyond a single organization appeared to be made during these

interactions, rather than in the larger, more-structured meetings.

Task Focus

Respondents felt that an important contributor to the effectiveness of the CWG was that it has had a clear mission and mandate. Critically, the group jointly developed shared goals and specific actions to be undertaken at the global and country levels. Through regular teleconferences and face-to-face meetings, these shared goals and actions were jointly reviewed, helping to ensure group accountability. The goal was always to draw on the collective expertise of the multidisciplinary CWG membership to advance introduction, scale up, and effective delivery of chlorhexidine.

Several of those interviewed pointed to the role of the CWG as an "uptake coordinator," by setting targets, defining strategies globally, and providing technical assistance to country programs, all aided by systematic sharing of information. Respondents felt this was a productive model for future collaborative partnerships. One donor referred to this function as analogous to that of a "product manager":

Much of what limits scale up is a lack of transparency and visibility about what is going on [with a product]. While there was no formal accountability within the CWG, it served as a sort of product manager. An uptake coordinator is ultimately accountable for global scale-up (e.g., not just in the first few countries). The uptake coordinator needs to see the big picture and should be granted the authority to lead, make decisions, and influence outcomes."

The CWG was facilitated in its role as uptake coordinator by having, as secretariat, an organization that was seen as playing an unbiased role (in this case, PATH). An organization playing this role must be trusted by all relevant stakeholders including ministry of health representatives. This respondent went on to say that having a clear mandate and adhering to rigorous project management standards helped provide the group with credibility, which, in turn, helped attract new members, who felt reassured that their involvement would be worthwhile and that the technical rigor of the group would meet their standards.

Several respondents noted that a helpful attribute of CWG meetings has been that they have been tightly organized, which kept the group task-focused and efficient. Telephone and in-person meetings were preceded by clear agenda items and focused on action; minutes were uniformly

Tightly organized meetings kept the group task-focused and efficient.

Most key decisions beyond a single organization appeared to be made during less formal interactions than in structured meetings.

shared; and face-to-face meetings were convened periodically to review new evidence and report on product introduction progress. The clear, reliable structure of communication, documentation, and convening "fostered a sense of being part of a joint effort, part of a community," said an NGO representative.

The CWG functioned as both an advocacy and technical assistance resource. Some group members felt that the advocacy and evidence-synthesis functions were sometimes pulling in different directions. In this case, the twin focus of the CWG meant, to some people, that chlorhexidine was being advanced in any country that was interested, without sufficient attention to existing data.

Although target setting was a noted strength of the CWG, several respondents expressed that the group could benefit from improved process and articulation of targets for utilization and tracking progress to ensure accountability. According to 2 respondents, the CWG became more of an advocacy body for the product than an objective source of information and technical assistance, with recommendations for introduction and scale up being perceived as being promoted before the full range of evidence was available. A USAID colleague also noted that:

With any intervention, the people involved will become extremely invested in advancing it. This is not unusual. Could there have been more introspection about the limitations, but also active debate? . . . I don't know if we really settled this.

This suggests that how the CWG has functioned has not always fostered sufficient critical reflection and debate on strategy. This tension around strategy for advancing chlorhexidine led, at times, to a lack of shared task focus, which undermined collaboration.

Participant Benefits and Costs

To continue to participate, members must perceive that the benefits of collaborating outweigh the costs (e.g., meeting attendance, time, labor, opportunity costs associated with prioritizing focus on one intervention over another). Respondents noted that a key benefit was that the process fostered effective translation of research to action. Respondents across disciplines noted that the CWG provided a forum for reviewing evidence as it emerged and determining the implications for program implementation. For CWG members residing outside the United States,

having access to evidence and technical assistance was essential for making the case for chlorhexidine introduction with national-level stakeholders, including ministries of health and regulatory and policy authorities. Several respondents noted the importance of having technical briefs and research summaries available to share with stakeholders, as well as information on how various countries were approaching product introduction and integration. Access to this information enabled individual group members to provide technical assistance and guidance at the country level, both within their own countries as well as in others. A Nepal-based NGO representative noted that:

Without this forum, there would be no scale up. We used it to share our experience, which then allowed us to reach so many other countries. We have now provided technical assistance to eight other countries.

Evidence was also used to develop specifications for manufacturing and product development and support regulatory and licensing processes. For the pharmaceutical company members of the group, having access to evidence on product effectiveness and program implementation experience, as well as access to technical assistance on manufacturing and technology transfer requirements, helped them plan for product introduction and ensure product quality. The openness with which information was shared also encouraged even potentially competitive entities to share experiences so that all members could learn from both successes and challenges that individual programs or countries were experiencing. According to an NGO representative, this openness, combined with project management rigor and reliability, "increased the value of the group in the eyes of many people beyond the small group that initiated this."

The CWG appeared to be relevant to multiple, diverse stakeholders—as reflected in the CWG's technical and geographic diversity. Numerous respondents commented on the value of having members from a broad range of disciplines, technical expertise, and geographic diversity. This collective expertise enabled the CWG to provide guidance and assistance throughout the product development and introduction value chain—from product formulation to ultimate delivery. This design was deliberate, according to a USAID respondent, who had been involved from the early days.

This was very much an explicit effort . . . to bring together a diverse group to think about how we roll this out. How can we be smarter? Can we anticipate what challenges we would encounter?

Another donor representative stated, however, that:

[although it was] definitely important that the CWG existed, it also felt like its [work] could have been considerably more time-efficient and cost-effective . . . incentives were not always aligned for action.

As we have noted, the CWG leadership made explicit efforts to encourage a collaborative, inclusive, and supportive approach, drawing on a technically and geographically diverse membership. A governing tenet was to be all-inclusive by offering membership to any interested party, including industry. Some tensions arose initially with the inclusion of pharmaceutical companies, with the perception of favoritism or providing commercial advantage needing to be managed carefully. Assisting the group members to ascertain an optimal role for their engagement increased collaboration effectiveness. Early on, members reached out directly to engage various multinational pharmaceutical companies in the production and distribution of chlorhexidine. This was somewhat at odds with the stated intention of the group to build local/regional production capacity²⁴ and could have reflected a lack of clear articulation and/or understanding of shared goals among group members. The multinational pharmaceutical company that chose to remain engaged in the CWG supported this strategy and communicated its role as a "back-up supplier" very clearly to the group.

Generally, pharmaceutical companies are more interested in market share than program implementers, who have more of a public health vision. Commercial interests were not addressed directly, even though for-profit pharmaceutical company representatives were active members of the group. Instead, all members were advised about the lack of confidentiality of information being shared and encouraged to use their own discretion to decide what information to share, considering prior and existing agreements with other organizations. One pharmaceutical company representative noted that:

The group didn't talk about commercial interests at all. This was left to the companies to figure out. And there was not conflict of interest because our risk was different, our regions of operation were different.

CWG members operate in a competitive environment, both in the pharmaceutical company and technical assistance spheres. Often these members are bidding for the same business (i.e., product orders, donor-funded scopes of work) so the potential for obtaining an unfair competitive advantage through group membership is real. To address this, the CWG maintained a strict commitment to transparency by sharing all materials and information with all members of the group to avoid putting any specific members at a disadvantage. This normative behavior built trust among group members and reduced overt competitive behavior.

While some participants have been actively involved in chlorhexidine-related program implementation, the CWG also has welcomed organizations expressing an interest in participating in the CWG on a more passive basis to obtain or provide certain information. Several respondents pointed to the group's openness to having new members join along the way as a key strength given that critical challenges and issues changed over time, requiring different expertise. This flexibility enabled the working group to respond to emerging needs while maintaining a clear focus on the overall goal. The CWG's responsiveness, especially to inquiries from the country level, was noted repeatedly, along with the value of having available online evidence synthesis, technical, and advocacy materials.

Ad hoc, time-limited subgroups were also created within the CWG when in-depth work on specific issues was needed. This included provision of country-specific guidance and support to country initiatives, support on local/regional manufacturer production and related market analysis, the development and implementation of advocacy and dissemination strategies, and creation of monitoring and evaluation indicators.

Finally, respondents valued the group's ability to deal with a wide range of technical issues because of its diversity. The mix of viewpoints and expertise enabled the group to think proactively from an integrated health systems perspective about the approach to scale-up in a particular country.

Early on, country point people were identified from organizations that were active or had the potential to be active in introducing and scaling up chlorhexidine in a given country. This country-level leadership was spread across many CWG members, which built shared commitment and accountability at the country level. When a country showed initial interest in the

intervention, the CWG would discuss and determine jointly the best person or organization to liaise with national stakeholders. In some circumstances, this support included using funds allocated to the CWG Secretariat to support CWG members to visit countries to conduct initial technical consultations and provide short-term technical assistance. These technical assistance visits benefited not only the country but also the point people and their organizations as they were able to be called upon by national leadership for longer-term technical assistance for introduction and scale planning.

Sustainability Planning

The CWG received funding for a formal secretariat in 2012, 10 years after its emergence as an ad hoc interest group. This support was critical to the functioning of the secretariat, provision of in-country technical assistance, development and maintenance of key informational materials, and arrangement of face-to-face meetings.

Activities of the CWG model have not been formally costed. The level of effort expended by PATH to support the working group, specifically for facilitating and managing the secretariat and hosting meetings (excluding PATH's technical work on chlorhexidine), was the equivalent of 1.5 full-time staff positions. One full-time person, with master of public health (MPH) training, managed the daily tasks and 2 other more senior staff contributed about one-quarter time each for overall leadership and technical input. Budget elements supporting the CWG included limited venue costs to host periodic face-to-face meetings, printing costs for selected CWG materials, communication, and travel to attend relevant meetings. Member organizations in the CWG covered their own travel costs and time to attend the face-to-face meetings.

The CWG has nurtured the establishment of independently sustainable programs as well. Since 2011, the CWG has supported planning for introduction of chlorhexidine for umbilical cord care in more than 25 countries. Chlorhexidine is now produced by local manufacturers in Bangladesh, Kenya, Nepal, and Nigeria. Through 2016, approximately 5.5 million doses of chlorhexidine have been distributed by these manufacturers. The United Nations Children's Fund (UNICEF) also distributed approximately 2.7 million doses up to 2015.

Of those interviewed, 6 respondents expressed that the CWG was instrumental in accelerating

national adoption and scale up of chlorhexidine for umbilical cord care, in terms of both number of countries and number of users. An NGO respondent stated that:

Without this working group, we would not be close to where we are in introducing chlorhexidine in countries.

Similarly, an NGO staffer based in Nigeria noted that scale up was greatly facilitated by the group having guidance materials available and "having a network of support" that facilitated access to key resources, evidence, and technical expertise not otherwise typically available. Several respondents remarked on the strategy used by the working group of simultaneously supporting generation of additional evidence on efficacy and priming the product for introduction by identifying potential local manufacturers and addressing potential policy changes. This approach, contrasted with a more linear, sequential model, was not supported by all members at the start but was viewed by most in retrospect as a more time-efficient approach to product introduction. A respondent from academia explained:

USAID wanted to have efforts ongoing even while evidence was being generated. The idea was to reduce the time frame between evidence generation and going to scale. By having a group that can engage at different points in the process, we could problem solve and apply lessons learned.

Participation of pharmaceutical companies as members in the CWG was considered an asset by many members. Those from national pharmaceutical companies believed that their participation helped them build capacity. A pharmaceutical company representative based in Nigeria stated that involvement in the working group helped them become "a world-class company" because of what they have been able to learn not just about manufacturing but also about effective advocacy. Said this respondent:

This is a new product that can change old ways that can be harmful. Changing from old practices to new ones takes a lot of advocacy. We didn't realize this, but we now understand that it is important to work with governments to change practices. We now see ourselves as a world company, not a local company. We are lifted. We also see the potential that lies ahead of us if we continue to do our best.

Funding support was critical to the functioning of the secretariat, provision of in-country technical assistance, and development of key materials.

Community Support

To support the global health community, the CWG created an effective clearinghouse of information for advocacy and implementation. With funding from the UNCoLSC, the CWG was able to establish a web-based comprehensive information platform that provides free access to global and country-level tools and reports hosted by Save the Children's Healthy Newborn Network portal,²⁵ which greatly improved access to information. This has meant that implementing partners, manufacturers, ministries of health, and other stakeholders have had readily available information on a range of topics and were not isolated in their efforts. This also conveyed a sense that the CWG was client-focused. As an NGO representative noted, it demonstrated:

a serious effort to understand what [clients] are facing, what their needs are, and what type of information was important to trying to address those needs.

This respondent felt that this was essential to the working group ultimately achieving its mandate to catalyze scale up and save lives. Another essential element to providing relevant information was the long-term commitment to updating evidence and resources.

As the CWG expanded over the years, membership became more diverse and representative of the various sectors in the global health community that could be instrumental in program implementation. International bodies such as the World Health Organization (WHO) and UNICEF are pivotal members in the global health community, and close collaboration among these bodies is generally sought. Several respondents commented that greater involvement and support from these bodies could have increased the effectiveness of the CWG. Although UNICEF underwrote some of the costs related to CWG activities as part of UNCoLSC, their engagement was uneven, primarily due to turnover in staff assigned to address newborn health and related staffing needs for global crises such as Ebola. WHO joined the group once it was formalized through UNCoLSC, but tensions arose around balancing the role of WHO as a normative body with the practicalities of creating sufficient demand and supply to make the product available for those most in need. For example, the accelerated process of research-to-use employed by the CWG was perceived to be inconsistent with the formal and more lengthy WHO process for evidence review and formation and approval of new intervention guidelines.

Because WHO, a key player in the global community, eventually disengaged from active participation in the CWG, the overall scope of collaboration that the CWG was able to achieve was reduced.

DISCUSSION

A secretariat model, in which an organization plays the role of convener, coordinator, and manager of working group activities, appears to be an effective means of support for collaborative partnerships in global health. In the case of the CWG, this structure offered an established platform to manage a diverse range of activities related to scale up of the intervention while at the same time sharing technical leadership across the membership. Creating a successful collaboration with tangible outcomes requires that the organization playing the facilitation or secretariat function be seen as trustworthy by all members. PATH, playing a secretariat role for the CWG, attempted to do so transparently and collaboratively using a participatory leadership approach,^{26,27} which essentially devolved leadership and encouraged shared ownership among all members.

Seeking involvement and feedback from members in the development of guiding documents was intentional and helped normalize participation and trust as a member experience. Transparency and flexibility in meeting agenda and structure appeared to incentivize members to share openly. Members received recognition and immediate feedback from their peers, which seemed to foster effective interpersonal communication.

While all members were motivated to participate, and did so without financial support from the secretariat, a global collaborative partnership cannot always be sustained in the absence of dedicated resources. Sufficient available resources over the short term, when critical efforts around global awareness raising and initial country roll-out are being implemented, can accelerate progress at both global and country levels.

Currently, due to lack of funding, the formal secretariat is no longer functioning. It is likely that the commitment to advancing chlorhexidine for umbilical cord care among key CWG members will remain and some elements of group function will be sustained on a less formalized, as-needed basis, as in the earlier history of the group. Negative aspects to allocating dedicated funds to institutionalize a group function (e.g., the secretariat) extend to the generally problematic issue of accessing continued funding to support group

The organization playing the facilitation function must be seen as trustworthy by all working group members.

Greater involvement of international bodies such as WHO and UNICEF could have increased effectiveness of the working group.

activities. On the other hand, allocating dedicated funds helped ensure accountability for centralized resource and knowledge management, ensured availability of point persons who were actively scanning and apprising global and country situations, and provided incentives for nurturing and sustaining involvement across a broad cross-section of members.

Closer coordination with normative bodies (in this case, WHO) was cited by respondents as an area to strengthen. More explicit and detailed discussion on the available and pending evidence and its implications for how and where to prioritize introduction of chlorhexidine could have been helpful in bridging this gap. In some cases, however, differences in how groups understand their mandates may not allow the flexibility that close collaboration requires.

