It Takes a System: Magnesium Sulfate for Prevention of Eclampsia in a Resource-Limited Community Setting

Magnesium sulfate is not a silver bullet to reduce maternal mortality associated with preeclampsia/eclampsia. We believe a well-functioning health care system, especially at the hospital level, with competent well-trained providers, adequate equipment, and medications will likely be necessary.

Robert L. Goldenberg, Elizabeth M. McClure
https://doi.org/10.9745/GHSP-D-19-00261

Health Volunteers Overseas: A Model for Ethical and Effective Short-Term Global Health Training in Low-Resource Countries

Three core attributes enable short-term volunteers to make incremental contributions to long-term outcomes at host institutions: (1) focusing on teaching rather than service delivery, (2) engaging in mutually beneficial and equitable partnerships with host institutions, and (3) operating within a structured management system.

Elizabeth MacNairn
https://doi.org/10.9745/GHSP-D-19-00140

The Open Birth Interval: A Resource for Reproductive Health Programs and Women’s Empowerment

The open birth interval is the time since a woman’s last birth. It reflects not only desire for contraception and child health services but also freedom for outside activities, employment, and personal autonomy. It merits attention from policy makers, program managers, and service providers.

John Ross, Kristin Bietsch
https://doi.org/10.9745/GHSP-D-19-00056
PROGRAMMATIC REVIEWS & ANALYSES

Provider Bias in Family Planning Services: A Review of Its Meaning and Manifestations

Provider bias, including bias regarding client age, parity, and marital status, persists as an important barrier to contraceptive choice and access. Newer approaches to mitigate bias that have moved beyond training and guideline development to more fundamental behavior change show promise.

Julie Solo, Mario Festin
https://doi.org/10.9745/GHSP-D-19-00130

ORIGINAL ARTICLES

Unintended Consequences of mHealth Interactive Voice Messages Promoting Contraceptive Use After Menstrual Regulation in Bangladesh: Intimate Partner Violence Results From a Randomized Controlled Trial

Automated interactive voice messages about post-menstrual regulation contraception delivered to women in Bangladesh via mobile phone were associated with increased reports of intimate partner violence. This finding highlights the importance of taking steps to minimize risk when delivering phone messages on sensitive topics and the need for assessing violence in such situations.

Kate Reiss, Kathryn Andersen, Erin Pearson, Kamal Biswas, Fahmida Taleb, Thoai D. Ngo, Altaf Hossain, Sharmani Barnard, Chris Smith, James Carpenter, Jamie Menzel, Katharine Footman, Katherine Keenan, Megan Douthwaite, Yasmin Reena, Hassan Rushekh Mahmood, Tanzila Tabbassum, Manuela Colombini, Loraine Bacchus, Kathryn Church
Glob Health Sci Pract. 2019;7(3):386–403
https://doi.org/10.9745/GHSP-D-19-00015

Evidence-Based Process for Prioritizing PositiveBehaviors for Promotion: Zika Prevention in Latin America and the Caribbean and Applicability to Future Health Emergency Responses

To maximize the impact of Zika prevention programming efforts, a prioritization process for social and behavior change programming was developed based on a combination of research evidence and programmatic experience. Prioritized behaviors were: application of mosquito repellent, use of condoms, removing unintentional standing water, covering and scrubbing walls of water storage containers, seeking prenatal care, and seeking counseling on family planning if not planning to get pregnant.

Jessie Pinchoff, Arianna Serino, Alice Payne Merritt, Gabrielle Hunter, Martha Silva, Priya Parikh, Paul C. Hewett
https://doi.org/10.9745/GHSP-D-19-00188
Operationalizing Integrated Immunization and Family Planning Services in Rural Liberia: Lessons Learned From Evaluating Service Quality and Utilization

Providers, managers, and clients valued the integrated service delivery model. Trends indicated slightly higher family planning uptake in intervention facilities, but that difference was not statistically significant. Intrafacility referrals by postpartum women did not negatively affect immunization utilization rates.

Allyson R. Nelson, Chelsea M. Cooper, Swalih Kamara, Nyapu D. Taylor, Topian Zikeh, Cefane Kanneh-Kesselly, Rebecca Fields, Iqbal Hossain, Lolade Oseni, Birhanu S. Getahun, Anne Fiedler, Anne Schuster, Hannah Tappis

https://doi.org/10.9745/GHSP-D-19-00012

Role of Male Sex Partners in HIV Risk of Adolescent Girls and Young Women in Mozambique

Efforts to prevent HIV among adolescent girls and young women (AGYW) should focus on providing male sexual partners of AGYW with HIV prevention, testing, and providing AGYW, particularly those who are less educated, pregnant, or single mothers, with prevention methods that do not require negotiating safer sex with their partners.

Jenifer Chapman, Nena do Nascimento, Mahua Mandal

https://doi.org/10.9745/GHSP-D-19-00117

Three Waves of Data Use Among Health Workers: The Experience of the Better Immunization Data Initiative in Tanzania and Zambia

Data quality and use rollout in Tanzania’s and Zambia’s immunization programs progressed along 3 phases—from strengthening data collection, to improving data quality, to increasing data use for programmatic decision making cultivating a culture of data use.

Laurie Werner, Dawn Seymour, Chilunga Puta, Skye Gilbert

https://doi.org/10.9745/GHSP-D-19-00024

FIELD ACTION REPORTS

Management of Preeclampsia, Severe Preeclampsia, and Eclampsia at Primary Care Facilities in Bangladesh

Program introduction, including cascade training, to screen for severe preeclampsia and eclampsia and initiate treatment with magnesium sulfate was somewhat successful. Challenges included inconsistent adherence to the national protocol, data quality, and some issues with supplies and equipment.

Anna Williams, Marufa Aziz Khan, Mohammed Moniruzzaman, Sk Towhidur Rahaman, Imteaz Ibne Mannan, Joseph de Graft-Johnson, Iftekhar Rashid, Barbara Rawlins

https://doi.org/10.9745/GHSP-D-19-00124
Getting to the First 90: Incentivized Peer Mobilizers Promote HIV Testing Services to Men Who Have Sex With Men Using Social Media in Mumbai, India

This peer mobilization pilot for HIV and syphilis testing used messaging on gay dating sites, clinic referrals, and peer recruitment to reach men who have sex with men in Mumbai. In 6 months, the pilot reached a relatively modest 247 individuals, 244 of whom had never tested for HIV. Challenges included low recruitment and loss to follow-up for posttest counseling and treatment initiation for individuals with HIV.


https://doi.org/10.9745/GHSP-D-19-00094

Increasing Family Planning Access in Kenya Through Engagement of Faith-Based Health Facilities, Religious Leaders, and Community Health Volunteers

The Christian Health Association of Kenya (CHAK) partnered with health facilities managed by faith-based organizations (FBOs), religious leaders, and community health volunteers to increase access to family planning in western Kenya. FBO-managed health facilities saw large increases in family planning uptake over the 5-year project, particularly for implants.

Allison Ruark, Jane Kishoyian, Mona Bormet, Douglas Huber

https://doi.org/10.9745/GHSP-D-19-00107

SHORT REPORTS

Indicators for Monitoring and Evaluation of Community-Based Injectable Contraception: Multisourced Process and New Global Guidance

We based our guidance on a literature review, technical consultation, and case studies of 3 countries. We identified 4 essential indicators: enough community health workers (CHWs) certified to provide injectables to meet project goals, CHWs are appropriately supervised, stock of injectables is reliable, and clients are receiving injections.