Shiffman reviewed 8 case studies of global health networks and identified 4 common strategic challenges: problem identification, positioning of the network, coalition building, and governance.²⁸ For the most part, CWG members concurred on problem identification (high newborn mortality) while struggling somewhat with consensus around positioning (chlorhexidine as an effective way to reduce newborn morbidity and mortality) due to new evidence from randomized controlled trials conducted in Africa.^{29,30} This new evidence failed to show a mortality effect of chlorhexidine in populations with relatively lower neonatal mortality, although—as with the earlier trials—cord infections were reduced. With these new results, some internal and external members questioned the positioning or framing for external audiences of chlorhexidine as an effective way to reduce newborn mortality in *all* settings. Framing chlorhexidine as an intervention that can be expected, necessarily, to reduce mortality risk, has had to be revisited. Instead, greater priority is being given to ensure availability in high-mortality settings and populations and to highlight the benefits of the use of chlorhexidine for reducing risk of cord infections across all populations.³¹

As noted in the USAID publication *Idea to Impact*³²:

Global coordination requires effort – something not always recognized in the global health community. Significant resources are needed to manage internal communications and logistics alone. However, deep technical and strategic skills and expertise are needed to

support, shape, and prioritize all the activities across all the functional areas of expertise.

A recent study among African and global health system professionals documented the lack of shared understanding around what and how to realize effective global partnerships.³³ We believe that the participatory collaborative approach used by the CWG offers an instructive example and insights into the factors that can help or hinder global health collaboration. For example, considerable evidence suggests that successful collaboration in global health is characterized by both discipline and flexibility in management during implementation.³⁴ A key lesson from the CWG experience was that, to the extent possible, clear, realistic targets and time frames need to be established, as well as specific criteria for when the work of the partnership is done.

The current case study involved document review and key informant interviews. As both a strength and potential limitation, 2 of the authors have been direct participants in this collaborative effort. This involvement—on the one hand—means that conclusions cannot be considered to be entirely neutral and objective. On the other hand, such a methodology, more systematically tapping the insights of direct participants, can yield deeper learning. This is, indeed, a principle of action research and participatory evaluation.^{35,36}

■ CONCLUSION

Effective collaboration in the case of the Chlorhexidine Working Group appeared to be a consequence of: (1) leadership that maintained a careful balance between discipline and flexibility, (2) a strong secretariat structure that supported the evolution of trust and transparent communication in interpersonal relationships, (3) shared goals that allowed for task focus, (4) diverse membership and active involvement from country-level participants, which created a positive benefit-cost ratio for participants, (5) sufficient resources to support the partnership and build sustainable capacity for members to accelerate the transfer of knowledge, and (6) support from the global health community across multiple organizations.

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FIELD ACTION REPORT

Positive Influence of Behavior Change Communication on Knowledge, Attitudes, and Practices for Visceral Leishmaniasis/Kala-azar in India

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After 8 months of behavior change communication activities, largely using group and interpersonal communication, refusal of indoor residual spraying to prevent visceral leishmaniasis was significantly lower among households in intervention villages (8%) than control villages (25%). Knowledge and attitudes were also better among the households in the intervention villages than control villages.

ABSTRACT

Background: Visceral leishmaniasis (VL) is endemic to 54 districts in 4 states of India. Poor awareness of the disease and inappropriate health-seeking behavior are major challenges to eliminating the disease. Between February 2016 and March 2017, we implemented a behavior change communication (BCC) intervention in 33 districts of Bihar, 4 districts of Jharkhand, and 3 districts of West Bengal using a mix of channels, including group and interpersonal communication, to improve knowledge, attitudes, and practices of communities, frontline health workers, and opinion leaders. We conducted an impact assessment in October 2016, after the second indoor residual spraying (IRS) round, in Bihar and Jharkhand to evaluate the effect of the BCC intervention.

Methods: Villages in 10 districts of Bihar and 4 districts in Jharkhand were selected for inclusion in the assessment. Selected villages were categorized as either intervention or control based on where project activities were conducted. Households were randomly selected proportional to caste composition, and interviewers surveyed the head of the household on whether the house was sprayed during the last IRS round and on knowledge, attitudes, and practices related to VL. We interviewed 700 households in intervention villages and 350 households in control villages and conducted correlation analysis to explore the association between IRS refusal and socioeconomic variables, and tested for association between IRS refusal and exposure to BCC activities. Odds ratios (ORs) were calculated.

Results: We reached an estimated 3.3 million contacts in Bihar and Jharkhand through the intervention's BCC activities. IRS refusal rates were significantly lower in intervention households than control households (mean=7.95% vs. 24.45%, respectively; OR, 0.27; 95% confidence interval [CI], 0.11 to 0.62; $P<.001$). Households in intervention villages were more aware than those in control villages that VL is spread by sand flies (68.4% vs. 7.4%, respectively; $P<.001$) and of IRS as an effective control measure (82.3% vs. 41.7%, respectively; $P<.001$). A greater percentage of households in intervention villages than control villages indicated they would encourage a patient to go to primary health centers for diagnosis and treatment of VL (77.0% vs. 39.4%, respectively) and to encourage others to accept IRS (78.6% vs. 44.6%, respectively; $P<.001$).

Conclusion: Households that were exposed to community-based BCC activities largely using group and interpersonal communication had better knowledge, attitudes, and practices related to VL, including acceptance of IRS as a preventive measure, than households not exposed. BCC activities are thus an important component of VL elimination strategies.

BACKGROUND

Visceral leishmaniasis (VL), known as kala-azar (KA) in South Asia, is a vector-borne disease caused by the *Leishmania* parasite (*Leishmania donovani*), spread by the infected sand fly (*Phlebotomus argentipes*).¹ Left untreated, it could be potentially fatal. In 2010, the World Health Organization (WHO) estimated that of 1.6 million new cases of leishmaniasis annually,

0.5 million were visceral while 1.1 million were cutaneous.² As many as 90% of the new visceral cases are concentrated in Bangladesh, Brazil, Ethiopia, India, Nepal, and Sudan.

In India, VL is endemic to 54 districts spread over 4 states—Bihar, Jharkhand, Uttar Pradesh, and West Bengal. Poor awareness of the disease coupled with inadequate health-seeking behaviors are considered to be major challenges to achieving elimination of VL. In alignment with global efforts to curb menace of this neglected tropical disease, in 2014 the Government of India declared VL elimination to be a priority public

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health intervention and developed the *National Road Map for Kala-azar Elimination 2014*. In this policy guideline, communication and social mobilization for behavioral impact, along with integrated vector management through indoor residual spraying (IRS), are among the 5 priority elimination strategies to bring incidence of VL cases below 1 per 10,000 persons annually in India.³

In 2015, UK Aid formed a consortium named KalaCORE comprising 4 agencies—Mott MacDonald, Médecins Sans Frontières, the Drugs for Neglected Diseases Initiative, and the London School of Hygiene & Tropical Medicine—to strengthen public health efforts toward the elimination of VL in South Asia and Africa.⁴ Between February 2016 and March 2017, New Concept Information Systems, as a subcontractor to the consortium, implemented behavior change communication (BCC) activities to support the elimination of VL in 3 of the 4 endemic states in India. The year-long communication activities were focused on improving knowledge, attitudes, and practices (KAPs) related to VA and IRS among communities, frontline health workers, and opinion leaders. The purpose of this article is to describe the BCC intervention and assess the effect of the intervention after 8 months of implementation (March through October 2016) on VL-related KAPs, especially on IRS refusals at the household level. Two IRS rounds were conducted over this assessment period: March–May 2016 and July–September 2016. West Bengal was not included in the assessment since the KalaCORE consortium could not support BCC interventions in that state beyond 2016, while it continued supporting the BCC intervention in another phase in Bihar and Jharkhand. Therefore, this article focuses mostly on implementation of the BCC intervention and its assessment in the 2 states of Bihar and Jharkhand.

PROGRAM DESCRIPTION

We implemented the BCC intervention in 33 high-endemic districts of Bihar, 4 districts of Jharkhand, and 3 districts of West Bengal (Figure). In Bihar and Jharkhand, each large village is subdivided into approximately 10–12 wards, which was the basic unit used for covering the village with BCC activities. We covered each village in a period of 3 days (1 day per village before each IRS round plus 1 day for follow-up activities at a later point in time). During any particular month during the intervention, the field team conducted community-level BCC activities over an average of 18 days per month per BCC facilitator and used the

remaining 7 days for follow-up, documentation, and reporting.

Aligned with the socio-ecological model of health promotion,⁵ which proposes that health is mediated by individual, interpersonal, community, organizational, social, and global forces, our communication strategy to eliminate VL was designed to address information (knowledge), motivation (attitudes, beliefs), ability to act (skill, efficacy, access), and norms (perceived, sociocultural, gender) at the individual, family, community, and institutional levels.

Key areas of focus for the BCC intervention were on improving KAPs of communities, frontline health workers, and opinion leaders about:

1. Causes, symptoms, and severity of VL
2. Diagnosis and treatment of VL and post-kala-azar dermal leishmaniasis (PKDL)—a complication of VL that is characterized by a rash in a patient who has recovered from VL
3. Prevention of VL through IRS

We mapped the current situation prevailing in the intervention districts with respect to these focal areas, gleaned from formative research conducted in Bihar, Jharkhand, and West Bengal during 2011 and 2012, to possible challenges to overcome, key BCC messages to address the challenges, and interdependencies involving capacities of frontline health workers and availability of drugs and diagnostic kits (Table 1).

Key Audiences

We identified primary and secondary audiences at the village, block, district, and state levels. The primary audience consisted of patients and families in endemic areas, communities living in damp and humid areas, workers in agricultural fields, and pregnant women. The secondary audience consisted of community-level opinion leaders, health workers, and policy makers (Table 2).

Communication Objectives

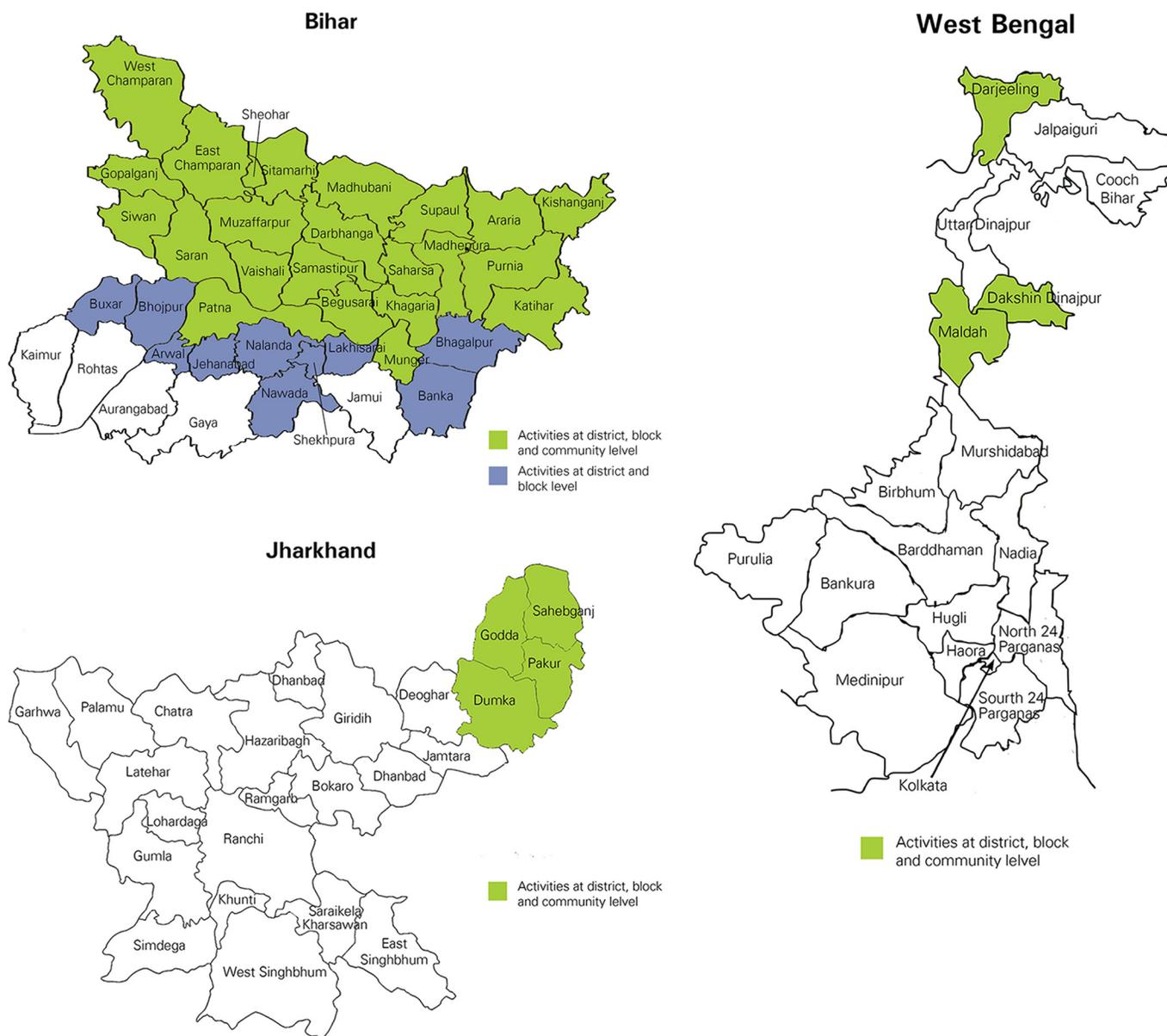
Table 3 maps in detail each of the audience segments to specific communication objectives (along with BCC activities and tools), which we used as a guide for training BCC facilitators. For the primary audience of community members, the communication objectives were to increase awareness about VL, appropriate health-seeking behaviors, and where to access treatment, as well as to increase awareness of IRS and of the importance of allowing the IRS team to enter the household

Visceral leishmaniasis is endemic in 4 states of India.

Behavior change communication activities were implemented in 3 of the 4 endemic states of India to support elimination of visceral leishmaniasis.

One of the key focal areas of the BCC intervention was to improve community knowledge about prevention of visceral leishmaniasis through indoor residual spraying.

FIGURE. Location of Project Districts in Bihar, Jharkhand, and West Bengal States of India, February 2016 to March 2017



and spray all rooms including the kitchen, prayer room, and the cow shed. For secondary audiences of frontline health workers, the communication objectives were to improve their knowledge about the importance of timely diagnosis and treatment of patients with VL, along with coverage of all households in endemic villages by the IRS spray team, and to improve their capacity to promote community awareness about VL and motivate appropriate health-seeking behaviors. For opinion

leaders, including religious leaders and school teachers, the communication objectives focused on increasing their awareness of VL, mobilizing communities to access health services, and ensuring proper IRS in their villages.