Jill M. Peterson, Kirsten Krueger, John Stanback

https://doi.org/10.9745/GHSP-D-19-00133
It Takes a System: Magnesium Sulfate for Prevention of Eclampsia in a Resource-Limited Community Setting

Robert L. Goldenberg, a Elizabeth M. McClure b

Magnesium sulfate is not a silver bullet to reduce maternal mortality associated with preeclampsia/eclampsia. We believe a well-functioning health care system, especially at the hospital level, with competent well-trained providers, adequate equipment, and medications will likely be necessary.

See related article by Williams.

One hundred years ago in high-income countries, hypertensive diseases accounted for a large proportion of adverse pregnancy outcomes including maternal mortality, stillbirth, and neonatal mortality. Hypertensive diseases include chronic hypertension, pregnancy-induced hypertension, preeclampsia, and its major complication, eclampsia. Presently, although the incidences of chronic hypertension, pregnancy-induced hypertension, and preeclampsia have not changed substantially, rates of progression of preeclampsia to eclampsia and the maternal mortality associated with preeclampsia and eclampsia have changed. The vast majority of hypertension-related maternal mortality is associated with eclampsia, but most hypertension-related stillbirths occur in the presence of preeclampsia.

MAGNESIUM SULFATE AND REDUCTIONS IN MATERNAL MORTALITY

Appreciating that much of the preeclampsia-related mortality is associated with the development of seizures, much attention has been directed at seizure prevention. Over the years, the use of many therapeutic agents has been described including morphine and valium as well as decreased stimulation including bed rest in darkened rooms. The use of magnesium sulfate for seizure prevention was first described in 1906, and in subsequent years, its use was advocated and sometimes adopted in the United States but rarely in Great Britain. In 2002, the results of a large 10,000-subject, multicountry, hospital-based randomized clinical trial, the Magpie Trial, showed a significant reduction from 1.9% to 1.1% in seizures in hospitalized women with preeclampsia associated with the use of magnesium sulfate. However, there were no differences in maternal or perinatal mortality between those treated with magnesium sulfate and those not treated. Since then, the use of magnesium sulfate has been widely advocated and adopted, even in settings that differ from those in the Magpie Trial. It is important to understand that during the years of the greatest reductions in the incidence of seizures and reductions in eclampsia-related deaths, magnesium sulfate was rarely used in the United States for preventing or treating eclampsia and almost never in Great Britain.

The incidence of eclampsia and the associated case fatality rates in many low-income countries today approach those seen in high-income countries 100 years ago. To better understand how mortality associated with preeclampsia/eclampsia in low- and middle-income countries could be reduced, we used mathematical models to evaluate the interventions most likely to reduce maternal mortality associated with preeclampsia/eclampsia in sub-

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Saharan Africa. Clearly, screening for preeclampsia by blood pressure and proteinuria measurements when combined with prompt transfer to an appropriate institution and early delivery saved the most lives. Use of magnesium sulfate alone or even when combined with other interventions resulted in fewer maternal lives saved and did not reduce the risk of stillbirths.10

**COMMUNITY-LED PROGRAM TO IMPROVE ECLAMPSIA CARE**

The article by Williams et al. in this issue of GHSP describes a study in Bangladesh to assess an intervention to improve identification, referral, and care for women with pre-eclampsia and eclampsia at primary care-level health facilities. The article examines the intervention’s focus on the use of magnesium sulfate, but also addresses issues such as the number of antenatal visits, availability of blood pressure apparatuses, the skills of health care providers to appropriately identify women with hypertensive disease, and transfer to a higher level of care. Improving hospital care for women with preeclampsia or eclampsia was not emphasized in the intervention. The study made little attempt at determining pregnancy outcomes, and instead predominantly evaluated the health workers’ compliance with the protocols to screen, provide prereterral management, and refer women with preeclampsia and eclampsia.

It is difficult to assess the quality of the health system in which this study took place. However, based on the data and the descriptions available, the quality seems challenged in this environment. Although 45 clinics were initially included in the study, only 35 had sufficient data for the analyses. The data available from the health registries appeared to be unreliable and much of it seemed inaccurate or lost. Health workers’ adherence to the protocol was poor. Although attendance at antenatal care was emphasized, and most women had some care, and blood pressure measurements were taken on nearly all visits that actually took place, 65% of the women received only 1 visit. The timing during the pregnancy that the blood pressure was actually measured is unclear. As the authors noted, why more women in the community were diagnosed with severe preeclampsia compared to mild preeclampsia was not clear because published data have suggested that many more women have mild preeclampsia compared to severe preeclampsia.11 These results suggest measurement error or other issues in how data were collected and recorded in the health system’s database. We emphasize that to understand the impact of any intervention, ensuring high-quality data is an important first step. Overall, it appears that although the Bangladesh program described in the paper by Williams et al. is attempting to improve the preeclampsia/eclampsia-related care, to date, this program has not been successfully implemented and is unlikely to reduce maternal and fetal mortality.

**WELL-FUNCTIONING HEALTH SYSTEMS REQUIRED**

If the lessons from high-income countries about successfully implementing a protocol to improve care for women with preeclampsia are considered, a well-functioning health system is almost always required. Identifying women with preeclampsia is necessary to provide adequate care. This requires routine, quality antenatal care with regular visits later in pregnancy when preeclampsia is likely to become apparent. The minimum of 4 visits recommended for this program (in line with Bangladesh policy at the time of implementation) without clarifying when during pregnancy these visits should occur will likely result in inadequate care. Although the World Health Organization (WHO) initially recommended a minimum of 4 prenatal visits, in 2016, WHO increased the recommended minimal number of visits to 8, mostly to better screen for preeclampsia. In high-income countries, the recommended frequency of prenatal visits varies, but generally increases in the third trimester of pregnancy and often occurs weekly during the last month of pregnancy. This type of visit schedule was adopted in the United States to screen for preeclampsia late in pregnancy.

To diagnose preeclampsia effectively, blood pressure and proteinuria measurements are needed at each antenatal care visit. Functioning equipment, a well-trained staff, and appropriate protocol, are necessary. In the Bangladesh protocol, substantial emphasis is placed on administering a loading dose of magnesium sulfate before transfer. With the diagnosis of severe preeclampsia, after a loading dose of magnesium sulfate, transfer to a facility with the capabilities to affect an immediate delivery (i.e., availability of cesarean delivery and induction of labor 24 hours a day, 7 days a week) is recommended. From the data presented, these requirements were met only about half the time. Another issue was that, although the referral protocol indicated referral to a higher level of care for women with less severe pre-eclampsia, the study findings indicated that...
most of the time this protocol was not followed. The care provided for those women with less severe pre-eclampsia is not clear, although referral was recommended. This is an important consideration, especially because mild preeclampsia can rapidly progress to severe preeclampsia or eclampsia. Managing women with severe preeclampsia and eclampsia, or even mild preeclampsia, is far more complicated than administering magnesium sulfate alone. Without comprehensive care by well-trained clinicians, women will die unnecessarily. We note again that little emphasis in the intervention assessed in this study was placed on hospital care. We believe that the use of magnesium sulfate may be overstressed in this intervention, and the extensive focus on provision of magnesium sulfate may detract from the ability of the health center staff to focus on appropriate screening coupled with referral. We strongly believe that diagnosing preeclampsia, transfer to a facility, and early delivery should be the primary focus of preeclampsia/eclampsia improvement programs, not magnesium sulfate.