Communication Channels

The BCC intervention used a mix of media channels comprising IPC and group communication

TABLE 1. Situational Analysis According to Focal Areas of the BCC Intervention

| Focal Areas | Current Situation/Issue | Barriers/Challenges | Components for BCC to Address | Interdependencies ^a |
|--|---|--|--|---|
| Knowledge and attitudes among communities and opinion leaders about causes, symptoms, and severity of VL | <ul style="list-style-type: none"> Unaware/not completely aware of the cause Inability to differentiate between malaria and VL in terms of causes and causative vectors | Insufficient/incorrect information about causative vector in transmission of VL | Knowledge about causes of VL and differences between malaria and VL | Building capacities of FLWs in IPC and effective use of BCC tools ^b |
| | Not aware of all the symptoms and the modes of transmission of VL | Insufficient/incorrect information about symptoms and modes of transmission | Knowledge about symptoms and modes of transmission | Building capacities of FLWs in IPC and effective use of BCC tools ^b |
| | Awareness and perception that VL is severe and can be fatal if not diagnosed and cured on time | <ul style="list-style-type: none"> Late diagnosis due to lack of information about symptoms Lack of identification of symptoms, leading to late diagnosis and delayed treatment | Knowledge that delayed diagnosis leads to high transmission of parasite by vector, thereby increasing the case load within a household | Building capacities of FLWs in IPC and effective use of BCC tools ^b |
| Knowledge, attitudes, and practices among communities and opinion leaders about diagnosis and treatment of VL | <ul style="list-style-type: none"> Analysis of health-seeking behavior of community at the onset of fever reveals that most sought home remedies or visited the local healer (<i>ojha</i>) Very few prefer going to government health facilities due to various service-delivery reasons Community is not fully aware about the Rk39 test and about where it can be done | <ul style="list-style-type: none"> Lack of awareness about diagnosis and treatment and about where to go Lack of timely diagnosis due to unavailability/inadequate quantity of Rk39 Lack of or poor access to government health facilities due to distance and transportation costs Low credibility of public health service providers (including FLWs) and the perception/experience of people that there are no/insufficient medicines available at these health facilities Low levels of motivation and knowledge among FLWs and other providers regarding diagnosis and treatment | <ul style="list-style-type: none"> Health-seeking behavior for early diagnosis and prompt treatment through public service delivery channels, emphasizing that it is of high quality and free of cost Informing the community about the various services available and how they can be accessed Increased credibility, confidence, and satisfaction among community on public health service delivery channels at the PHC and at Sadar district hospital Increased credibility, trust, and confidence in FLWs, so the community feels motivated to seek help from them | <ul style="list-style-type: none"> Building capacities of FLWs in IPC and effective use of BCC tools^b Ensuring sufficient stock of Rk39 diagnostic kits and AmBisome vials, as well as complete and appropriate treatment at Sadar district hospital Advocating with policy makers regarding implementation of guidelines on incentives for patients and FLWs for treatment Addressing 'softer' aspects like behavior and treatment toward patients by PHC/Sadar district hospital staff |
| Knowledge, attitudes, and practices among communities and opinion leaders about prevention of VL | Less knowledge on prevention measures of VL to prevent breeding of sand fly. Despite incomplete knowledge, VL perceived to be a preventable disease | Incomplete knowledge on the methods of prevention | Knowledge on preventive methods for Kala-azar (VL) | Building capacities of frontline functionaries in IPC skill building and effective use of BCC tools ^b |

Continued

TABLE 1. Continued

| Focal Areas | Current Situation/Issue | Barriers/Challenges | Components for BCC to Address | Interdependencies ^a |
|--|---|---|---|--|
| | <ul style="list-style-type: none"> Limited knowledge of IRS as one method of prevention Insufficient information provided to households well in advance of the date of the spray Practices related to covering the entire house through IRS, including inside the house and cowsheds and in the surroundings and outside the house | <ul style="list-style-type: none"> IRS has not been done in the recent past in the village Perceive the spray to affect the walls of the house and contaminate the food because of the bad smell and the stains it leaves behind Spray workers taking bribes/food grains in exchange for spraying IRS perceived to be ineffective in the long run Allergy to the smell (causes headache, cough, etc.) Face difficulty while emptying the house prior to IRS (which is related to prior communication of the IRS dates) Absence of male member in the house when spray workers arrive Delay and continuous changes in dates of IRS | <ul style="list-style-type: none"> Complete knowledge about IRS and its intended benefits Advantages of SP and the improvement over DDT Key influencers and opinion leaders (ward members, Mukhiya, etc.) to play an active role in demanding complete spray | <ul style="list-style-type: none"> Building capacities of FLWs in IPC and effective use of BCC tools^b Training of spray workers on technical and soft skills Ensuring dates of IRS are communicated well in advance, and adhered to by the spray squad Coordinating with other development partners like CARE |
| | Lack of basic awareness on maintaining cleanliness and keeping the surroundings clean as preventive methods for VL | Limited knowledge of importance/benefits of keeping household, cowsheds, and surroundings clean and dry | Knowledge and awareness of maintaining proper hygiene and cleanliness especially in damp areas | Building capacities of FLWs in IPC and effective use of BCC tools ^b |
| Knowledge, attitudes, and practices among communities and opinion leaders about PKDL or relapse of kala-azar | <ul style="list-style-type: none"> Inadequate awareness about PKDL and importance of treatment among patients and their families Lack of sufficient information that PKDL is a reservoir of infection, which would increase transmission and the case load Delayed reporting of PKDL cases due to lack of knowledge | Insufficient knowledge about PKDL among community members | Knowledge about PKDL and importance of getting it treated immediately | <ul style="list-style-type: none"> Building capacities of FLWs in IPC and effective use of BCC tools^b Increasing awareness and motivation about PKDL among Medical Officer In-Charge |

Abbreviations: BCC, behavior change communication; FLW, frontline health worker; IPC, interpersonal communication; IRS, indoor residual spraying; PHC, primary health center; PKDL, post-kala-azar dermal leishmaniasis; VL, visceral leishmaniasis.

^a Intervention focused primarily on BCC at the community level while recognizing that achieving the overall goal of VL elimination depends also on structural factors such as availability of timely and quality services.

^b The intervention used BCC facilitators to implement the BCC activities but also involved FLWs in the BCC activities; no formal communication capacity building of the FLWs, however, was done.

TABLE 2. Primary, Secondary, and Tertiary Audiences of BCC Activities

| Level | Type of Audience | Specific Audience |
|---------------------------------------|---|---|
| Village/ <i>tola</i> /community level | Primary audience: Will be carrying out the intended action and therefore the prime target for BCC interventions | <ul style="list-style-type: none"> • Patients and families in the endemic areas • Communities and clusters living in damp humid areas and near vegetation, especially certain vulnerable sections of the population (excluded communities and marginalized groups) • Workers in agricultural fields and in cowsheds • Pregnant women and families with children residing in the endemic areas |
| Village/ <i>tola</i> /community level | Secondary audience: Responsible for facilitating the desired action toward successful behavior change | <ul style="list-style-type: none"> • Community-level key influencers and opinion leaders such as PRI members, religious leaders, SHGs/AGGs/youth groups, school teachers/headmasters • Children in middle and secondary schools |
| Village/block level | Secondary audience: Responsible for facilitating the desired action toward successful behavior change | <ul style="list-style-type: none"> • MoICs, frontline health workers (if any), and active SHG women |
| District, state, and national level | Tertiary audience: Responsible for providing an enabling environment for sustained behavior change | <ul style="list-style-type: none"> • Policy makers and program managers |

Abbreviations: AGG, adolescent girls' group; BCC, behavior change communication; MoIC, Medical Officer In-Charge; PRI, Panchayati Raj Institution; SHG, self-help group.

with IRS-resistant families, frontline health workers, and opinion leaders in the community; outdoor/mid-media, such as "miking" in Bihar and West Bengal (a 3-wheeler fitted with a loud-speaker travels through the villages to convey BCC messages), drum beating in Jharkhand, posters, and billboards, in villages and at the facility level to create an enabling environment; and mobile-based media. Mass media was used sparingly. The media mix was based on the results of the formative research mentioned earlier, which showed that IPC and group communication were the most effective channels to reach communities affected by this disease. [Supplement 1](#) outlines the BCC activities, materials, and audience segments by each type of media.

Communication Messages, Tools, and Activities

The messages were developed mainly around 2 broad issues: (1) prevention of VL, mainly through IRS, and (2) identifying symptoms of VL that would prompt appropriate health-seeking behavior, ultimately leading to diagnosis and treatment.

We developed several types of BCC tools, such as a film on KA, a flip-book for IPC sessions, a frequently asked questions (FAQ) booklet, posters,

and stickers, for use at the village and higher levels. We pretested these tools in July 2015 with stakeholder groups in Bihar at 2 levels—the community level and with frontline health workers, as applicable. The BCC materials were piloted in 7 districts of Bihar (Araria, Vaishali, Muzaffarpur, Purnia, Sitamarhi, Saharsa and Saran) between August and November 2015. Evidence from the pilot further confirmed that most of the VL-endemic habitations were marginalized from mainstream media and typically had low literacy levels. People were largely unaware of the signs and symptoms of VL and of preventive measures. They were also unaware of the single-day treatment of choice (injectable liposomal amphotericin B [LAmB]), which for most positive cases is more beneficial than the previous standard 28-day treatment (oral miltefosine) because it drastically reduces the number of sick days and associated indirect costs (e.g., wages lost for the patient and accompanying relative, days lost, transport, food, lodging costs).⁶ Community members were also unaware of the differences between malaria and VL, government incentives for obtaining VL treatment, the role of frontline health workers in supporting VL diagnosis and treatment, and the benefits of IRS of houses with synthetic pyrethroid (SP), which does not leave odor and white patches

The BCC intervention used a mix of media channels including interpersonal communication, group communication, mid-media, and mobile-based media.

TABLE 3. Mapping of Key Audiences to Communication Objectives, BCC Activities, and BCC Tools

| Level | Audience | Communication Objectives | Description of BCC Activity | BCC Materials/Tools |
|---------------------------------------|--|---|---|--|
| Village/ <i>tola</i> /community level | <p>Primary audience:</p> <ul style="list-style-type: none"> • Patients and families in the endemic areas • Communities and clusters living in damp humid areas and near vegetation • Workers in agricultural fields and in cowsheds • Pregnant women and families with children residing in the endemic areas | <ul style="list-style-type: none"> • Increase awareness about VL and PKDL causes, symptoms, and mode of transmission • Ensure timely identification and reporting of fever and PKDL cases to avoid delays in diagnosis and treatment (which increases chances of transmission and case load) • Ensure IRS within complete household (including cowsheds, cracks, holes) • Maintain cleanliness and hygiene within household and surroundings and keep them dry • Increase in awareness regarding: <ul style="list-style-type: none"> • Location and accessibility of the nearest PHC and Sadar district hospital • Duration, costs, side effects regarding treatment • Provision of incentives for treatment | <ul style="list-style-type: none"> • Group communication sessions using the VL film • IPC using the flip-book • IPC activities such as simple and participatory games, which can be carried out without any specific BCC tool • Miking during IRS (only in Bihar) • Munadi (drum beating) during IRS (only in Jharkhand) | <ul style="list-style-type: none"> • VL film • Flip-book • Posters and stickers displayed at the PHC and Sadar district hospital • Display posters on rickshaws, tempo, and other vehicles plying in rural areas • SMS alerts |
| Village/block level | <p>Secondary audience: Frontline health workers at village level; MoC and KTS at the block level</p> | <ul style="list-style-type: none"> • Ensure timely diagnosis and treatment of Kala-azar patients • Ensure active case finding and identification during Kala-azar fortnights and passive case finding during home visits (both Kala-azar and PKDL) • Increase community awareness on causes, symptoms, diagnosis, treatment and prevention of Kala-azar and PKDL • Provide identification and motivation of patients and their families for seeking timely diagnosis and treatment for fever and PKDL (through IPC and counselling during home visits) • Provide information about incentives/other entitlements for Kala-azar patients | <ul style="list-style-type: none"> • Ensuring active participation of FLWs in group communication sessions using the Kala-azar film (to ensure continuity and sustainability) • IPC using the flip-book • Interactions/meetings using FAQ booklet • Capacity building on IPC and communication skills | <ul style="list-style-type: none"> • VL film for GC sessions • Flip-book for IPC sessions • FAQ booklet • Module on IPC and effective communication • SMS alerts |
| Village/ <i>tola</i> /community level | <p>Secondary audience: Opinion leaders, PRI/Gram Sabha members, religious leaders, SHGs/AGGs/youth groups, school teachers and headmasters</p> | <ul style="list-style-type: none"> • Increase awareness about VL and PKDL causes, symptoms, and mode of transmission • Timely reporting of fever and PKDL cases • Ensuring IRS of complete village in each and every household (including cowsheds) | <ul style="list-style-type: none"> • Ensuring active participation in group communication sessions using the VL film • IPC using the flip-book • Interactions/meetings using FAQ booklet; | <ul style="list-style-type: none"> • VL film • Flip-book • FAQ booklet • Posters and stickers distributed to the community, the PHC, and Sadar district hospital |

Continued

TABLE 3. Continued

| Level | Audience | Communication Objectives | Description of BCC Activity | BCC Materials/Tools |
|-------------------------------------|---|---|---|--|
| | | <ul style="list-style-type: none"> Mobilize and motivate the community to timely report PKDL cases Mobilize and motivate the community to access and demand various services Provide information and assist patients in getting incentives after treatment Provide support during active case finding in Kala-azar fortnights | <ul style="list-style-type: none"> Screenings of VL film at the school Miking during IRS (only in Bihar) <i>Munadi</i> (drum beating) during IRS (only in Jharkhand) | <ul style="list-style-type: none"> Display posters on rickshaws, tempo, and other vehicles plying in rural areas SMS alerts |
| Village/block level | Secondary audience: Private practitioners/traditional healers | <ul style="list-style-type: none"> Ensure timely diagnosis and treatment of VL patients Informing the patients about causes, symptoms, diagnosis, treatment, and prevention of VL and PKDL Provide information about diagnosis and treatment processes as well as procedures for referral to Sadar district hospital Ensure proper recording and reporting of cases Inform the patients about the nearest accessible and functional health facility | Sensitization workshops | <ul style="list-style-type: none"> FAQ booklet Posters and stickers for display and distribution in clinics, hospitals SMS alerts Workshop kit |
| District, state, and national level | Tertiary audience: Policy makers and program managers | <ul style="list-style-type: none"> Provision of quality and timely resources (human, equipment, and finances) Provision of timely and regular supply of diagnostic kits and medicines Ensure proper planning and implementation to ensure complete coverage through IRS Devise a plan for capacity building of health care service providers and spray staff on technical and soft skills to enhance their motivation and awareness levels Coordinate with other departments to ensure concerted efforts toward elimination Ensure periodic review of the VL elimination program by senior officials at state and district levels | Advocacy by KalaCORE with support | Advocacy |

Abbreviations: AGG, adolescent girls' groups; BCC, behavior change communication; FAQ, frequently asked questions; IPC, interpersonal communication; IRS, indoor residual spraying; KTS, Kala-azar Technical Supervisor; MoIC, Medical Officer In-Charge; PHC, primary health center; PKDL, post-kala-azar dermal leishmaniasis; PRI, Panchayati Raj Institution; SHG, self-help group; VL, visceral leishmaniasis.

after spraying. Two of the most critical issues identified were (1) low acceptance of IRS due to earlier negative experiences with DDT sprays such as odor, white patches left on walls and wooden household articles, and increased insect levels after the spray, and (2) lack of trust in the benefits of the spraying process. Identification of suspected cases and immediate referral for diagnosis were not being done adequately by community-level health outreach workers. Pretesting among people residing in VL-endemic villages confirmed that group communication using the short film on VL; IPC using the flip-book by BCC facilitators and frontline health workers; and IPC with key opinion leaders such as village heads, retired government employees, political representatives, social workers, and women's group leaders using leaflets were effective in addressing such barriers.

IPC and group communication tools such as the flip-book and the KA film contained all the key messages and were used by well-trained BCC facilitators. Outdoor media materials, such as posters, stickers, and billboards, focused either on prevention through IRS or on identifying symptoms to ensure timely diagnosis and treatment. BCC materials on prevention through IRS were used to a greater degree just before or during the IRS rounds, whereas materials related to symptoms, diagnosis, and treatment were used throughout the year.

BCC activities consisted mainly of:

- Group communication sessions in the community using the KA film
- Engagement of students and teachers by screening the KA film in schools
- IPC sessions with key opinion leaders in the village using the flip-book and FAQ booklet
- General awareness-raising through outdoor media (posters, stickers, billboards)
- Sensitization of frontline health workers on VL by screening the KA film and training on proper use of the flip-book

For the intervention states we developed implementation plans detailing the number of activities expected to be carried out and coverage targets to ensure we achieved our intended outreach goals during the implementation period. See [Supplement 2](#) for an illustrative example for Bihar.

Team Composition and Management

An implementation team of 216 professionals based in the intervention states carried out the

intervention comprising 168 BCC facilitators, 27 district project managers, 18 quality monitors, and 3 state program managers. A team leader headed the implementation team, closely assisted by a project manager and project coordinator, both of whom were located in New Delhi ([Supplement 3](#)). They traveled frequently to the states for review meetings and monitoring visits. In addition, a team of senior resource persons with expertise in communication and capacity building helped to strengthen the capacity of the project team; these senior resource persons also conducted monitoring visits.

At the state level, the implementation teams were led by a state project manager; the state project manager for Bihar also served as the regional manager for all 3 states. The state project managers managed all tasks associated within their respective states. District project managers managed communication activities in the districts and coordinated with the District Vector-Borne Disease Control Officers and Vector-Borne Disease consultants. The implementation team also included district-level quality monitors who were in charge of supportive supervision of BCC facilitators and the BCC facilitators themselves, who were primarily in charge of conducting BCC activities at the community level.

The BCC facilitators received training over 5 days in planning and carrying out communication activities. The training covered technical information on VL, communication skills, principles of behavior change, and use of various BCC tools. During the first 2 days of training, trainers walked participants through various sessions using training job aids. This helped in clarifying doubts and gave ample time for activities such as question and answer sessions to gain confidence and understand how BCC activities should be conducted. The remaining 3 days were used for conducting mock sessions, where participants were asked to facilitate a community session. They were closely observed and graded based on specific parameters to help in final selection. (See [Supplement 4](#) for field instructions.)

Project Management Information System

An online management information system (MIS) was created to capture the project process and measure outputs ([Supplement 5](#)). BCC facilitators documented daily activities in village visit formats, which were then keyed into the online MIS on a weekly basis by district project managers. The quality of village activities was randomly checked

by the quality monitors through on-the-spot monitoring and post-session assessment and reported through 40 quality-related questions. This was done using Android-based smartphones. Monitoring data were integrated into the online reporting system at the central level.

METHODS

After the second IRS round (July to September 2016), we conducted a cross-sectional study in October 2016 in 14 VL-endemic districts (10 districts of Bihar and 4 districts of Jharkhand). The study did not include West Bengal, the third intervention state, since the KalaCORE consortium did not have funds to support activities in the state beyond 2016. The study aimed to quantify the outcomes of the BCC activities related to IRS refusal and community-level indicators related to the causative agent, preventive measures, suspected case detection, and diagnosis and treatment-seeking behavior.

The sampling method was driven by the need to include a representative set of households for analysis. First, we selected 1 high-endemic block in each of the 14 study districts based on 2 criteria: (1) the villages in the selected block had higher reported VL cases than villages in other blocks, and (2) the villages in the selected block that had IRS conducted. We obtained the list of VL-endemic villages from the second IRS round microplan, prepared by the District Vector-Borne Disease Control Offices. From this list, we extracted those villages that were covered through the project's BCC activities. This list formed the sampling frame for selection of intervention villages to be included in the assessment, from which we randomly selected 10 villages per study district for inclusion in the assessment. Five control villages per study district were selected from the remaining villages that were not considered for the intervention sample (i.e., from the villages that were not covered by the project's BCC activities). We ensured that control villages were sufficiently distant from intervention villages in order to exclude, or at least minimize, the effect of diffusion of BCC activities into control villages. Since both intervention and control villages were selected from the list of VL-endemic villages, we considered it safe to assume that the populations had similar demographic and socioeconomic characteristics.

After categorizing the selected villages as intervention or control, households in the intervention and control villages were selected proportional to caste composition. Caste is an age-old social

stratification in India, which categorizes households into upper (general) and lower caste. The lower castes consist of Other Backward Caste, Scheduled Caste, and Scheduled Tribe.⁷ In Bihar, we surveyed 3 Scheduled Caste households, 1 Other Backward Caste household, and 1 general caste household in each village. In Jharkhand, a state with a sizable tribal population, we surveyed 2 Scheduled Tribe households, 1 Scheduled Caste household, 1 Other Backward Caste household, and 1 general caste household in each village. We also ensured inclusion of households below the poverty level as well as those above the poverty level. The criteria for classification of households based on poverty level has been defined by the C. Rangarajan Committee, Government of India (2014). Households with persons earning less than Rs 32 (less than US\$0.50) per day in rural areas are considered below the poverty level.⁸ To account for religious diversity, we also made an effort to include households belonging to Christian, Muslim, Hindu, and Sarna faiths, and houses located at a distance from each other were selected in order to capture any diversity within the settlement.

In each study district, we surveyed 5 households each in 10 intervention villages (N=700 intervention households in all 14 study districts) and 5 households each in 5 control villages (N=350 control households in all 14 study districts). We based this sample size on a power calculation using IRS refusal rates that were available from government sources from the previous round of IRS. Only half as many control households were sampled as intervention households due to limited time and resources.

The survey, administered with the house owner/head of the family, included questions on socioeconomic profile, IRS coverage, exposure to BCC activities, and KAPs. Those houses with rooms partially sprayed, not sprayed at all, or locked and not visited by the spray team were grouped under the category of "houses with IRS refusal" for this study.

We used the paired *t* test to test for statistically significant differences between IRS refusal among households in villages with BCC activities (N=700 households) and households in villages without BCC activities (N=350 households). Odds ratios (ORs) were calculated with respect to the rate of IRS refusal for households exposed to BCC interventions in comparison with those not exposed. The assessment of KAPs was based on percentage responses.

We used the statistical package, Stata Version 11.2 (Stata Corp LP, Texas, USA) for the quantitative

analysis, and Microsoft Excel 2011 for qualitative analysis. To calculate ORs, we used the trial version of MedCalc (Ostend, Belgium), an online easy-to-use statistical software.⁹

Ethical Considerations

As the study was not biomedical in nature, involved less than minimal risk, and was meant solely for academic purposes, formal Institutional Review Board approval was not required per ethical guidelines of the Indian Council of Medical Research (ICMR). Further, as the study was related to a public health program with community (consumer) acceptance, it qualified for waiver from the formal consent process from the KalaCORE consortium. Verbal informed consent was obtained prior to interviews and unique code numbers were assigned to each respondent to maintain their confidentiality.

RESULTS

Reach of BCC Activities

Among all 3 intervention states, we estimate that we reached around 65% of the 12,265 VL-endemic villages, comprising a population of 10 million, with communication messages about VL. Based on the number of BCC activities conducted and documented in our project MIS, we estimate reaching 3.3 million contacts in Bihar and Jharkhand alone (Table 4).

Background Characteristics of Surveyed Households

The average distance between intervention households and the nearest PHC was 10.1 km, and for control households 11.9 km (Table 5).

The average family size per intervention household was 8.4 and 8.9 for control households. Agriculture was the mainstay occupation followed by wage labor. In the state of Bihar, most of the households in the intervention and control households were Hindu and largely from the Other Backward Caste and Scheduled Caste. In contrast, in Jharkhand the majority of the households were split between Hindu, Christian, and Sarna (indigenous group of religions) faiths and the large majority belonged to the Scheduled Tribe.

Exposure to BCC Activities

Nearly 69% of households in intervention villages recalled communication activities related to VL compared with only 21% in control villages (Table 6). The most commonly recalled source of communication among households in intervention villages was BCC project activities in general (24.5%), followed by posters (10.5%), miking or drum beating (6.5%), TV (6.4%), and door-to-door meetings (5.7%). (Note that only the first source mentioned by the respondent was recorded.) Respondents were also asked if they had received prior information about IRS, referring to miking conducted on the day of or before the spray to announce the arrival of the spray team. The government usually conducts these miking activities in all villages, but the BCC project team assumed responsibility for this activity in the intervention villages during the project period. A higher percentage of households in intervention villages than control villages responded positively to this question (66.9% vs. 30.3%; $P < .001$).

Nearly 69% of households in intervention villages recalled communication activities related to visceral leishmaniasis compared with only 21% in control villages.

TABLE 4. Estimated Reach of BCC Activities in Bihar and Jharkhand, India, February 2016 to March 2017

| BCC Activities | No. of Activities | No. of Contacts Made ^a |
|---|-------------------|-----------------------------------|
| Group communication sessions | 24,572 | 982,880 |
| VL film screenings | 3,090 | 185,400 |
| Interaction with frontline health workers through FAQ booklet and with KI using leaflet | 64,484 | 64,484 |
| IPC sessions through flip-book | 74,452 | 595,616 |
| Posters (on treatment, IRS, PKDL) | 91,228 | 456,140 |
| Wall stickers (on treatment and PKDL) | 215,697 | 1,078,485 |
| TOTAL | | 3,363,005 |

Abbreviations: BCC, behavior change communication; FAQ, frequently asked questions; IPC, interpersonal communication; IRS, indoor residual spraying; PKDL, post-kala-azar dermal leishmaniasis; VL, visceral leishmaniasis.

^aThese do not necessarily represent unique contacts because there may have been overlap in the people exposed to different BCC activities.

TABLE 5. Demographic Characteristics of Households Included in the Survey, Bihar and Jharkhand States of India, 2016

| Variables | Bihar | | Jharkhand | | Total | |
|--|-----------------|----------------------|-----------------|----------------------|-----------------|----------------------|
| | Control (n=250) | Intervention (n=500) | Control (n=100) | Intervention (n=200) | Control (N=350) | Intervention (N=700) |
| Population of villages ^a | 112,522 | 394,497 | 12,590 | 37,516 | 125,112 | 432,013 |
| Total no. of households ^a | 24,431 | 63,944 | 2471 | 7620 | 26,902 | 71,564 |
| Distance to nearest PHC, mean (km) | 11.0 | 9.0 | 14.3 | 12.6 | 11.9 | 10.1 |
| Average no. of family members in the surveyed households | 10.1 | 9.5 | 6.0 | 5.6 | 8.9 | 8.4 |
| Caste group, % | | | | | | |
| General | 12.8 | 13.4 | 0.0 | 0.5 | 9.1 | 9.7 |
| Other Backward Caste | 42.0 | 43.6 | 10.0 | 13.0 | 32.9 | 34.9 |
| Scheduled Caste | 31.2 | 27.2 | 9.0 | 3.5 | 24.9 | 20.4 |
| Scheduled Tribe | 6.4 | 8.2 | 78.0 | 82.0 | 26.9 | 29.3 |
| Mahadaliit ^b | 6.8 | 5.8 | 1.0 | 0.0 | 5.1 | 4.1 |
| Not disclosed | 0.8 | 1.8 | 2.0 | 1.0 | 1.1 | 1.6 |
| Religious affiliation, % | | | | | | |
| Hindu | 85.2 | 83.8 | 37.0 | 41.5 | 71.4 | 71.7 |
| Muslim | 13.6 | 15.0 | 0.0 | 0.5 | 9.7 | 10.9 |
| Christian | 0.8 | 0.4 | 35.0 | 33.5 | 10.6 | 9.9 |
| Sikh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Jain | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Buddhist | 0.0 | 0.0 | 1.0 | 0.0 | 0.3 | 0.0 |
| Sarna | 0.0 | 0.6 | 27.0 | 23.5 | 7.7 | 7.1 |
| Not disclosed | 0.4 | 0.2 | 0.0 | 1.0 | 0.3 | 0.4 |
| Major occupation, % | | | | | | |
| Agriculture | 32.4 | 31.3 | 95.0 | 87.5 | 50.3 | 47.4 |
| Labor | 44.8 | 44.1 | 1.0 | 2.5 | 32.3 | 32.2 |
| Service | 5.6 | 5.2 | 2.0 | 2.0 | 4.6 | 4.3 |
| Business | 10.0 | 11.2 | 1.0 | 2.0 | 7.4 | 8.6 |
| Other | 7.2 | 8.2 | 1.0 | 6.0 | 5.4 | 7.6 |
| Income category, % | | | | | | |
| Below the poverty level | 74.0 | 70.6 | 90.0 | 86.5 | 78.6 | 75.1 |
| Above the poverty level | 22.0 | 25.4 | 9.0 | 12.5 | 18.3 | 21.7 |
| Don't know | 4.0 | 4.0 | 1.0 | 1.0 | 3.1 | 3.1 |

Abbreviation: PHC, primary health center.

^a Data from government IRS microplan.

^b Lowest Scheduled Caste subcategory.

IRS Refusals

There were marked differences in the IRS refusal rate, during the second round of IRS, between intervention and control households (Table 7).

Households in intervention villages exhibited a significantly lower IRS refusal rate (7.95%) compared with households in control villages (24.45%). The odds of IRS refusal were 27% less in intervention

TABLE 6. Exposure to the VL Messages Among Intervention and Control Households, Bihar and Jharkhand States of India, 2016

| | Intervention (%) (N=700) | Control (%) (N=350) | OR | 95% CI | P Value |
|---|-----------------------------|------------------------|------|----------------|---------|
| Have heard/seen anything about VL in the last 12 months? | 68.7 | 21.1 | 8.4 | (4.41, 15.90) | <.001 |
| Where did you hear/see anything about VL?^a | | | | | |
| Radio | 0.3 | 0.7 | 0.3 | (0.01, 8.20) | .50 |
| TV | 6.4 | 1.3 | 6.3 | (0.75, 53.48) | .09 |
| Newspaper | 0.5 | 0.7 | 1.0 | (0.06, 16.21) | 1.00 |
| Poster | 10.5 | 0.9 | 12.2 | (1.55, 96.68) | .02 |
| Health meeting at PHC | 0.2 | 0.4 | 1.0 | (0.02, 50.89) | 1.00 |
| Community meeting | 2.9 | 0.4 | 7.2 | (0.37, 141.53) | .19 |
| Religious place/religious leaders | 0.3 | 0.0 | 1.0 | (0.02, 50.89) | 1.00 |
| Community leaders | 0.0 | 0.1 | 1.0 | (0.02, 50.89) | 1.00 |
| Friends/neighbor | 1.9 | 1.4 | 2.0 | (0.18, 22.65) | .57 |
| Miking/drum beating | 6.5 | 4.4 | 1.5 | (0.42, 5.60) | .52 |
| ASHA, ANM, AWW, or other health staff | 3.5 | 2.1 | 1.5 | (0.25, 9.27) | .65 |
| Door-to-door meeting | 5.7 | 0.0 | 13.8 | (0.77, 248.81) | .07 |
| Other | 0.0 | 0.4 | 1.0 | (0.02, 50.89) | 1.00 |
| BCC project activities | 24.5 | 0.3 | 67.9 | (4.02, 113.00) | <.001 |
| Don't know/not heard or seen | 36.8 | 87.0 | 0.1 | (0.04, 0.18) | <.001 |
| Did you get prior information about IRS of your house?^b | | | | | |
| Yes | 66.9 | 30.3 | 4.7 | (2.61, 8.61) | <.001 |
| No | 25.3 | 51.4 | 0.3 | (0.18, 0.58) | <.001 |
| Don't know | 7.9 | 18.3 | 0.4 | (0.16, 0.96) | .04 |

Abbreviations: ANM, auxiliary nurse-midwife; ASHA, Accredited Social Health Activist; AWW, Aaganwadi Worker; BCC, behavior change communication; CI, confidence interval; OR, odds ratio; PHC, primary health center; PKDL, post-Kala-azar dermal leishmaniasis; VL, visceral leishmaniasis.

^a Respondents were asked open-ended questions and their first response was recorded.

^b Refers to information through miking on the day of or before the IRS spray to announce arrival of the spray team. In intervention villages, miking was conducted by the BCC project, whereas in control villages it was conducted by the government.

IRS refusal among households in intervention villages was about 8% compared with about 25% among households in control villages.

households than control households (OR=0.27; 95% CI: 0.11, 0.62; *P*<.001).

IRS refusal rates in intervention households ranged in the districts from 1% to 19%. Among control households, the rate of IRS refusal ranged from 2% to 51%—substantially higher than in intervention households (Table 7).

Knowledge, Attitudes, and Practices

The difference in KAPs related to prevention and treatment of VL between households in intervention and control villages was pronounced (Table 8). Households in BCC intervention villages were better informed and had greater knowledge of VL compared with households in non-BCC villages,

particularly in terms of their knowledge of the causes and symptoms of VL and the single-day treatment preference. For example, 68.4% of households in intervention villages knew that VL was spread by sand flies compared with only 7.4% of households in control villages (*P*<.001). Similarly, 64.7% of households in intervention villages indicated effective treatment for VL is a 1-day course of medicine provided at a government hospital compared with only 13.1% of households in control villages (*P*<.001). Furthermore, 82.3% of households in intervention villages knew that IRS was an effective preventive measure against VL compared with 41.7% of households in control villages (*P*<.001).

When asked where they would guide a patient to go for diagnosis and treatment of VL,

TABLE 7. IRS Refusal Rates During the Second Spray Round Among Intervention and Control Households, by District and Block, Bihar and Jharkhand States of India, 2016

| District | Block | % IRS Refusal | | OR ^a | 95% CI | P Value |
|------------------------------------|-------------------|---------------|--------------|-----------------|---------------------|-----------------|
| | | Intervention | Control | | | |
| Bihar | | 6.20 | 20.90 | 0.24 | (0.09, 0.62) | <.001 |
| Araria | Forbesganj | 5.63 | 51.39 | 0.06 | (0.02, 0.15) | <.001 |
| Gopalganj | Baruali | 3.16 | 15.08 | 0.18 | (0.05, 0.63) | .01 |
| Katihar | Kadwa | 3.68 | 4.62 | 0.79 | (0.21, 3.04) | .73 |
| Muzaffarpur | Paroo | 11.96 | 16.65 | 0.67 | (0.30, 1.48) | .32 |
| Purnia | Kaswa | 5.18 | 1.67 | 2.58 | (0.49, 13.62) | .26 |
| Samastipur | Sarairanjan | 12.72 | 26.11 | 0.43 | (0.20, 0.89) | .02 |
| Saran | Dariyapur, Garkha | 9.08 | 32.84 | 0.20 | (0.09, 0.45) | <.001 |
| Sitamarhi | Dumra | 5.63 | 37.79 | 0.10 | (0.04, 0.26) | <.001 |
| Siwan | Barhariya | 3.96 | 12.44 | 0.31 | (0.10, 0.98) | .05 |
| Vaishali | Mahua | 1.44 | 10.12 | 0.09 | (0.01, 0.72) | .02 |
| Jharkhand | | 12.20 | 33.40 | 0.28 | (0.13, 0.58) | <.001 |
| Dumka | Ramgarh | 1.18 | 34.72 | 0.02 | (0.00, 0.14) | <.001 |
| Godda | Sundarpahari | 18.76 | 44.73 | 0.29 | (0.15, 0.54) | <.001 |
| Pakur | Litipara | 19.07 | 25.07 | 0.70 | (0.36, 1.38) | .31 |
| Sahibganj | Borio | 9.82 | 29.09 | 0.27 | (0.12, 0.60) | <.001 |
| Total (Bihar and Jharkhand) | | 7.95 | 24.45 | 0.27 | (0.11, 0.62) | <.001 |

Abbreviations: CI, confidence interval; OR, odds ratio; IRS, indoor residual spraying.