Several recent studies that focused on community diagnosis and transfer of the pregnant woman with complications to a facility have failed to reduce mortality. A multicountry randomized trial, the Emergency Obstetric and Neonatal Care study, which focused on community identification of various pregnancy complications and transfer, failed to show a reduction in mortality. The First Look study, a trial focusing on ultrasound use during antenatal care and transfer for complications, also failed to reduce mortality. The results of the Community Level Interventions for Preeclampsia (CLIP) study, a randomized trial conducted in 4 low-and middle-income countries, specifically aimed at reducing mortality from preeclampsia/eclampsia identified in the community, failed to show mortality reductions at any of the sites. As examples, the conclusions from the India site were that “community-level interventions for pre-eclampsia did not improve maternal, fetal, or newborn mortality or major morbidity.”

Likewise, the authors from the Mozambique site found, “The CLIP intervention was not associated with an improvement in the primary outcome.” And finally, from the Pakistani site, the investigators noted, “Overall, the CLIP trial did not show significant impact on the primary composite maternal and perinatal death or morbidity end-point.” Together, these studies suggest that without adequate hospital care, mortality reductions may not occur, regardless of what community-level interventions are introduced. Simple interventions introduced at the hospital level have also failed to reduce mortality, as a study on checklists within hospitals in India also failed to show benefit.

Therefore, we believe these results indicate that even diagnosing pregnancy-related complications in the community with transfer is not sufficient to achieve substantial reductions in mortality, if the hospital care is inadequate. Taking care of women, fetuses, and newborns with complicated medical conditions is difficult and often requires substantial provider training, good judgment, and excellent medical and sometimes surgical skills. Brief trainings of health workers will likely not accomplish the goal of substantial reductions in mortality. Although we applaud the effort to address a serious health issue in Bangladesh, the introduction of “silver bullets” such as magnesium sulfate, used alone or even with other interventions, will also not likely achieve reductions in mortality. Instead, a well-functioning health care system staffed with competent well-trained providers with adequate equipment and medications will likely be necessary to provide appropriate care to women with pre-eclampsia/eclampsia, as well as those with other complicated conditions, and reduce the associated mortality.

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REFERENCES

Health Volunteers Overseas: A Model for Ethical and Effective Short-Term Global Health Training in Low-Resource Countries

Elizabeth MacNairn

Three core attributes enable short-term volunteers to make incremental contributions to long-term outcomes at host institutions: (1) focusing on teaching rather than service delivery, (2) engaging in mutually beneficial and equitable partnerships with host institutions, and (3) operating within a structured management system.

INTRODUCTION

Health care professionals from high-income countries are increasingly interested and engaged in short-term volunteer global health experiences in low-resource settings. These experiences may focus on direct service delivery, teaching and training, humanitarian relief work, or global health electives for medical students and residents, among other purposes. A growing body of academic literature addresses guidelines for ethical global health engagement, but there is little consensus on standards and scant evidence of the benefits and potential harms of the engagement efforts on host institutions and communities. Additionally, much of the existing literature centers on the perspectives of "sending" institutions and clinicians, rather than the viewpoints and priorities of "host" institutions and practitioners.

A wide variety of sending institutions engage in short-term global health work. These institutions include charities, churches, or other faith-based organizations, universities, and for-profit entities, and each employs defined operational models to achieve organizational objectives. For example, in the "fly-in medical mission" model, individuals or teams of health professionals volunteer to travel to underserved communities to provide dental care or health services that are otherwise unavailable, such as cleft palate repair or cataract surgery. While this model may deliver needed health services, it comes at a high financial cost, estimated at US$3.7 billion annually. Other potential problems associated with a direct service delivery approach, such as the fly-in medical mission model, include a high burden on host institution staff in resource-limited settings, power imbalances and perpetuation of global health inequities, a lack of bilateral participatory relationships and longitudinal planning, and concerns about long-term sustainability and patient safety.

In this article, I argue that a well-designed and ethical global health engagement model that combines effective volunteer management systems with mutually beneficial partnerships can maximize the potential benefits and minimize the costs, or harms, of such programs. Expanding on an article published in 2017 describing the Health Volunteers Overseas (HVO) partnership model, I discuss HVO’s health workforce capacity building approach in low- and middle-income countries (LMICs), focusing on the organization’s unique short-term volunteer management structure, while considering its strengths, constraints, and implications.

HVO is a U.S.-based nonprofit organization founded in 1986 that aims to improve the quality and availability of health care in LMICs through teaching, training, and professional mentorship of the local health workforce. HVO deploys a short-term, highly skilled volunteer model to achieve its mission. Through HVO, more than 6,400 volunteer health professionals have completed an estimated 11,500 short-term assignments in 55 countries, serving in 248 different training projects. Table 1 shows a summary of HVO’s 2018 activities.

RATIONALE

Global Health Workforce Shortage

There is a global shortage of health care providers, and it is estimated that it will reach 18 million by 2030. This deficit disproportionately affects LMICs, where the burden of disease is highest and the ability to educate and support the health workforce is limited. These environments do not have enough health care professionals, few of the professionals have the opportunity for continued professional education or subspecialty training, and many work in isolation with large patient...
loads and limited resources. The “brain drain,” in which clinicians from resource-poor countries emigrate to higher-income countries, further exacerbates the shortage. Health worker performance in LMICs also remains a challenge to delivering high-quality, evidence-based health care. Yet, a well-trained and appropriately deployed global health workforce is essential to achieving universal health coverage, economic growth, and the United Nations Sustainable Development Goals.

Standards for Short-Term Global Health Engagement

Guidelines for short-term global health engagement typically start with the principles of beneficence and nonmaleficence, or “do no harm,” while also enumerating certain principles or recommendations. For example, a 2018 American College of Physicians paper identifies 5 positions, including predeparture preparation as an ethical requirement, in and of itself. A 2017 Pediatrics article summarizes 10 recommendations for trainee and clinician preparation, including exploring personal motivations, avoiding “poverty tourism,” and ensuring that professional goals are clarified and aligned with host goals. The authors call for the establishment of preparation standards in partnership with both sending and host institutions.

An article from the host institution perspective, published in BMJ Global Health, addresses expectations for international visiting faculty including developing mutually agreed-upon goals and careful selection and preparation of guest faculty to meet host’s goals. The authors give the following instruction:

You plan the time the person should be here and when he/she is needed most, and you plan the curriculum and the topics. So they also come prepared and send someone who is an expert.

Research from a 2018 Globalization in Health study defines the following 6 core consensus principles for effective and ethical short-term global health activities: (1) appropriate recruitment, preparation, and supervision of volunteers; (2) host partner, who defines the program and their role in it; (3) sustainability and continuity of programs; (4) respect for governance, legal, and ethical standards; (5) regular evaluation of programs for impact; and (6) mutuality of learning and respect for local health professionals.

The next section of this article focuses on how the HVO short-term global health engagement model operationalizes best practices, similar to the guidelines discussed above, in a systematized, effective, and financially sustainable approach. This approach has been replicated and adapted within HVO itself, enabling the organization to grow from initially addressing just 1 area of clinical training, orthopedics, 33 years ago to 18 different clinical areas today (Table 2). This model can be implemented, in whole or in part, by other organizations or entities seeking to address global health training needs in cost-effective and ethical approaches.