^aOR estimated based on assumption that the percentage of households that accepted IRS in the intervention areas would have refused IRS had they not been exposed to the BCC intervention. For example, in Araria district, 5.63% of households exposed to BCC activities still refused IRS. Therefore, we assume that 94.37% of households would have refused IRS if they had not been exposed to the BCC intervention, keeping aside confounders and outliers.

households in intervention villages preferred PHCs over private doctors or traditional healers (77.0% vs. 7.3% and 0.4%, respectively). In contrast, households in control villages were more evenly split between PHCs and private doctors (39.4% and 27.1%, respectively). A higher percentage of households in intervention than control villages indicated they would encourage others to accept IRS (78.6% vs. 44.6%, respectively; $P<.001$), and to help community members identify suspected cases of VL (72.3% vs. 30.9%, respectively; $P<.001$). Finally, 77.3% of households in intervention villages said they allowed spraying of all rooms during the first round of IRS compared with 54.6% of households in control villages ($P<.001$).

DISCUSSION

Community participation in controlling and eliminating VL in endemic districts of India is crucial.¹⁰

Communication and social mobilization for behavioral impact and integrated vector management are among the 5 elimination strategies prioritized by the Government of India in its *National Road Map for Kala-azar Elimination 2014* and accordingly adopted in state-level public health initiatives to contain this neglected vector-borne disease. Our evaluation found that households in VL-endemic villages exposed to health communication activities had greater acceptance of IRS, awareness of the disease, and willingness to prevent and treat it compared with households in VL-endemic villages that were not targeted with these communication activities. Since IPC and group communication channels were used to reach primary stakeholder groups directly and both contained holistic information, it is difficult to attribute the contribution of specific channels to improvement in BCC indicators. A similar study in Mexico found that community understanding about the objectives of spraying were

Households in BCC intervention villages were better informed about visceral leishmaniasis compared with households in control villages.

TABLE 8. Knowledge, Attitudes, and Practices^a Related to Prevention of VL Among Intervention and Control Households, Bihar and Jharkhand States of India, 2016

| | Intervention (%) (N=700) | Control (%) (N=350) | OR | 95% CI | P Value |
|--|-----------------------------|------------------------|------|----------------|---------|
| KNOWLEDGE^b | | | | | |
| What causes VL? | | | | | |
| Insects | 3.6 | 4.9 | 0.8 | (0.21, 3.04) | .73 |
| Mosquitos | 20.3 | 63.1 | 0.1 | (0.08, 0.28) | <.001 |
| Sand fly | 68.4 | 7.4 | 28.2 | (11.76, 67.77) | <.001 |
| Other | 3.3 | 1.7 | 1.5 | (0.25, 9.27) | .65 |
| Don't know | 4.3 | 22.9 | 0.1 | (0.05, 0.42) | <.001 |
| Is VL contagious and spread by touching? | | | | | |
| Yes | 21.0 | 23.4 | 0.9 | (0.46, 1.74) | .73 |
| No | 66.7 | 44.6 | 2.5 | (1.41, 4.40) | <.001 |
| Don't know | 12.3 | 32.0 | 0.3 | (0.14, 0.60) | <.001 |
| What are the symptoms of VL? | | | | | |
| Fever >2 weeks | 25.4 | 10.5 | 3.0 | (1.36, 6.64) | .01 |
| Loss of appetite | 15.5 | 7.1 | 2.5 | (0.99, 6.45) | .05 |
| Enlargement of spleen | 14.8 | 5.5 | 2.8 | (1.03, 7.45) | .04 |
| Weakness and anemia | 11.4 | 4.2 | 3.0 | (0.91, 9.66) | .07 |
| Don't know | 29.4 | 68.1 | 0.2 | (0.11, 0.35) | <.001 |
| Do you know IRS prevents VL? | | | | | |
| Yes | 82.3 | 41.7 | 6.3 | (3.29, 12.01) | <.001 |
| No | 7.4 | 19.7 | 0.3 | (0.12, 0.75) | .01 |
| Don't know | 10.3 | 38.3 | 0.2 | (0.08, 0.39) | <.001 |
| What is effective treatment of VL? | | | | | |
| Local/traditional treatment | 6.4 | 12.6 | 0.4 | (0.15, 1.17) | .10 |
| Malarial medicine | 8.1 | 14.6 | 0.5 | (0.19, 1.22) | .13 |
| 1-day medicine that is given in government hospital | 64.7 | 13.1 | 12.4 | (6.09, 25.36) | <.001 |
| No need for medicine | 0.6 | 0.0 | 3.0 | (0.12, 75.28) | .50 |
| Other | 1.6 | 7.7 | 0.2 | (0.05, 1.13) | .07 |
| Don't know | 18.4 | 52.0 | 0.2 | (0.11, 0.39) | <.001 |
| Do you know that complete treatment of VL is available? | | | | | |
| Yes | 88.3 | 62.0 | 4.5 | (2.17, 9.29) | <.001 |
| No | 3.9 | 14.0 | 0.3 | (0.08, 0.81) | .02 |
| Don't know | 7.9 | 24.0 | 0.3 | (0.12, 0.65) | <.001 |
| Do you know that complete treatment of VL is free? | | | | | |
| Yes | 81.0 | 39.1 | 6.7 | (3.51, 12.66) | <.001 |
| No | 6.9 | 26.9 | 0.2 | (0.08, 0.49) | <.001 |
| Don't know | 12.0 | 34.0 | 0.3 | (0.13, 0.55) | <.001 |

Continued

TABLE 8. Continued

| | Intervention (%) (N=700) | Control (%) (N=350) | OR | 95% CI | P Value |
|---|-----------------------------|------------------------|-----|---------------|---------|
| When to treat a patient with VL? | | | | | |
| <i>Immediately</i> | 38.0 | 20.3 | 2.5 | (1.31, 4.63) | .01 |
| Within 1 week | 11.3 | 5.7 | 1.9 | (0.68, 5.46) | .21 |
| Within 2 weeks | 22.6 | 6.0 | 4.7 | (1.81, 12.07) | <.001 |
| When the patient has a fever | 10.4 | 12.6 | 0.7 | (0.31, 1.78) | .51 |
| Other | 1.7 | 3.4 | 0.7 | (0.11, 4.04) | .65 |
| Don't know | 16.0 | 51.4 | 0.2 | (0.09, 0.36) | <.001 |
| ATTITUDES | | | | | |
| To whom do you advise patients with VL symptoms to go for diagnosis and treatment? | | | | | |
| PHC | 77.0 | 39.4 | 5.2 | (2.83, 9.69) | <.001 |
| Private doctor | 7.3 | 27.1 | 0.2 | (0.08, 0.49) | <.001 |
| RMP/Quack | 1.1 | 6.3 | 0.1 | (0.01, 1.04) | .05 |
| Traditional healer | 0.4 | 0.3 | 1.0 | (0.02, 50.89) | 1.00 |
| Other | 1.3 | 2.3 | 0.5 | (0.04, 5.55) | .57 |
| Don't know | 12.9 | 24.6 | 0.4 | (0.21, 0.94) | .03 |
| Will you motivate/help community members to accept IRS? | | | | | |
| Yes | 78.6 | 44.6 | 4.6 | (2.47, 8.56) | <.001 |
| No | 14.9 | 31.1 | 0.4 | (0.19, 0.79) | .01 |
| Don't know | 6.6 | 24.3 | 0.2 | (0.09, 0.58) | <.001 |
| Will you help community members to identify suspected cases of VL? | | | | | |
| Yes | 72.3 | 30.9 | 5.7 | (3.11, 10.52) | <.001 |
| No | 18.4 | 44.3 | 0.3 | (0.15, 0.53) | <.001 |
| Don't know | 9.1 | 24.9 | 0.3 | (0.13, 0.67) | <.001 |
| PRACTICES | | | | | |
| Did you allow spraying of SP last time^c in your house? | | | | | |
| Yes, all rooms | 77.3 | 54.6 | 2.7 | (1.49, 5.04) | <.001 |
| Yes, partially | 16.3 | 27.4 | 0.5 | (0.26, 1.03) | .06 |
| No | 1.1 | 4.0 | 0.2 | (0.03, 2.21) | .21 |
| My house was locked | 1.9 | 2.9 | 0.7 | (0.11, 4.04) | .65 |
| Unaware about day of IRS | 3.4 | 11.1 | 0.3 | (0.06, 0.93) | .04 |

Abbreviations: ANM, auxiliary nurse-midwife; ASHA, Accredited Social Health Activist; AWW, Anganwadi Worker; CI, confidence interval; OR, odds ratio; PHC, primary health center; PKDL, post-Kala-azar dermal leishmaniasis; RMP, registered medical practitioner; SP, synthetic pyrethroid; VL, visceral leishmaniasis.

^a Respondents were asked open-ended questions and their first response was recorded.

^b Correct answers are shown in italics.

^c Refers to the first IRS round.

Households in villages exposed to BCC activities had greater acceptance of IRS, awareness of the disease, and willingness to prevent and treat it compared with households in villages not targeted with the BCC activities.

correlated with acceptance, thus leading to higher spray coverage.¹¹

Our evaluation suggests that a short spurt of communication activities over 8 months can bring about significant positive changes in knowledge, attitudes, and practices essential for VL elimination. The BCC intervention, however, was highly resource-intensive with hundreds of BCC facilitators covering thousands of villages before, during, and after the spray months. Because this level of effort cannot be sustained over the long-term, this intensive intervention needs to be followed up with a more focused intervention that prioritizes highly endemic pockets/villages so that households do not relapse to pre-intervention levels. Government planning should factor in such intensive spurts of BCC activities followed by focused interventions and continuous outreach activities.

In addition, the government can consider strengthening linkages between outreach workers and doctors and technicians at public health centers and hospitals to better improve diagnosis and treatment of suspected VL cases. The BCC intervention seems to have resulted in an immediate increase in detection of potential VL cases, but the project did not track suspected cases to ensure diagnosis and complete treatment. Therefore, it was not possible to determine whether BCC activities ultimately led to complete treatment. Longer-term planning and implementation could create the necessary linkages between communication activities and diagnosis and treatment services to better track the prevention and care process.

Limitations

Considering that more than 65% of VL-endemic villages of project states were covered in the year-long BCC intervention, the sample size of households from intervention and control villages included in the evaluation was relatively small. We decided to sample only half as many households in the control villages as the intervention villages, since we had limited time and resources to complete the survey. In Jharkhand particularly, households were spread out making it more difficult to implement the survey efficiently. Furthermore, sampling was not conducted in a strictly random manner. Instead, effort was made to include a representative sample of households in terms of caste, religion, occupation, and income levels. Therefore, we used a stratified sampling approach whereby sub-lists of eligible households were made at each level and then randomly selected the sample from these

sub-lists. Finally, efforts were taken to make sure that control villages were sufficiently far away from intervention villages to eliminate or minimize effects of contamination. However, since both intervention and control households could have used the same public health center, contamination cannot be totally ruled out. Even with all of these sampling constraints, the sizeable difference in the IRS refusal rate between intervention and control households (7.95% vs. 24.45%, respectively) suggests that the BCC intervention had some impact on the key outcome of interest.

Another challenge of the study was to ensure completion of household surveys within 2 months after the second IRS round so that IRS recall among households was not poor. This was overcome through a combination of orientation training, administration of close-ended questionnaires, and rigorous monitoring during survey administration.

Finally, the evaluation was conducted with the inherent assumption that IRS was well-planned and executed and that the spray team was highly motivated and adopted proper spraying logistics with regular supervision by spray supervisors and quality external monitoring. However, such ideal implementation conditions may not always hold true in all VL-endemic villages, which affects the generalizability of our findings. In other words, if implementation of the IRS is poorly conducted, then communication activities may not make a difference, regardless of whether the communication activities are conducted well. Thus, further enquiry into IRS planning, the implementation process, and coverage quantification may throw more light on the actual coverage vis-à-vis houses that refused or allowed partial spraying.¹²

CONCLUSION

Households exposed to BCC activities had significantly better awareness and acceptance of IRS than households not exposed to BCC activities, and they were better able to identify suspected VL cases and to immediately seek diagnosis and treatment at PHCs. Thus, health communication that encourages community participation should continue to be an important component of India's VL elimination strategy.¹³ To ensure sustained behavior change, BCC interventions should be planned with a longer time frame than the 12-month intervention period described here since social and behavior change is a complex process, involving several steps to transition from awareness to practice.

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STUDENT ARTICLE – UNDERGRADUATE

Palm Oil in Myanmar: A Spatiotemporal Analysis of the Effects of Industrial Farming on Biodiversity Loss

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Satellite imagery analysis reveals a progressive shift from smallholder farming to industrial oil palm plantations in rural Myanmar, concomitant with biodiversity loss. Although industrial palm oil cultivation may help the local economy flourish, rural communities assume the dual burden of ecosystem instability from deforestation and potential health risks from increased palm oil consumption.

ABSTRACT

Background: Palm oil consumption is potentially deleterious to human health, and its production has resulted in 11 million hectares of deforestation globally. Importing roughly 394,000 metric tons of palm oil in 2012 alone, the Burmese government has recently pushed for intensive oil palm development to sate domestic demand for consumption and become international market players. Given well-studied linkages between biodiversity loss and ecosystem instability, this study aims to characterize the nature of deforestation for oil palm production in Myanmar, its relationship to increased biodiversity loss, and contextualize the potential impacts of this loss on diets and human health in rural Myanmar.

Methods: First, a GIS land suitability analysis overlaying spatial data on rainfall, elevation, and slope was conducted in order to identify areas of Myanmar best suited to oil palm tree growth. Second, after narrowing the geographic range, vegetation indices using varying spectral band models in ENVI (Environment for Visualizing Images) allowed a more granular examination of changes in vegetation phenology from 1975 to 2015. Lastly, ground truthing permitted an in-person verification of GIS and ENVI results and provided contextual understanding of oil palm development in Myanmar.

Results: GIS analysis revealed that the Tanintharyi Region, one of the most biodiverse regions in Myanmar, is highly suitable for oil palm growth. Next, vegetation indices revealed a progressive shift from smallholder farming, with little observable deforestation between 1975 and 1990, to industrial oil palm plantations all throughout Tanintharyi starting around 2000—a shift concomitant with biodiversity loss of primary forestland. Ground truthing indicated that plantation development has advanced rapidly, though not without barriers to growth.

Conclusions: If these trends of Burmese oil palm intensification continue, 4 key outcomes may follow: (1) even higher levels of biodiversity loss, (2) increased access and affordability of edible palm oil, (3) decreased importing of palm oil, and (4) large profits made from selling excess palm oil on the international market. Although the first 2 outcomes may adversely affect low-income Burmese populations, the latter 2 may bode well for the domestic economy and international trade partners, thus encouraging competing interests. This increased domestic access and affordability of palm oil may increase consumption and cause increased prevalence of cardiovascular disease, diabetes, and obesity. Finally, this biodiversity loss concurrent with industrial deforestation may disproportionately impact vulnerable, rural communities.

INTRODUCTION

Palm oil is a \$50 billion global market and is used in approximately 50% of products in European supermarkets.¹ From agrochemical and food production to biofuels and cosmetics, palm oil is used as a key ingredient across many industries.

There have been many studies that demonstrate the potentially deleterious health outcomes when palm oil is used as cooking oil. In a landmark 1999 study on the influence of palm oil consumption on health, researchers Ebong et al. of the University of Calabar in Nigeria demonstrated while palm oil in the fresh (uncooked) state is rich in antioxidant vitamin A precursors such as beta-carotene and vitamin E, once it reacts with oxygen during the cooking process, saturated fatty acids are introduced and the plasma lipid profile becomes adverse—specifically, low-density lipoprotein (LDL) ("bad") cholesterol levels increase. Both of these changes pose significant threats to physiological and

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biochemical functions.²⁻⁴ Furthermore, the malignancy of these effects is compounded each time the oil is reheated when used for cooking. Some low-income families may reuse palm oil when cooking household meals, as do restaurants or street vendors in commercial food settings.⁵ These health consequences could be significant, especially as cardiovascular disease, obesity, and diabetes increase in prevalence in low- and middle-income countries. As this trend progresses, the need for healthier and sustainably sourced fats will become even more pressing.

Southeast Asia presently supplies the vast majority of palm oil globally.^{6,7} Of the 53.8 million tons of palm oil produced globally in 2012, Indonesia and Malaysia alone comprised 89% of total production.⁶ As a large-scale palm oil supplier, Myanmar is young compared with Indonesia and Malaysia. Until recently, Myanmar was a palm oil net importer. According to the Myanmar Edible Oil Distribution Association, in 2012 alone, Myanmar imported roughly 394,000 metric tons of palm oil, primarily from Indonesia and Malaysia, at a cost of \$376 million.⁸ In a survey of 900 households on edible oil preferences among groundnut, sesame, and palm oil, Han et al. found that 96% of households ranked palm oil as the most affordable edible oil while 99% ranked palm oil as least suitable to health.⁸ Similar findings that palm oil is the cheapest and most readily available edible oil in Myanmar have been noted by S. Downs, PhD (written communication, January 2018).

To satisfy domestic demand and mitigate the import of palm oil, the Burmese government has rapidly pushed for intensive palm oil production—what it refers to as an "edible oil self-sufficiency policy."⁹ In 2014, for example, there were over 140,000 hectares of oil palm plantations in Myanmar with an additional 400,000 allocated for future development to more than 40 local companies and 3 international companies.¹⁰ Accordingly, in Myanmar, palm oil consumption is catalyzed by its affordability and availability while the prospects for its production, at least in the near future, appear to be safeguarded by a government invested in ensuring edible oil self-sufficiency.

There are numerous studies focusing on palm oil industries in Indonesia and Malaysia and their historical land-use patterns,¹¹⁻¹³ but few have focused on Myanmar's palm oil production. This article analyzes spatiotemporal trends in land use from 1975 to 2015 in rural Myanmar, focusing on oil palm cultivation, and its effects on land

biodiversity. We start first by providing an overview of the impact of industrial farming on planetary and human health to provide background context on the importance of this issue.

■ CONTEMPORARY FOOD SYSTEMS: THE IMPACT OF INDUSTRIAL FARMING

The push for oil palm cultivation is significant because of its role within a global food market. When industrial food production began replacing smallholder farming in the 18th and 19th centuries, the primary objective was to meet rising food demand.¹⁴ This agricultural revolution paved the way for the dawn of synthetic agrochemicals and the global distribution of high-yield seeds.¹⁵ Unintentionally, this movement also helped spawn today's complex global food system—a system in which industrial oil palm cultivation has environmental, nutritional, and ethical implications. Intensive agriculture affects ecosystems by the use and release of nitrates and pesticides and converts natural ecosystems to industrial farmland.¹⁵ This conversion is strongly linked with the degradation of key ecosystem services and accelerates soil nutrient depletion. Furthermore, as mass food production grew easier, it became cheaper to export high-energy, nutrient-poor foods in bulk.

According to the Intergovernmental Panel on Climate Change, agriculture contributes between 10% and 12% of global greenhouse gas emissions.¹⁶ Industrial farming occupies enormous swaths of land, makes extensive use of agrochemicals, reduces (or eliminates) fallow periods that allow natural soil nutrient regeneration, and heavily utilizes high-yield seed variety.¹⁷ The disadvantages of this type of farming can be divided into two categories with considerable overlap: planetary health and human health.

Planetary Health and the Importance of Biodiversity

Humans derive considerable benefit from natural ecosystems. Natural resources including lumber, fossil fuels, and food are the most obvious. However, there are economic and ecological benefits that are not readily quantifiable. For example, primary forests can reduce flood damage, absorb large amounts of atmospheric carbon dioxide, and purify water.¹⁷ The benefits gleaned from these services can be drastically reduced by anthropogenic environmental degradation. The

There are potentially deleterious health outcomes when palm oil is used as cooking oil.

To satisfy domestic demand and mitigate the import of palm oil, the Burmese government has instituted an "edible oil self-sufficiency policy."

Industrial farming can have negative impacts on both planetary health and human health.

focus of this article and one of the most damaging of these degradations is biodiversity loss.

On a macro scale, ecosystem stability depends on the "diversity of form and function of the constituent species."¹⁸ This stability is often measured by species density, or biodiversity, of fauna and flora within a given area. More specifically, the importance of biodiversity in tree species is extremely important. Forests and their soils act as a crucial sink for anthropogenic carbon emissions, storing roughly 45% of terrestrial carbon.¹⁹ Yet as of 2013, agricultural deforestation alone resulted in the loss of 45% of temperate deciduous forests and 27% of tropical rainforests globally.¹⁹ In their 2013 study, Gamfeldt et al. studied the effect of biodiversity of tree species on 6 ecosystem services. Significantly, this study found that forests with greater tree diversity produced 54% more biomass, captured 11% more carbon in the soil, and boasted 31% more diversity of understory plant species.¹⁹ Furthermore, the link between biodiversity loss and negative human health outcomes is most keen in vulnerable populations.²⁰ Primary and diverse forestland provides not only lumber and cooking fuel in these communities but also protection against storms, medicinal ingredients, seasonal fruits and vegetables, habitat for animals (a key protein source), and a cultural landmark.²⁰ As industrial monoculture agriculture progresses, the availability of these local resources may decrease, leading to measureable impacts on diet composition. In Myanmar, the Coastal zone (including the Tanintharyi Region, the site of current and future oil palm plantation development) has the highest poverty rates in the country at 53.1%.²¹ As such, the human health impacts of biodiversity loss from deforestation may be most acutely felt by these vulnerable populations in surrounding communities within Tanintharyi.

It is clear that the maintenance of biodiversity is paramount for planetary health and the ecosystem services that improve human health, particularly in vulnerable communities. It is also clear that industrial monoculture agriculture greatly reduces biodiversity via deforestation. Therefore, the large, highly simplified industrial monocultures that are phasing out smallholder farming systems in the Global South are bad not just for planetary health but also human health. For example, a diet comprised of only a few recurring food groups is less healthful than a diet of diverse foods from different food groups.²² Food homogeneity has increased by 16.7% globally over the past 50 years with many East and Southeast

Asian countries showing an in-country homogeneity increase of 35.7%.²³ In other words, these countries have witnessed lower agricultural and diet diversity due in part to the intensification of large-scale industrial monocultures such as oil palm. In fact, over the past 50 years, the rate at which palm oil consumption has grown in national food supplies and the rate at which its cultivation is spreading to new lands is among the highest of any crop in the world.²³

With recent global climate concerns, agriculture intensification, urbanization, and shifted cultural valuations toward environmentally costly products, global efforts to combat hunger can no longer focus solely on maximizing production with industrial monoculture agriculture. Instead, these factors highlight the need to produce food that is sustainably grown, culturally acceptable, affordable, readily accessible, and nutritious.^{24,25} The "Sustainable Diet" approach values each of these important considerations.

Human Health and the Sustainable Diets Framework

Burlingame (2012) defined sustainable diets as "those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations."^{26(p7)} Accordingly, the 6 key interconnected determinants of a sustainable diet are: (1) well-being, health; (2) biodiversity, environment, climate; (3) equity, fair trade; (4) eco-friendly, local, seasonal foods; (5) cultural heritage, skills; and (6) food and nutrient needs, food security, accessibility (Figure 1).²⁴

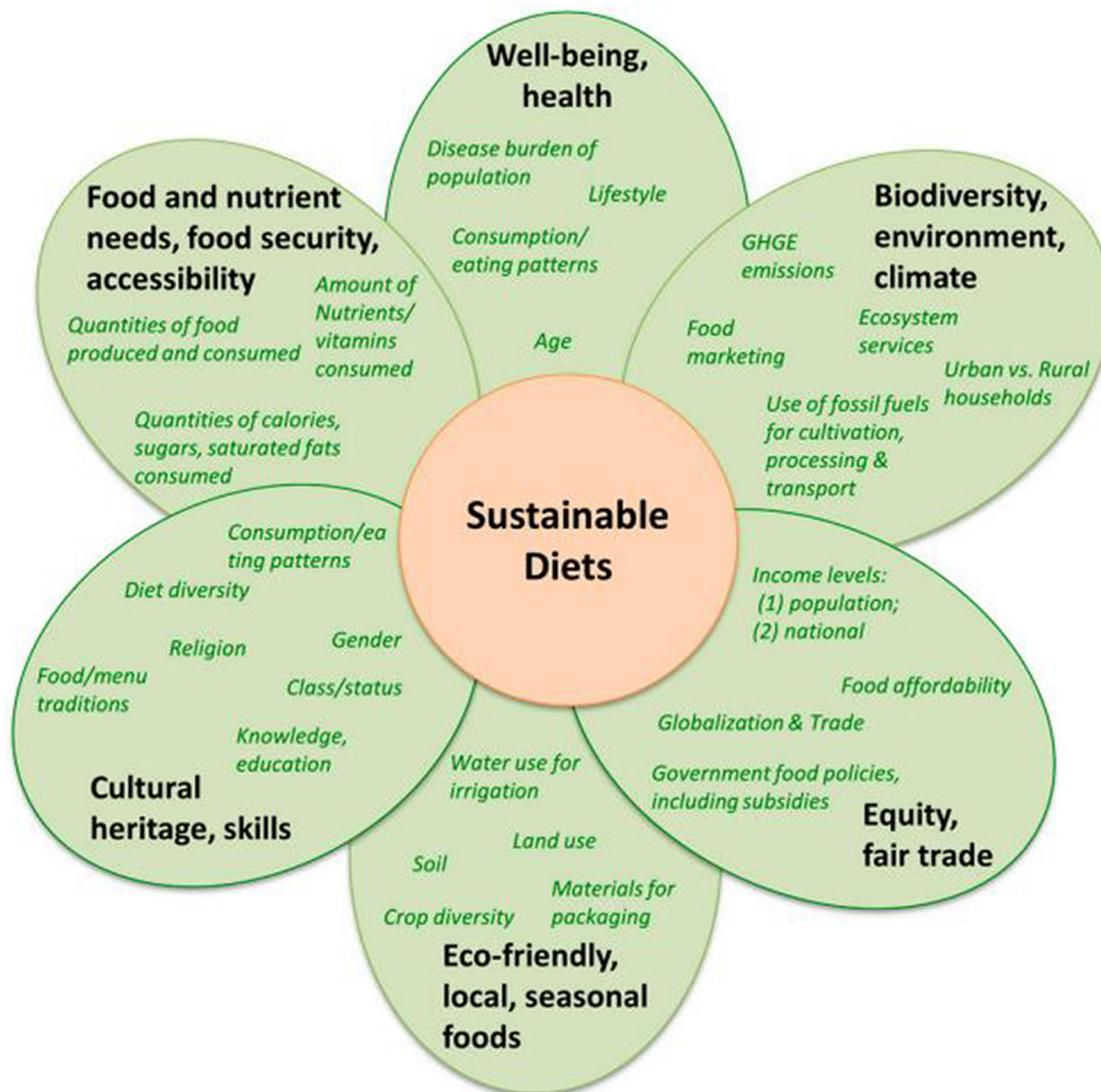
Any fluctuation of one of the key determinants will have a corresponding effect on the quality of the sustainable diet. For example, under the "biodiversity, environment, climate" determinant, if greenhouse gas emissions increase from intensive slash-and-burn agriculture, then the sustainable diet will be decidedly less sustainable. Each component is also inextricably linked to the other. With an increase in greenhouse gas emissions, for example, the disease burden of a population process might increase the prevalence of respiratory diseases because of soot and ash released from the burning of hydrocarbons, and so on.

To analyze sustainable diets across countries, researchers have developed a suite of 10 principles that seek to integrate elements of nutrition and the environment in food-system analyses (Table 1). This study focuses on the third principle, maximizing landscape biodiversity. As discussed,

Industrial monoculture agriculture greatly reduces biodiversity via deforestation.

Biodiversity loss has implications on ecosystem services, food production, and human health.

FIGURE 1. Components of the Sustainable Diet



Abbreviation: GHGE, greenhouse gas emissions.

Source: Adapted from Johnston, Fanzo, and Cogill (2014).²⁴

biodiversity loss has implications on ecosystem services, food production, and human health. This underscores the link between planetary and human health. That is, if palm oil becomes even more affordable and readily available under the government's self-sufficiency push, lower-income communities in Myanmar may continue to consume it in equally abundant amounts or even increase their consumption of palm oil. Importantly, of these lower-income communities,

those located in Tanintharyi Region may additionally bear health burdens induced by biodiversity loss from deforestation.

METHODS

Our approach to analyzing land-use changes in Myanmar used 3 methods with increasing geographic specificity: (1) Beginning with a land suitability analysis using geographic information

TABLE 1. Suite of 10 Principles Integrating Nutrition and the Environment in Food Systems

| Principle | Example(s) |
|---|---|
| 1. Be coherent with health-based dietary guidelines | Nutrient intake compared with age-, gender-, and health condition-based adequacy |
| 2. Maximize nutritional output per unit of input (energy, land, water, nutrients, labor) in production, post-harvest management, and processing | Nutrients produced per unit of input. High-quality seeds, life cycle analyses, and agricultural subsidies help maximize this metric |
| 3. Maximize biological diversity at different levels of the food system (in the landscape, the markets, and the diets) | Investment in local seed banks, changing consumer behavior, shared market space, and landscape preservation policies |
| 4. Minimize greenhouse gas emissions | Promote balanced meat consumption |
| 5. Minimize chemical pollution and water contamination | Responsible use of fertilizers and pesticides, farmer training programs |
| 6. Minimize waste and enhance recycling of nutrients throughout the food system | Percentage of food wasted along value chain |
| 7. Maximize food safety | Estimated risk for food contamination |
| 8. Ensure human rights, including rights to food and health, of food system workers are supported | Fair hours and wages; health risk exposure; tradeoffs between jobs created and divisions along socioeconomic lines |
| 9. Improve equity and affordability of healthy food items | Minimize cost of nutritious diets for low-income consumers |
| 10. Be adapted to local and changing conditions | Culturally relevant and acceptable diets |

Source: Remans et al. (2015).²⁷

systems (GIS) modeling, we identified regions of interest for oil palm cultivation. (2) We then analyzed these regions using Exelis' ENVI (Environment for Visualizing Images) satellite image processing. (3) Finally, we traveled to these regions for photo-based observations and ground truthing (verification of remote sensing models).

GIS Modeling: Land Suitability Analysis

GIS modeling allows the user to spatially relate different types of data, cartographically display these relationships, and query the data to identify new patterns in these relationships. First, we conducted a land suitability analysis for oil palm cultivation in Myanmar. That is, we analyzed Myanmar to identify which regions are conducive to oil palm cultivation based on rainfall, elevation, and slope parameters. This land suitability analysis is based on a simple assumption: above or below certain thresholds, oil palm trees will not grow. These climate data are freely available online through databases such as WorldClim and the Myanmar Information Management Unity.

First, it was necessary to prime the data. With most natural phenomenon (e.g., elevation), data come referenced in preset groups. We had to adapt these data to our purposes. With all 3 natural

parameters (elevation, rainfall, slope), we created a custom symbology using a binary system in which color 'A' represented unsuitable land while color 'B' represented suitable land. Suitability levels were based on land with rainfall between 2,400–3,200 mm/year, on a slope of <16%, and at an elevation of <400 m and <100 m (see the [supplement](#) for details on selecting parameter thresholds). After creating these binary bins, we used the Reclassify Tool with the custom-binned file as our input. The output from this tool was visually identical to the input map, except that land with color A now refers to value '0' while color B refers to value '1'. This step was necessary for the final overlay analysis. Note that an additional step was required for slope. Because slope is a derivation of elevation and the units and scale of elevation (z) are different than those of surface measurements (x, y), a z-factor conversion was necessary. In Myanmar, based on a 20° N latitude, we used a z-factor conversion constant of 0.00000956. Following this step, all that remained was the final overlay.