Guidelines for short-term global health engagement contain principles of beneficence and nonmaleficence.
THE HVO MODEL

Overview

HVO programs address both the shortage of health workers and the quality of care delivered in LMICs by teaching, training, and mentoring health care providers, including faculty, residents, and students based in hospitals, clinics, and universities (Supplement 1). Since its inception, HVO has focused on teaching rather than service delivery, although its St. Lucia site centers on clinical care provision. To achieve its mission, HVO sends highly skilled, short-term volunteers to teach in projects that are designed with host partners and articulate clearly defined goals and objectives, as well as monitoring and evaluation processes. The organization’s health worker capacity building approach is distinguished by 3 core attributes: efforts are education focused, volunteer driven, and partnership based.

- **Education focused**: HVO is committed to providing education that builds health worker...
capacity and promotes exchange of knowledge and skills between health care provider peers. It develops partnerships with host institutions that address their long-term training needs and priorities. Project design is guided by local diseases and conditions, and the projects are relevant and realistic, focus on prevention (when appropriate), promote lifelong learning, and identify and train local personnel who will assume the roles of both educator and provider.

- **Partnership based**: HVO establishes ethical and mutually beneficial partnerships with host institutions—hospitals, clinics, and universities—to provide education, training, and mentorship. A set of key principles serves as the foundation of HVO’s partnership model, including mutual goal setting, honest and open communication, equity, mutual benefit, active partner engagement throughout the project life cycle, flexibility, and clearly defined leadership roles. Another key component is identification of a local champion who can inspire and motivate others, help maintain project momentum, and guide partnership evolution.6

- **Volunteer driven**: Project implementation is ensured by a small staff and a large cadre of volunteer health professionals, based both in the United States and abroad, who serve in clearly delineated roles. Annually, an estimated 600 volunteer health professionals serve with HVO as teachers, project directors, steering committee members, or on-site coordinators, supporting more than 90 projects in approximately 25 countries. Roles are defined in HVO’s Leadership Manual and Guide to Starting New Projects as well as in agreement letters signed with each site when projects are established.

**Human Resource Infrastructure**

The HVO model has a unique and cost-effective human resource infrastructure that assures project management and oversight, enabling effective short-term global health engagement. Key stakeholders include staff, volunteers, project directors, on-site coordinators and steering committee members.

Staff administer the volunteer management system, implementing processes to ensure timely and on-target project activities. Staff serve as the communications, coordination, and support nexus for the organization.

Volunteers are fully licensed health care professionals from private practice and academic settings who teach, train and mentor students, residents, faculty, and other health care providers in 2-week to 1-month assignments, depending on the site. The annual number of volunteers needed at each project site is assessed based on feedback from clinical leadership. HVO strives to identify and send the requested number of volunteers and measures progress toward recruitment goals annually.

Some HVO project sites can also accommodate residents, if they are accompanied by a preceptor. Volunteers are responsible for funding their own airfare and accommodations although HVO has several grant opportunities to defray these costs including the Orthopaedics Traveling Fellowship and the Plotnick Nursing Education Volunteer Fund. Approximately 28% of 2018 volunteers received partial funding to support their overseas assignments.

Project directors are experienced health professionals whose responsibilities include project design and monitoring, volunteer selection and orientation, and technical oversight. They help prospective volunteers set realistic expectations, understand site needs, and thoughtfully prepare for assignments. Project directors submit annual surveys outlining accomplishments, challenges, and new initiatives, and they are expected to be in regular contact with their sites, including visiting, to stay abreast of important changes and issues.

On-site coordinators are selected by host partner institutions for each project. Some HVO project sites identify both an administrative as well as a clinical coordinator, who is typically a senior faculty member or department head. Administrative coordinators assist with visas, arrival arrangements, and housing issues, liaising closely with HVO staff. Clinical on-site coordinators identify training needs; approve, schedule, and orient volunteers; and provide feedback on both volunteers and evolving project needs through informal and formal mechanisms, including an annual survey. Their level of engagement depends on individual motivation and availability and thus varies from project to project, which can affect project quality.

Steering committees provide programmatic oversight for each of the 18 clinical divisions. Each steering committee is composed of 3–10 volunteer health professionals who approve new projects and review existing projects (and, when appropriate, suspend or close projects); set policy
on the types of volunteers who can be placed; help to recruit new members and volunteers; and plan workshops, meetings, and other outreach activities. Steering committee members are selected with input from HVO staff and current committee members, based on criteria such as commitment to teaching and training, availability to participate in 1 or 2 meetings per year, and global health experience.

HVO volunteers, project directors, on-site coordinators, and steering committee members are volunteers who donate their time and expertise to the organization, receiving no compensation for their efforts. In 2018, the value of services donated to HVO totaled approximately $6,743,500.

Volunteer Management System

Over 3 decades, HVO has developed—and continues to refine—a volunteer management system that enables highly skilled health professionals to make incremental but sustained improvements in the availability and quality of care delivered in low-resource settings. Each volunteer’s teaching assignment contributes to stated project goals and objectives and builds upon the previous assignment. For example, a team of 5 HVO volunteer nurse educators worked with nurses at Hue University of Medicine and Pharmacy in Vietnam who wanted to expand their research capacity. Together, the nurses developed a 2-year plan for their research agenda, which included education about research methodologies, grant writing, and publishing in peer-reviewed journals. Each HVO volunteer nurse educator knew what she was expected to teach to advance the collaborative plan, and the Vietnamese nurses were confident in achieving their goals and advocating for needed resources.

In any given year, 40% of volunteers have completed a previous HVO assignment. Some return to the same site, providing teaching continuity, while others volunteer at new sites. Repeat volunteers can also share insights and techniques learned at one site and bring this information to new sites. In this way, HVO’s short-term volunteers help expand a network of professional peers who sometimes continue to engage long after a volunteer leaves the host institution.

HVO is sponsored by 18 professional associations (Supplement 2), including the American Academy of Pediatrics, the American Society of Clinical Oncology, and the American Physical Therapy Association. These associations provide invaluable access to their membership, which serves as a primary volunteer pipeline for our projects, while HVO provides sponsors with structured teaching and training assignments and the opportunity for their members to participate directly in their specialty’s global health community.

Key Processes

HVO’s volunteer management system includes 4 key processes, as described below. An array of resources support these processes, ensure quality implementation, and enable organizational learning. These HVO resources include the comprehensive Guide to Volunteering Overseas, Leadership Manual, Guide to Starting New Projects, and KnowNET, a password-protected intranet for volunteers and project directors that provides volunteer schedules, teaching resources, and policies on research and donations of equipment and pharmaceuticals.

Volunteer Application, Vetting, and Approval

Potential volunteers complete an online application and provide a curriculum vitae (CV), which HVO staff review to determine if applicants have appropriate credentials to participate in projects. Staff contact applicants to learn more about their motivations for volunteering, commitment to training and teaching, availability for assignment, and geographical or programmatic preferences. Applicant CVs are then shared with relevant project directors and on-site coordinators for review and additional follow-up, ensuring that all applicants are vetted by peer health care professionals with the technical skills and global health experience to evaluate their capacity to engage productively in HVO training projects. Before a final decision is made, project directors check applicant references.