After having reclassified these datasets into maps referencing binary values 0 and 1, all 3 natural parameters had an identifiable virtual language and interacted more smoothly. Using the Weighted Overlay tool, we input the 3 natural

We first conducted a land suitability analysis to identify which regions in Myanmar are conducive to oil palm cultivation based on rainfall, elevation, and slope parameters.

TABLE 2. Summary of Spectral Band Models Used in Remote Sensing Analysis

| Spectral Representation | GLS Image Year | Description |
|-------------------------|------------------------------------|---|
| Pseudo-Natural Color | 1975, 1990, 2000, 2005, 2010, 2015 | Selective activation of Landsat bands 3, 2, and 1. Ground features appear in colors similar to reality. Healthy vegetation is green, cleared lands are light, and unhealthy vegetation is brown and yellow. Roads are gray. |
| Vegetation | 1975, 1990, 2000, 2005, 2010 | Selective activation of bands 4, 5, and 1. Vegetation appears in shades of red, brown, oranges, and yellow. Soil may be green or brown. Differences in vegetation types easier to discern. |
| Color Infrared | 2015 | Selective activation of bands 5, 4, and 3. A highly detailed yet simple model to analyze vegetation. Vigorous vegetation growth is intense red, light pink is dead vegetation. |

parameter raster datasets and created a custom evaluation scale with '0' as 'NODATA' and '1' as '1'. The tool now had a translation code, creating a dual-colored map. Black represented the most suitable land for oil palm cultivation in Myanmar and white represented non-ideal geographies. This preliminary model construction revealed areas of agricultural interest in Myanmar that were then juxtaposed against known areas of forested landscape and high biodiversity.

Remote Sensing Analysis: ENVI Satellite Imaging

Since the mid-1900s, Global Land Surveys (GLS) have captured terabytes of satellite imagery. Over the decades, as scientists launched new Landsat satellites into orbit, this imagery became clearer and more abundant, and it captured more information from the electromagnetic spectrum not visible to the human eye. This latter feature renders modern imagery highly useful, because advanced image processing software can manipulate the spectral bands and discover new land-use patterns. ENVI is one such software that we used.

In the chosen area of study obtained from GIS modeling, we analyzed GLS satellite imagery from 1975, 1990, 2000, 2005, 2010, and 2015. With the requisite satellite imagery imported into ENVI, we gained key insight into spatiotemporal land-use patterns over time, such as deforestation trends, the development of transportation infrastructure, and changes in relative intensity of industrial oil palm farming. For each of these images, we selectively activated certain spectral bands to produce 2 images each: (1) a pseudo-natural color image in which healthy vegetation

is green, recently cleared fields are lighter, and browns and yellows indicate unhealthy vegetation, and (2) a false-color image whose properties reveal distinct characteristics about vegetation abundance. The specifications for these images are outlined in Table 2.

Having identified areas of agricultural interest based on the land suitability analysis, we further investigated the impact of oil palm plantation growth on local flora and fauna. Based on these spectral band models dating from 1975 to 2015, a more granular, detailed examination of suitable arable land was possible.

Ground Truthing

GIS modeling and ENVI analysis provided key insights but still needed validation. Ground truthing helps provide context and validation in a complex Burmese sociopolitical backdrop. Having identified key areas of industrial deforestation, our field visit verified the extent and nature of deforestation and informally allowed us to gain insight into community relationships with palm oil industries.

RESULTS

GIS Modeling: Land Suitability Analysis

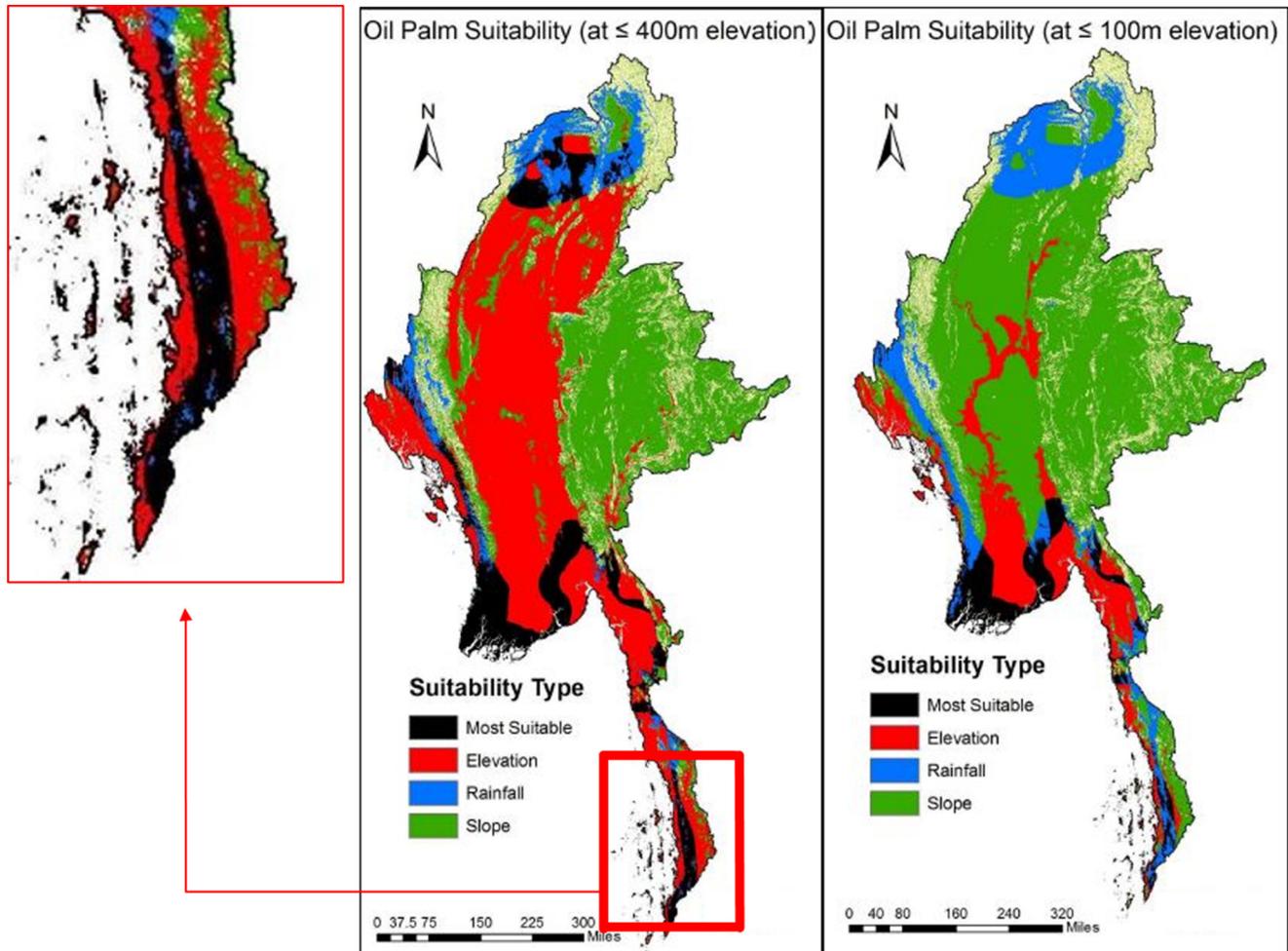
From the suitability overlay analyses, it was apparent that there were 2 regions of interest: the Irrawaddy Division comprising the southwestern peninsula and the Tanintharyi Division on the long southern strip (Figure 2).

Naturally, there is a greater proportion of most suitable land in the more generous 400 m-elevation cutoff (38% more suitable land, specifically). We identified the Tanintharyi Region, the

We analyzed satellite imagery from 1975 to 2015 to discern land-use patterns over time.

Land suitability analysis identified Tanintharyi Region as the region of most interest for oil palm cultivation.

FIGURE 2. Land Suitability Analysis



The most suitable area represents land with rainfall between 2,400 and 3,200 mm/year, on a slope of <math><16\%</math>, and at an elevation of either <math><400\text{ m}</math> (left) or <math><100\text{ m}</math> (right), the latter based on studies conducted in Malaysia²⁸ and Myanmar,¹⁰ respectively. There is 38% more "most suitable" land in the 400 m versus 100 m elevation models. The expanded area is the Tanintharyi region where both this model and literature reviews confirm palm oil development will take place.

In 1975, there was virtually no observable deforestation near Maliwan Township.

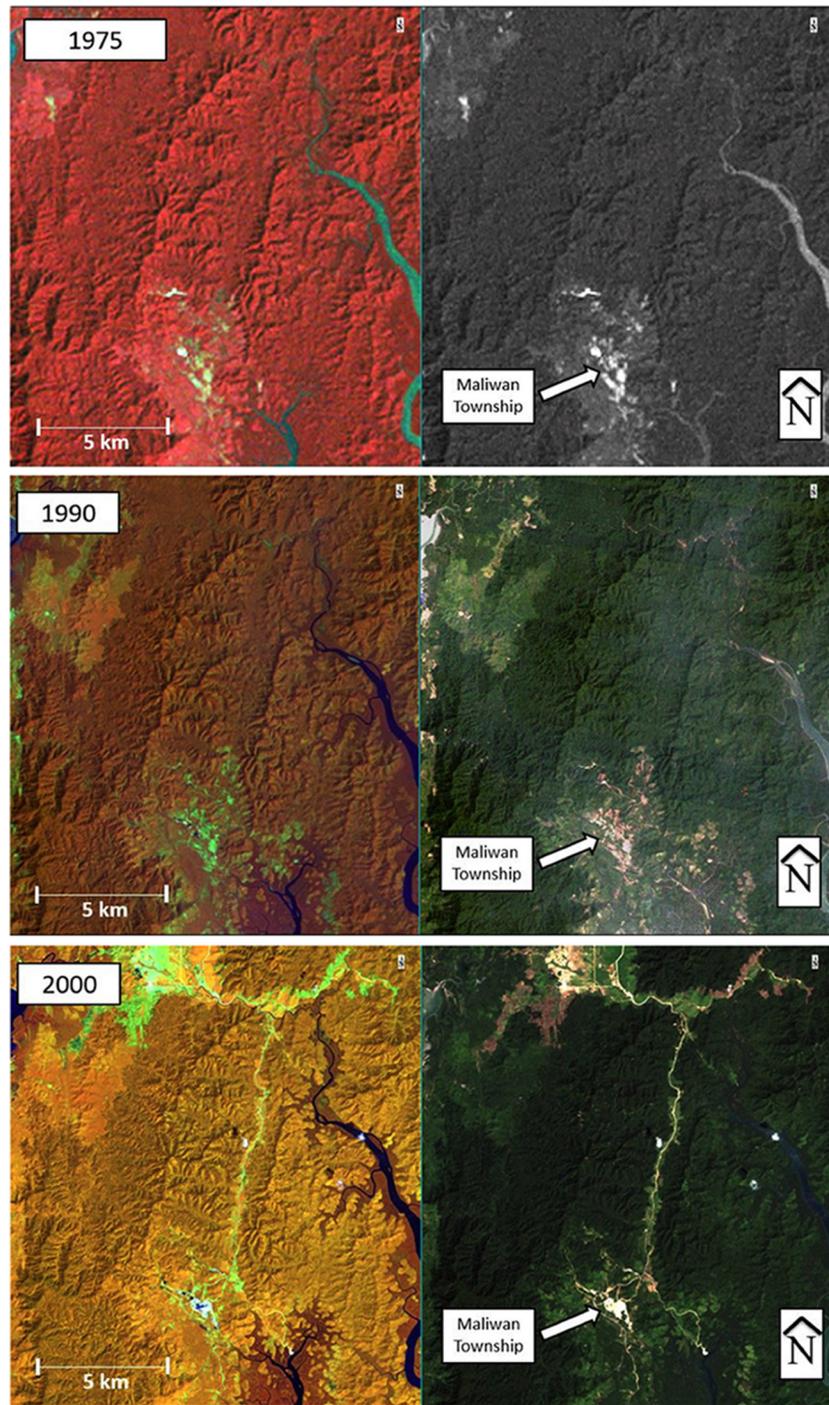
expanded area in the map, as the region of most interest. It not only proves very suitable land for oil palm plantations in this model, but also is the most biodiverse region in Myanmar.¹⁰ This region also has the highest poverty rates in Myanmar. We will, however, note that many of the issues raised by oil palm cultivation in Tanintharyi outlined below may be ameliorated by the partial shifting of cultivation to the Irrawaddy Region, though of course this will bring its own set of challenges. In sum, Tanintharyi demonstrates a confluence of agricultural activity, deforestation, biodiversity, and vulnerable communities that render it

indicative of similar communities around the globe and will be the focus of our analyses here.

Remote Sensing Analysis: ENVI Satellite Imaging

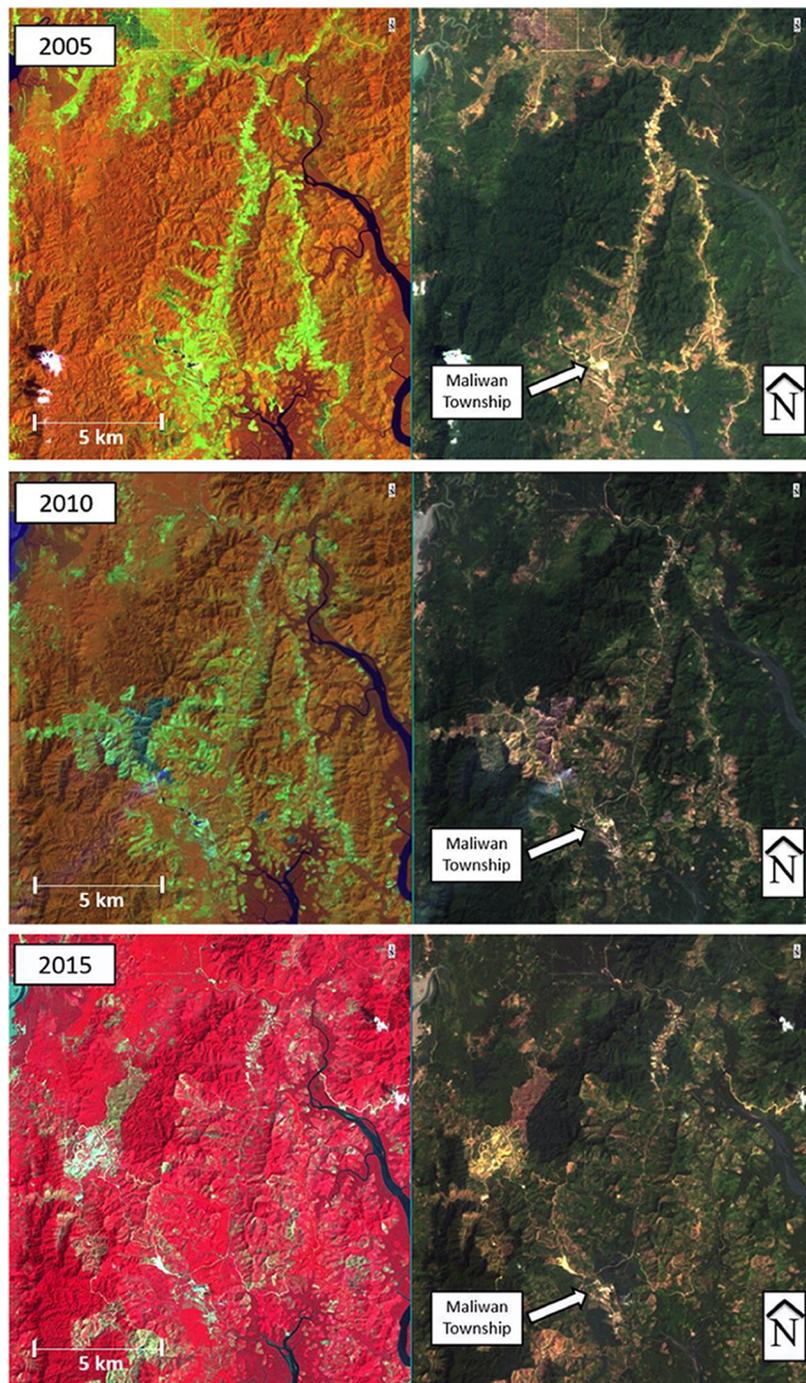
In the Tanintharyi Region, we identified the Maliwan and Kawthaung townships as key regions for oil palm cultivation based on ENVI models. From the 1975 imagery, we see that there is virtually zero observable deforestation near Maliwan township (Figure 3). From the vegetation false-color image, the forested lands in the

FIGURE 3. Remote Sensing Vegetation Analysis, 1975–2015



continued on next page

FIGURE 3. Continued



In each set of maps, the rightmost map is the natural color model and the leftmost map is the false color model. 1975: There appears to be little deforestation surrounding Maliwan Township and virtually none in the forested lands to the north. 1990: Surrounding deforestation near Maliwan Township appears to have increased. 2000: A marked increase in deforestation is evident. 2005: Since 2000, the road system has split into 2 main segments and smaller forays into the mountainside branch off of the main road. 2010: The road system is now flanked by cleared land on both sides. 2015: Deforestation has encroached on vast areas of once natural forestland. The road systems have evolved into complex and planned transport infrastructure.

FIGURE 4. Photo-Based Truth Finding Observations



[1] Field of abandoned oil palm trees; [2] Cleared field of oil palm trees with a new, leafy tree species growing in their stead; [3] Paved road flanked on one side by natural tree cover and the other by an encroaching oil palm plantation.

north are largely identical in hue, indicating no change in forest cover. The area of land directly surrounding Maliwan and the swath of land in the northwest are, however, different in hue. The light pink indicates either poor vegetation or recent deforestation. These results are consistent with historical trends for the Tanintharyi Region.

Next, Landsat imagery from 1990 revealed a slight but noticeable change in vegetation cover compared with 1975 (Figure 3). First, the buffer of cleared land surrounding Maliwan appears to have increased in size. This may be due to growing populations and expanding town boundaries or it may foreshadow the expected intensive cultivation in the region. The northwest region that appeared to be the onset of deforestation in 1975 here finds its parallel. There appears to be little intensive deforestation or road system through the mountain.

Landsat imagery from 2000 revealed a progressive shift in the preceding trends (Figure 3). The first and most striking observation is the beginning of a road system through the mountains. This road is connected to a series of smaller roads around the Maliwan Township, which has also increased in size. The northwestern deforestation

observed over the past 20 years progressed well into the western edge of the mountain range. Most important, however, is the bright area of deforestation in the north. This land, ground truthing later revealed, is the beginning of an immense area of land dedicated to intense industrial oil palm cultivation.

Landsat 2005 imagery indicated a progression of this trend (Figure 3). The road system has developed a parallel eastern counterpart that extends further into the hillside and away to the southeast. The Maliwan Township, which was before almost an enclave among the forestland, now connects directly to the primary road system. Additionally, the road system has not only developed an eastern counterpart but also dendrite-like forays into the mountainside. In the vegetation false-color image, recent deforestation, such as that which formed the roads, is a bright yellow. Older deforestation, such as the original swath of land in the northwest, is now a darker orange, indicating either the return of forest cover or, more likely, the growth of oil palm farms. Lastly, the northern swath of deforested land looks increasingly like designed, industrial farming. The roads form a grid-like system and deforestation has spread outward.

Satellite imagery from 2000 revealed a progressive shift in deforestation trends.

As smallholder farming converts to industrial monocultures, deforestation increases and biodiversity decreases.

Increased palm oil production in Myanmar may be concomitant with increased consumption in low-income communities and associated increases in health risks.

Next, the 2010 Landsat imagery revealed a continuation and acceleration of the previous trends (Figure 3). First, were it not for the marker indicating the location of Maliwan Township, it might prove difficult to locate its boundaries, because there is little primary forest surrounding it anymore. Furthermore, the primary road system is no longer flanked by forestland, but instead recently cleared land surrounds it. The lighter orange that surrounds the road compared with the pockets of forest adjacent indicates this. There is an additional pocket of recently cleared land immediately northwest of Maliwan, already with a relatively complex road system. Lastly, the industrial oil palm land in the north appears obscured by, in the false-color image, a deep orange, and in the pseudo-natural color image, a deep green. This indicates a high level of vegetation abundance that is most likely intensive crop growth. In this image frame, there appears to be just about as much cleared land now as there is primary forest cover. After only 12 years since the first plantation, this shift is quite significant.

Lastly, the 2015 Landsat imagery depicted the current landscape (Figure 3). Immediately evident in the pseudo-natural color image is the sheer lack of deep green that once dominated the region. The road systems are barely distinguishable, because there is so much deforestation flanking them that it is hard to discern where one road starts and deforested land starts. The infrared image provides very interesting insight here. First, pinks and light reds dominate the spectrum of hues observed. This indicates recent deforestation. The deeper the hue, the more intense the chlorophyll content and vegetation growth. Accordingly, the land with the most vibrant red is, unsurprisingly, the northern edge of the industrial oil palm plantations. This indicates intensive oil palm growth. Given that this image was taken 17 years after the onset of industrial oil palm cultivation in Myanmar, this time scale is on par with the amount of time it takes for planted trees to mature and reach their maximum yield.

Ground Truthing

Ground truthing validated the observed spatio-temporal land-use changes brought about by the spread of industrial oil palm plantations. In addition to this validation, ground truthing revealed several barriers to oil palm plantation development. First, given the industry's obvious growth, it is curious that fields of abandoned oil palm trees would exist in the region (Figure 4.1).

Second, that an entire field of oil palm trees was cut down in favor of another crop in this region is also surprising (Figure 4.2). The healthy adjacent oil palm field in the background indicates that this particular plot of land was not likely fallow or poorly suited to growth. Lastly, separated by a well-paved road winding through the hillside with a golden pagoda in the background, newly planted industrial oil palm trees (as denoted by their short stature) sit across from remaining primary forest cover (Figure 4.3).

DISCUSSION

The relationship between planetary and human health within the context of Burmese palm oil can be summarized as follows: as smallholder farming converts to industrial monocultures, deforestation increases and biodiversity decreases. This decrease results in 2 outcomes in Tanintharyi. First, fewer ecosystem services are available for low-income Tanintharyi communities around which plantations develop. Second, extrapolating from this observed development of oil palm plantations in satellite imagery and ground truthing in the context of a government push for edible oil self-sufficiency, palm oil production will increase. This increased production may be concomitant with increased palm oil consumption in low-income communities (assuming increased availability and constant or decreased prices) and an associated increase in health risks within these communities (assuming increased consumption).

However, deforestation in Myanmar need not be necessarily associated with oil palm cultivation, particularly in Tanintharyi. During the reign of Myanmar's military junta, "crony capitalism," in which business transactions favor affiliates of government and military officials, was rampant.²⁹ Logging of Myanmar's natural forestland, especially in Tanintharyi, proceeded unimpeded such that between 1990 and 2010, forest cover in Myanmar fell from 45% to less than 20%.²⁹ The Htoo Group, with annual revenues of nearly half a billion dollars, is one of the largest palm oil companies in Myanmar.³⁰ Htoo business leader, Tay Za (whose father served with high-ranking military officials), has received massive government land concessions (668,000 acres in Tanintharyi in 2014) and has rapidly logged 162,000 acres allotted his firm as a separate palm oil land concession.³⁰ Despite a 2014 ban on timber exports in Myanmar, this raises the question of whether (or perhaps to what extent) logging will still occur, but simply under the guise of oil palm farm

development safeguarded under a national edible oil self-sufficiency drive.

Still, despite the impact of illegal (or legally sanctioned, via land concession) logging on the observed deforestation in Tanintharyi, we believe new oil palm plantations will continue to comprise a large portion of the newly deforested lands. In addition to the government stance on edible oil self-sufficiency, we have observed the formation of grid-like plantations (characteristic of oil palm) in Tanintharyi via Landsat data in our remote sensing analyses and have confirmed the existence of these plantations via ground truthing. As such, we maintain that oil palm cultivation in Tanintharyi, if propagated, may impact the diets of low-income communities reliant on its edible oil along with the well-being of surrounding Tanintharyi communities most affected by deforestation. Whether from a planetary or human health perspective, the case for prompt and significant changes in the trajectory of Burmese oil palm growth is strong.

Implications of This Study

This study confirms that recent oil palm development in Myanmar is concurrent with extensive deforestation and frames this within the context of sustainable diets. These results may have important implications for the future of sustainable diets in Myanmar. To that end, it is important to note that this study focuses on the environmental implications of intensive monoculture oil palm cultivation in rural Myanmar and what downstream health impacts may occur given the described political and economic mediators of palm oil consumption. As we have shown, the extent of deforestation has impacts on the extent and scale of biodiversity loss. This biodiversity loss has negative health outcomes borne particularly by vulnerable, rural populations such as the ones surrounding Maliwan, one site of oil palm cultivation in the Tanintharyi province. However, more research is needed to fully measure the effects of this biodiversity loss on rural diet composition. As we examine the progression of diets and nutrition in Myanmar, it will remain important to contextualize the magnitude and direction of land-use changes in the region given associated biodiversity loss, as outlined in this study. It is also important to note that these impacts of biodiversity represent only 1 of 10 principles of sustainable diets. That is, the food system-based determinants of human health are varied, intertwined, and complex; biodiversity is extremely important, but not of sole importance.

Finally, because low-income populations are the primary consumers of palm oil and live in closest proximity to plantations, they likely bear the brunt of the consequences. If these trends of palm oil intensification continue, 4 key outcomes may unfold: (1) high levels of biodiversity loss, (2) increased accessibility and affordability of edible palm oil, (3) mitigated importation of palm oil domestically, and (4) large profit margins made from selling excess palm oil on the international market. The first 2 implications bode poorly for low-income Burmese people. Higher-income communities are largely unfazed by changing palm oil prices, because they can afford healthier, more nutritious alternatives. The latter 2 implications bode very well for the domestic economy and international players invested in the palm oil market. The Burmese government may view this mitigated reliance on neighboring markets for what can be produced domestically as desirable. Further-more, given the size of the global palm oil market, it is possible that agrochemical industries with strong interests will have more influence over the government than low-income Burmese communities. Given this distribution of power, we may assume that if the growth of the Burmese palm oil industry proceeds at its current rate and without policy or nutrition interventions, then low-income Burmese communities, especially those in the immediate vicinity of industrial deforestation, may face negative health outcomes for years to come.

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LETTER TO THE EDITOR

Yazidi Women: Healing the Invisible Wounds

Dilshad Jaff^a

Global health cannot be improved without addressing the plight of the survivors and victims of brutal armed conflicts, especially minorities and marginalized people.

While serving in hospitals and health facilities as a physician during the U.S. war in Iraq between 2003 and 2011, I witnessed firsthand the suffering of many vulnerable people and came face-to-face with the terrible acts of barbarity that we humans perpetrate against each other. I also discovered that every survivor has a unique and horrifying story to tell.

Among the greatest atrocities in the Middle East today are those committed against the Yazidis, a Kurdish-speaking religious and ethnic minority descended from the ancient peoples of Mesopotamia. The Yazidis, who number approximately 700,000, observe an ancient religion with elements of Zoroastrianism, Mithraism, and Islam.

Accused of being "devil worshipers," the Yazidis have been persecuted for centuries. In 2014, ISIS massacred approximately 2,400 Yazidis; more than 600 were children and elderly adults. ISIS fighters also enslaved, tortured, and raped tens of thousands of women and children. During military operations, more than 3,000 people, mostly women and girls, were rescued. Some were released after paying ransom to ISIS fighters; some managed to escape their captors.

At present, more than 200,000 Yazidis have been displaced, and thousands of women and girls are still missing. Yazidi women have suffered the greatest physical and psychological consequences from the attacks by ISIS. Suicide, poverty, separation, and stigma shadow the lives of the survivors who live in pain and isolation. Their unseen psychological scars and poor physical health often inhibit their ability to reconnect with their families and Kurdish and Yazidi communities. While there are no accurate figures, it is estimated that there are very high rates of suicide, burning/self-immolation, and attempted suicide among the Yazidi survivors.

The condition in which Yazidi women find themselves is a major public health crisis that challenges the capabilities and resources of local authorities and the international community. To date, programs and

interventions that could help these women are limited in scope and employ passive approaches that are short-term and small scale and that do not include local inputs. The volatile situation in Iraq and throughout the Middle East requires an ambitious vision; a clear and adaptable road map; and practical, tailored programs that allow survivors of atrocities to recover in safe and secure societies.

Without policies to promote inclusion, members of the Yazidi community and others will continue to feel isolated and in despair. Implementing effective policies and strategies calls for recognizing the devastating, long-term effects of the atrocities on the survivors and their communities, and it requires international organizations and civil society to implement effective resiliency policies and programs to provide care to these neglected survivors.

At present, there is no agency or program in place to address the needs of the Yazidi women. Agencies with the expertise and capacity to address these conditions should coordinate their efforts with others to introduce measures using community-based and participatory approaches.

To address the crisis, at least 3 steps must be taken.

- First, survivors should be guaranteed personal safety and security.
- Second, effective counseling is needed to allow the survivors to tell their stories—a measure that will help them realize that they are not alone.
- Third, support should be offered to empower each woman to see herself as worthy of respect and valued by her family and community. Each woman needs some psychosocial and material assistance, i.e., safe and secure housing, job skills, and employment.

Effective, coordinated support should be provided to the survivors to ensure that the Yazidi community has a stable and secure future. Global health cannot be advanced without addressing the plight of the victims and survivors of these brutal armed conflicts. Practitioners of global health must address this crisis along with other humanitarian challenges.

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UPDATE

Update of: Kara et al., The BetterBirth Program: Pursuing Effective Adoption and Sustained Use of the WHO Safe Childbirth Checklist Through Coaching-Based Implementation in Uttar Pradesh, India

Nabihah Kara,^a Rebecca Firestone,^b Tapan Kalita,^c Atul A Gawande,^d Vishwajeet Kumar,^e Bhala Kodkany,^f Rajiv Saurastri,^c Vinay Pratap Singh,^c Pinki Maji,^c Ami Karlage,^a Lisa R Hirschhorn,^g Katherine EA Semrau,^h on behalf of the BetterBirth Trial Group*

➔ See updated article.

In the article "The BetterBirth Program: Pursuing Effective Adoption and Sustained Use of the WHO Safe Childbirth Checklist Through Coaching-Based Implementation in Uttar Pradesh, India" by Nabihah Kara, Rebecca Firestone, Tapan Kalita, et al., which appeared in the June 2017 issue (Volume 5, Number 2) of GHSP, the authors describe the BetterBirth program and lessons learned as the program was tested in a cluster-randomized controlled trial conducted in Uttar Pradesh, India. The trial assessed whether use of a safe childbirth checklist could improve birth attendants'

adherence to essential birth practices and maternal and newborn health outcomes. At the time of publication of this article, we noted at the end of the Abstract field that we would update this article by including a reference to the impact findings of the intervention, which were pending publication in another journal. Those impact findings have now been published in the *New England Journal of Medicine*, so we have updated the related GHSP article accordingly. The overall impact findings were that the intervention had no significant effect on maternal or perinatal mortality or maternal morbidity, despite having positive effects on essential birth practices.

These impact findings are now referenced at the end of the Abstract.

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UPDATE

Update of: Marx Delaney et al., Improving Adherence to Essential Birth Practices Using the WHO Safe Childbirth Checklist With Peer Coaching: Experience From 60 Public Health Facilities in Uttar Pradesh, India

Megan Marx Delaney,^a Pinki Maji,^b Tapan Kalita,^b Nabihah Kara,^a Darpan Rana,^b Krishan Kumar,^b Jenny Masoinneuve,^a Simon Cousens,^c Atul A Gawande,^{a,d,e} Vishwajeet Kumar,^f Bhala Kodkany,^g Narender Sharma,^b Rajiv Saurastri,^b Vinay Pratap Singh,^b Lisa R Hirschhorn,^{a,h} Katherine EA Semrau,^{a,i,j} Rebecca Firestone^k

➔ See *updated article*.

In the article "Improving Adherence to Essential Birth Practices Using the WHO Safe Childbirth Checklist With Peer Coaching: Experience From 60 Public Health Facilities in Uttar Pradesh, India" by Megan Marx Delaney, Pinki Maji, Tapan Kalita, et al., which appeared in the June 2017 issue (Volume 5, Number 2) of GHSP, the authors assessed birth attendants' adherence to essential birth practices in 60 public health facilities in Uttar Pradesh, India. At the time of publication of this

article, we noted at the end of the Abstract field that we would update this article by including a reference to the impact findings of the intervention, which were pending publication in another journal. Those impact findings have now been published in the *New England Journal of Medicine*, so we have updated the related GHSP article accordingly. The overall impact findings were that the intervention had no significant effect on maternal or perinatal mortality or maternal morbidity, despite having positive effects on essential birth practices.

These impact findings are now referenced at the end of the Abstract.

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