Volunteer Scheduling, Planning, and Logistics Support

HVO staff work with approved volunteers to schedule assignments based on site needs and timelines, and volunteer availability. Most volunteers serve as individuals, although HVO coordinates a limited number of team assignments for multidisciplinary projects (e.g., spine surgery, wound management, oncology) when appropriate. HVO teams are usually composed of 3 or 4 volunteers.

HVO staff provide significant planning and logistics support to volunteers throughout their
engagement, significantly reducing the burden on both host institutions and the volunteers themselves. Increasingly, for example, host country ministries of health require visiting clinicians to register with national medical and nursing associations. Such processes are important but also time-consuming, requiring background checks and the submission of multiple documents.

HVO staff provide detailed instructions, help volunteers fulfill credentialing and registration requirements, and liaise with host personnel and volunteers throughout the process. Staff also work with volunteers to address assignment logistics and orientation, which includes obtaining visas; assisting with questions about flight, hotel, and arrival arrangements; providing cultural, political, and historical information; and providing information on personal health and safety.

**Professional Orientation (Predeparture and On-Site)**

Predeparture and on-site orientation for volunteers is provided by a network of HVO stakeholders, including staff, project directors, on-site coordinators, and, often, previous volunteers. Information, shared through email, phone, and Skype exchanges, addresses site training needs and priorities, partner institution structure, prospective trainees and their educational levels, prevalent local diseases and conditions, locally available resources (e.g., pharmaceuticals, diagnostic testing), and previous volunteers’ presentations and evaluations.

Predeparture orientation may also include identification of specifically requested lecture topics to ensure that assignments align with host priority training needs. The *HVO Guide to Volunteering Overseas* and *KnowNET* (the HVO intranet for volunteers and clinical leadership) provide a range of information to help volunteers prepare for their assignments, both professionally and personally. Once a volunteer arrives on-site, host faculty typically provide a short briefing, although the responsibility for professional integration rests primarily with the volunteer. HVO emphasizes that it is essential for volunteers to prepare as fully as possible for their assignments prior to departure because site-based staff are busy with their regular (and usually very high) patient loads, teaching, and family responsibilities as well as second jobs in some cases.

Dr. Jon Kolkin, an HVO orthopedics volunteer, summed up the personal qualities essential for successful global health volunteers:

...humility, compassion, patience and flexibility. ... One must be willing to think creatively, look at a situation from multiple viewpoints and adopt therapeutic strategies to accommodate and respect local conditions, cultures, techniques, politics, resources, educational backgrounds, demographics and social norms.

**Volunteers’ Evaluations and Recognition**

Returned volunteers and multidisciplinary teams complete an online survey to evaluate several dimensions of their teaching and overall experience. Repeat volunteers to the same site complete a slightly different survey, which elicits their assessment of HVO’s longer-term impact on the site. As needed and on a continuous basis, HVO staff reach out to volunteers to discuss their feedback surveys and share surveys with clinical leadership to address immediate problems and make needed improvements in project implementation.

On an annual basis, project directors and on-site coordinators complete a survey assessing project achievements, challenges, and needed changes in project design. HVO staff collate and review these data, sharing with steering committees, project directors, and on-site coordinators to inform adaptations in project design and identify and address challenges and opportunities (Table 3 and Table 4).

HVO recognizes outstanding volunteers—based at both host institutions and those who travel to teach—with the annual Golden Apple Award for exceptional contributions to HVO’s mission. Recognizing exceptional service and commitment is essential in a volunteer-driven organization like HVO because it expresses

### TABLE 3. Observations of On-Site Coordinators on General Areas of Improvement as a Result of Health Volunteers Overseas’ Activities, 2018 Survey (N=65)\(^{a}\)

<table>
<thead>
<tr>
<th>Observations</th>
<th>% of On-Site Coordinators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvements in staff skills</td>
<td>91</td>
</tr>
<tr>
<td>Improvements in staff attitudes</td>
<td>88</td>
</tr>
<tr>
<td>Increased efficiency of care</td>
<td>86</td>
</tr>
<tr>
<td>New techniques introduced and utilized</td>
<td>85</td>
</tr>
<tr>
<td>Improvements in patient outcomes</td>
<td>84</td>
</tr>
<tr>
<td>Improvements in patient safety</td>
<td>82</td>
</tr>
</tbody>
</table>

\(^{a}\) 73% response rate.
appreciation, establishes organizational role models, and encourages ongoing engagement.

## DISCUSSION

### Strengths of HVO’s Model

HVO’s model has important strengths that enable short-term volunteers to make incremental contributions to long-term outcomes at host institutions. The human resource infrastructure of this model is a unique combination of administrative staff and volunteer technical leadership based both in the United States and at host institutions who work together to support volunteer teachers and ensure quality programming and sustained impact. Strengths of the HVO model include effective systems to vet, approve, and prepare volunteers; opportunities for health leadership development and recognition; the opportunity to develop enduring professional relationships; sustainability, cost efficiency, and replicability across a breadth of clinical specialties; and mutual skills transfer.

### Volunteer Management Systems

As previously described, HVO has detailed volunteer management processes to ensure that qualified and committed volunteers with appropriate general or subspecialty expertise are selected for projects, well-prepared for their

<table>
<thead>
<tr>
<th>Country</th>
<th>Clinical Specialty</th>
<th>Observed Improvement/Accomplishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bhutan</td>
<td>Nursing/oncology</td>
<td>Development and implementation of nursing chemotherapy assessment form that was approved and implemented by nursing department as a standard of care practice</td>
</tr>
<tr>
<td>Bhutan</td>
<td>Emergency medicine</td>
<td>Initiation of emergency medicine residency program and emergency medical technician/emergency medical responder program</td>
</tr>
<tr>
<td>Cambodia</td>
<td>Anesthesia</td>
<td>Epidural analgesia protocol implemented in maternity department</td>
</tr>
<tr>
<td>Ghana</td>
<td>Hand therapy</td>
<td>Implementation of new protocol for management of flexor tendon repairs</td>
</tr>
<tr>
<td>Haiti</td>
<td>Physical therapy</td>
<td>Clinical guidelines and assessment form for stroke patients implemented</td>
</tr>
<tr>
<td>Nepal</td>
<td>Oral health</td>
<td>Clinical protocols in orthodontics implemented, and adoption of conscious sedation for the first time in the dental department</td>
</tr>
<tr>
<td>Peru</td>
<td>Hematology</td>
<td>Introduction of the Wright-Giemsa stain for better cytological evaluation of bone marrow smears in hematological diseases, new to hospital</td>
</tr>
<tr>
<td>Tanzania</td>
<td>Hematology</td>
<td>Clinical protocols developed for management of all hematological malignancies</td>
</tr>
</tbody>
</table>

Clinicians learn to suture at Health Volunteers Overseas’ emergency medicine project in Thimphu, Bhutan. © 2018/Health Volunteers Overseas
assignments, and scheduled according to site needs as much as is possible. These systems enable effective and ethical short-term global health engagement.

Cost Efficiency, Sustainability, and Replicability Across Multiple Clinical Specialties
While each project differs according to host needs and priorities, HVO has well-documented and efficient systems for partnership development and program monitoring that promote both sustainability and replicability. HVO’s annual operating budget is approximately $1 million, primarily from individual donors, which enables a core staff of 12 to support clinical leadership, volunteers, and project sites. HVO’s clinical expertise and leadership are provided by a cadre of more than 600 volunteer health professionals annually, which reduces costs significantly while also providing sustained support for the training of local health care providers.

Opportunities for Leadership Development
Throughout the organization’s structure, volunteers fulfill a variety of roles to design, implement, and monitor training projects and to support other volunteers. HVO continuously seeks new leadership to fulfill these roles, offering opportunities for clinicians to broaden their professional experience.

Long-Term Collaborations
Strengthening health systems through education and training is a long-term endeavor. Health professionals in both LMICs and higher-income countries alike need ongoing opportunities to hone their skills and learn new approaches, integrate new knowledge into their practice, and develop professionally. HVO establishes enduring partnerships with host institutions, some of which have lasted 3 decades or more, enabling the growth of mutually beneficial and trusting relationships, the creation of a peer professional network, and promotion of opportunities for ongoing training, conference attendance, and research collaboration.

Mutual Skills Transfer
Many HVO volunteers report they learn more than they teach, citing in particular the opportunity to learn about unfamiliar or advanced stage diseases and health conditions, and the provision of care in resource-constrained environments lacking diagnostic tests, advanced equipment, medicines, and sufficient staff.

Constraints of the HVO Model
The types of potential ethical dilemmas inherent in the deployment of short-term health volunteers to LMICs are well-documented and are exactly the dilemmas that our volunteer management model is designed to mitigate, to the extent possible. The HVO model does present some specific constraints that merit exploration, including the following issues.

Data Limitations
HVO’s monitoring and evaluation system, including the data collection tools discussed above, effectively captures project-level data on achievements, challenges, and evolving needs. However, it is difficult to isolate the impact of either an individual HVO volunteer or HVO as a whole on a site, given the range of training inputs, including country-led expertise and the capacity building support provided by other outside actors, such as NGOs, universities, and hospitals. During the next 2 years, HVO plans to develop several in-depth case studies to capture the impact of training efforts over time and to implement a trainee-specific survey.

While HVO’s model is designed to foster progressive and sustained improvements, rapid and measurable gains in evidence-based patient care sometimes occur. In 2018, for example, a volunteer pediatric intensivist and pediatric resident in a Bhutanese hospital worked together to explore high mortality levels in infants in the pediatric intensive care unit (PICU) that had been attributed to acute encephalopathy. The clinicians postulated and later demonstrated that the infants had thiamine deficiency linked to infantile beriberi, leading to new standards of care in the PICU of that hospital and others in Bhutan. Initial data from their study showed that thiamine administration to these children led to a precipitous drop in infant mortality in the PICU (Box).

Teaching Continuity
In HVO’s global health capacity building model, ensuring continuity between volunteer assignments is an ongoing challenge. Aligning the availability of a subspecialty volunteer with a host institution semester-long curricula, for example, can be difficult. This kind of scheduling challenge can be mitigated through advanced and thoughtful planning and, potentially, a combination of on-site and remote teaching. Similarly, ensuring
BOX. Case Study: Identifying Infantile Beriberi in Bhutan

This case study is a condensed version of a longer article published in the HVO summer 2019 newsletter, The Volunteer Connection, written by Dr. Dinesh Pradhan, Pediatric Resident, Khesar Gyalpo University of Medical Sciences of Bhutan (Thimphu, Bhutan), and HVO volunteer Dr. Christoph Funk, Pediatric Intensivist, Dietrich-Bonhoeffer-Klinikum (Neubrandenburg, German), with contributions from Dr. Leila Srour, Chair of HVO’s Pediatric Steering Committee. Dr. Funk served in a 3-month volunteer assignment in Bhutan in 2018, working closely with Dr. Pradhan and other pediatric care providers at the project site.

Bhutanese pediatricians at the National Referral Hospital in Thimphu were grappling with a perplexing problem in the pediatric intensive care unit (PICU): infants who initially presented with nonspecific respiratory or gastrointestinal symptoms that rapidly progressed to acute encephalopathy and, within a week, led to death in almost 80% of cases. Survivors had serious neurological sequelae.

Management focused on treating them as “meningencephalitis” cases with a possible viral etiology. They were treated with antibiotics, antivirals, anti-epileptics, and general supportive care, including nutrition, hydration, and ventilator support, with poor results. Collaboration with the National Institute of Virology in India and the Centers for Disease Control and Prevention in the United States to isolate a virus from the cerebrospinal fluid of these children was not successful.

After observing the survival of such a patient following Dr. Pradhan’s administration of a cocktail of multivitamins, Dr. Funk analyzed the case, postulating that thiamine could have been the key ingredient that made the difference. He researched the literature, which pointed to the possibility of these cases being “infantile beriberi” or thiamine deficiency.

Supported by the hospital’s pediatrics department, Drs. Pradhan and Funk sought to prove their hypothesis. They adapted a protocol from an Indian study to administer thiamine to these children and observe for any improvements, collecting 1 year of data (January–December 2018). They compared 19 children who had not received thiamine (January–July) with 32 who had received it (August–December). None of the children in the thiamine cohort died, whereas 73.7% in the no-thiamine cohort had died. The doctors will seek to prove their empirical findings, but based on their initial study, thiamine administration to children with acute encephalopathy is now standard-of-care in the PICU.

Dr. Pradhan (with funding from HVO) and Dr. Funk presented their research on infantile beriberi in Bhutan at the 2019 Annual Conference of the German Society of Tropical Paediatrics and International Child Health (GTP) and won the Helmut Wolf Award for their work, selected by a jury of scientists and clinicians.

HVO presents a replicable model for ethical and effective short-term global health experiences.

The “Failed Volunteer”

Although it is rare, some HVO volunteers are unsuccessful. Typically, these individuals are volunteers who, despite preparation, realize that they are not personally or professionally equipped to work effectively or to manage the stress of resource-limited environments. They may unduly burden hosts or may interact in a disrespectful or unproductive manner with host institution personnel, and develop a deep understanding of site priorities. Sharing lectures and presentations through HVO’s KnowNET is another way of promoting continuity of training.

continuity of educational content between volunteers introduces a complexity that is not always surmountable, although in strong collaborations between on-site coordinators and project directors, this risk can be mitigated.

Repeat volunteers are invaluable to host sites because they can provide needed continuity, orient first-time volunteers, build and enhance trusting professional relationships with host institution personnel, and develop a deep understanding of site priorities. Sharing lectures and presentations through HVO’s KnowNET is another way of promoting continuity of training.

HVO’s intensive volunteer vetting, approval, and preparation processes tend to screen out such individuals, but it is not always able to do so. We have occasionally found that unsuccessful first-time volunteers can become successful volunteers through the transformative experience of their work with HVO. The capacity for and practice of personal reflection are key in these circumstances because the individual can ultimately achieve “transformation, meaning and connection” through experience.

HVO presents a replicable model for ethical and effective short-term global health experiences. Over more than 30 years, HVO has developed efficient and comprehensive volunteer management structures and systems that enable highly skilled volunteers to improve health workforce capacity in LMICs through short-term teaching and training assignments. HVO’s model integrates best practice guidelines for short-term global health engagement with well-designed training projects implemented through long-term, equitable, and mutually beneficial partnerships.

CONCLUSION

FUTURE IMPLICATIONS AND

HVO presents a replicable model for ethical and effective short-term global health experiences.
An effective and ethical volunteer management system also enables HVO to explore new approaches for education and training delivery that build upon the existing platform. In 2015, HVO launched the Wyss Scholarship for Future Leaders in Global Health to support the professional development and leadership skills of local health care providers at HVO project sites. Thus far, 30 scholars from a wide variety of clinical specialties and countries have been funded to attend conferences and participate in intensive training courses or observerships. In 2018, HVO sponsored the publication of an e-book entitled International Partnerships for Strengthening Health Care Workforce Capacity: Models of Collaborative Education in partnership with the open-access journal Frontiers in Public Health. The e-book consists of 33 peer-reviewed articles submitted by 163 authors from 28 different countries, representing 96 unique organizations and institutions.

Recent programmatic innovations include select opportunities for longer-term volunteers to design responses to complex global health training needs in collaboration with partner institutions, and e-volunteering or distance mentoring for activities such as curriculum development, research support, or leadership skills enhancement. New clinical areas have been added in recent years. For example, projects in obstetrics and gynecology started in 2017, and HVO is exploring a broader approach to physical rehabilitation to build upon the physical therapy program. Increasingly, HVO project sites request training in subspecialty areas such as neonatology, infectious disease, nephrology, cardiology, and neurology, as well as support for research. HVO is expanding recruitment to address these evolving site priorities.

HVO provides a well-structured and cost-efficient model for health professionals interested in sharing and building their skills and knowledge to improve and expand health care delivery in lower resource settings. HVO continues to refine and adapt our model to address evolving global health training needs at project sites and to ensure ongoing alignment with core principles of ethical and effective global health engagement.

Acknowledgments: I am grateful to Nancy A. Kelly, HVO Executive Director, for her inspiring leadership over more than 30 years. I also acknowledge April Pinner, HVO Director of Program Design & Evaluation, for her co-authorship with Ms. Kelly, of “Health Volunteers Overseas: 30 Years of Leveraging International Partnerships to Strengthen Health Worker Capacity,” upon which this article is based.

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REFERENCES
15. Kalkin J. A physician’s perspective on volunteering overseas: it is not all about sharing the latest technology. Front Surg. 2018;4:77. CrossRef Medline
The Open Birth Interval: A Resource for Reproductive Health Programs and Women’s Empowerment

John Ross, a Kristin Bietsch b

The open birth interval is the time since a woman’s last birth. It reflects not only desire for contraception and child health services but also freedom for outside activities, employment, and personal autonomy. It merits attention from policy makers, program managers, and service providers.

INTRODUCTION

Every woman who has ever given birth has a most recent birth, and she now stands at some point removed from it, in an “open interval.” Some women go on to another pregnancy and birth, but some never do, remaining permanently in the open interval. This interval is entirely different from the well-known “closed interval,” which pertains only to the time between 2 births in the past. The open interval can be determined from a simple question: “How long has it been since your last birth?” Recent national surveys can provide a current snapshot, and changes through time can be detected by reference to earlier surveys.

We undertook research on the open interval, with the expectation that it holds promise for a deeper understanding of reproductive behavior, women’s status, and demographic processes. This study was exploratory in nature, rather than an investigation of a specific hypothesis. It required assembling the first general body of empirical information on interval lengths, and it included the following research questions:

- Currently, how are women distributed by the age of their youngest child?
- How does this distribution vary over time, by region, and by fertility levels?
- How does the open interval distribution relate to personal characteristics (age, wealth quintiles, etc.) and to reproductive health variables (contraceptive use, unmet need for contraception, intention to use a method)?
- How do these variables change within the first year after birth and in each ensuing year for the age of the youngest child?
- Has the declining percentage of women having children been offset by the overall increasing number of women, leading to a higher absolute number of women needing pregnancy and child care services?
- What are the likely policy and program applications of information on numbers and trends in the age of the youngest child?
- What are the implications of the age of the youngest child for women’s roles, their freedom to pursue activities other than those related to pregnancy and child care, their participation in the labor force, and their empowerment?

In this commentary, we discuss our findings for these questions and show how the open interval distribution, based upon a single question in national surveys, can usefully augment other information for analytic and management purposes.

LITERATURE REVIEW

Literature on the open interval is primarily composed of highly technical modeling work, starting in the mid-1960s, with publications by Sheps et al. in 1967 and 1970 and later by Srinivasan and Schmertmann and others. Some of the literature conveyed skepticism about the usefulness of the open interval for program applications, but such doubts were expressed without the benefit of actual data for countries showing the interval’s close relationship to contraceptive use, unmet need, and fertility measures. A recent review by Singh provides a thorough summary of the modeling analyses through 2015 and concisely explains their main assumptions. Some of this literature focuses on the possible relationships between closed and open intervals. Very little empirical information has been available on actual open intervals until now, when we have a large set of
national surveys providing data over time on women’s intervals since their last birth.

However, for 4 countries—Ethiopia, Kenya, Tanzania, and Zimbabwe—a notable analysis of past survey trends incorporates both closed and open intervals, using technical methods to combine data to estimate both time trends and determinants. This analysis reveals that intervals in all 4 countries have lengthened, predominantly due to increased use of contraceptives. Intervals in these countries now range from 35 to 51 months. The intervals have been lengthening continuously, notably at a faster pace and to greater durations in urban areas compared with rural areas.

An early Taiwan survey in the 1960s that included the open interval showed that it explained socioeconomic variations in fertility levels at ages 30–39 better than past closed intervals. That survey further showed that contraceptive practice had helped extend the intervals.

One experimental study included the open interval as a predictor of contraceptive adoption. It used before and after surveys in 2 Korean counties to test which baseline characteristics of the women would correspond to adoption of a method between the surveys. These characteristics included items such as age, family size, education, having enough sons, stated desire to use a method, and exposure to mass media, in addition to time since the last birth. In the county with a strong family planning program, 57% of women with open intervals shorter than 30 months adopted a method, but only 9% did so if the intervals were longer. In the other county, which had a weaker program, the stated desire to use a method was the strongest predictor.

One section below concerns the first year after birth, termed the “extended postpartum period, defined as the first year after birth.” There is an extensive literature on women’s needs and behavior in that year, but here we refer to only selected sources, as explained in that section, for postpartum programs offered at or soon after women give birth.

### DATA AND METHODS

This study uses 232 Demographic and Health Surveys (DHS) conducted from 1985 onward in 74 countries, of which 56 have multiple surveys. The focus throughout is on the time since the woman’s last birth, for currently married/in union women of reproductive age (15–44 or 15–49 depending on the survey). The analyses below pertain only to married women who have had at least 1 birth, although for brevity we refer simply to women.

The inclusion of unmarried women would have complicated this first examination of open intervals across many countries. Countries are weighted equally in all averages presented below.

The key DHS variable in our study is the time elapsed since the most recent birth, and we use this period as an approximation for the age of the woman’s youngest child. In doing so, we neglect errors due to nonreporting of a most recent birth when the child died, in which case the youngest child is from an earlier birth. For example, if the latest birth was 10 years ago but the child died, the woman may be reporting a birth that occurred 12 years ago.

Pregnant women are usually included with the women closest to birth (those in the first 3 months or alternatively the first year after birth). Pregnant women represent 9% of all married women, on average, or 31% of those within the first-year category. The actual measurement of the open interval is subject to errors, as with misdating of births and with births omitted due to infant deaths; also, the data on current pregnancies omit early, unrecognized conceptions. We assume here that the error components are minor for our purposes, are constant for trend estimates, or both. Unmet need, referring basically to women not using any method but who are still fecund and wish to avoid pregnancy, has been defined technically with variations, but as used in this article, it follows the standard DHS definition. The various alternatives that have been suggested give both lower and higher estimates of unmet need. For this study, however, we use the DHS definition, as taken from the survey files. For some older surveys, we calculated unmet need using the Stata Do-file available on the DHS website. Actual open intervals can extend from a single birth when a woman is 15 years old to when she is age 50, for a maximum of 35 years, but in practice most are far shorter.

Stata 15 and R software were used to access the individual survey files and tabulate the data. The analytic methods included tabulations across countries and over time, with selected summary measures and regression techniques.

### RESULTS

**Patterns Among Countries and Over Time**

We use 2 figures to illustrate first, the character of the open interval distribution, and second, to show how the distribution differs by country and over time. These figures use 1- or 5-year intervals
up to 15 years (i.e., they include women whose youngest child is up to 15 years old).

In Figure 1, we compare Nigeria and Indonesia to illustrate the differences between a high-fertility country, with women clustered close to a recent birth, and a mid- to low-fertility country, with a broader spread. Women in Nigeria, a high-fertility country, are more heavily involved in childbearing compared with women in Indonesia, which has a lower fertility rate. Consequently, the resource demands on pregnancy, delivery, and early child care are considerably different between the 2 countries.

Further, such demands can change over time, as illustrated by the trends in Bangladesh (Figure 2). The percentage of women either pregnant or within a year of delivery has fallen from about 25% in 1993 to about 13% in 2014. Such a large reduction, of about half, has clear implications for changes in managerial decisions and for the health ministry’s plans with regard to supplies, types of clinic loads, personnel decisions, and budgetary allocations. Only through the open interval distribution is information available to contrast the service needs of women with children at various ages.

On average over all 74 countries, a remarkable one-fourth of women are pregnant or in the first year after birth and another fourth are clustered in their second or third year. The other half are spread thinly, at declining percentages, over the ensuing years, albeit with a peak of 8% in the final interval, which represents women whose youngest child is aged 15 or older (Table 1).

Supplement 1 documents the variation around the average figures, by country and by region. Among regions, the proportion of women who are pregnant or have an infant is as low as 10% in Europe/West Asia and as high as 36% in West/ Central sub-Saharan Africa. Among countries, the proportion is 15% or less in India, Bangladesh, Vietnam, Indonesia, and Nepal, as well as in Kazakhstan and Turkey, and in most countries listed in Europe/West Asia. The highest percentages are in the 2 sub-Saharan regions, exceeding 40% in Chad, the Democratic Republic of the Congo, and Niger. The range represented by the various countries—from 10% to over 40%—implies a great deal about the variation in the daily activities and personal options for the women involved, given how much women’s lives can change when they no longer have the care of very young children.

The greatest regional contrast is between sub-Saharan Africa (38 countries) and other regions (36 countries), as depicted in Figure 3, which displays the range of variation within each of the 2 regional groupings, as well as the dissimilar averages. In nearly all sub-Saharan African countries, more than 70% of women have a young child under age 5, while in the other regions the percentage is at or well below

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**FIGURE 1. Distribution of Women of Reproductive Age by the Open Birth Interval in Nigeria and Indonesia**

Changes in open birth intervals have clear implications for planning with regard to supplies, types of clinic loads, personnel decisions, and budgets.

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a Based on latest Demographic and Health Surveys for Nigeria (2013) and Indonesia (2012).
60% in most countries. The percentages are much higher and closer together in sub-Saharan Africa than elsewhere; consequently it bears a much heavier burden of health and demographic investments for youth.

Birth Intervals Are Lengthening in Most Countries
As contraceptive use has increased over the years, more women are going longer without a next birth. In our data set, 56 countries had multiple surveys, and a comparison of the earliest and latest survey in each country (average 17.3-year gap) shows a drop from 32.7% to 26.5% of women in the first interval (pregnant or in the first year after birth) and an increase from 26.1% to 31.3% in the final interval of over 5 years (data not shown). The intermediate intervals are consistent with that transition, with an initial decline and a subsequent increase. These changes modify the circumstances of many women as they are freed from the care of children in their early years of life. An additional view of the lengthening intervals over time in these countries is provided in the section labeled “A Simple Model Captures the Open Interval Distribution.”

The Mix of Reproductive Statuses Evolves Over the Intervals
Rapid changes occur in women’s lives as their youngest child ages. Figure 4 separates women in each interval after birth into mutually exclusive categories (adding to 100%) to show the major shifts. It is understood, however, that overlaps exist between categories. In particular, many pregnant women also have unmet need under the DHS definition, so Table 2 separates out all women with unmet need to clarify the proportion who are currently pregnant. (This approach also applies to...
In Table 2 and in both figures, the intention to use contraception ("intends") is recognized separately from unmet need.

After pregnancy, women reporting amenorrhea are prominent in the first year, but that proportion declines rapidly. Afterward, contraceptive use increases, and it remains important in all intervals (women who are both amenorrheic and using a method are counted as users). Women are also divided into those who have an unmet need (and again by whether they intend to use contraception in the future or not) and those without unmet need (and whether they intend to use contraception in the future).

Total unmet need (sum of the first 2 bars below contraception for both those intending to use and not intending to use) grows substantially across the intervals. Total intention to use (first and third bars below contraception) is less than total unmet need, but it remains at a near constant level after the first year until shrinking in the final interval. Notably, the largest of the 4 subgroups pertains to
women classified with unmet need who say they do not intend to use a method, which underscores the importance of watching trends for intention to use regardless of unmet need.

Infecundity in Figure 4 is not important until the final interval, which includes many of the oldest women. Figure 4 and Figure 5 are snapshots across the intervals. In contrast, flows through time would

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**TABLE 2.** Profiles of Women of Reproductive Age by Contraceptive Use, Unmet Need, and Intention to Use a Method: Unweighted Averages for 74 Countries, Latest Demographic and Health Surveys, Various Dates

<table>
<thead>
<tr>
<th>Open Interval (Months)</th>
<th>Pregnant</th>
<th>0–11</th>
<th>12–23</th>
<th>24–35</th>
<th>36–47</th>
<th>48–59</th>
<th>60+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>All women</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100.0</td>
</tr>
<tr>
<td>Contraceptive use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>15.8</td>
<td>20.5</td>
<td>12.1</td>
<td>7.2</td>
<td>5.2</td>
<td>4.1</td>
<td>35.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Traditional</td>
<td>14.7</td>
<td>18.1</td>
<td>13.2</td>
<td>8.8</td>
<td>7.0</td>
<td>38.2</td>
<td></td>
<td>100.0</td>
</tr>
<tr>
<td>Modern, short-acting</td>
<td>16.8</td>
<td>20.9</td>
<td>15.5</td>
<td>10.6</td>
<td>7.4</td>
<td>28.8</td>
<td></td>
<td>100.0</td>
</tr>
<tr>
<td>Modern, long-acting</td>
<td>7.5</td>
<td>12.7</td>
<td>12.0</td>
<td>9.3</td>
<td>8.1</td>
<td>50.4</td>
<td></td>
<td>100.0</td>
</tr>
<tr>
<td>Unmet need</td>
<td>14.5</td>
<td>23.0</td>
<td>19.9</td>
<td>11.6</td>
<td>7.4</td>
<td>5.4</td>
<td>18.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Spacing</td>
<td>19.7</td>
<td>29.4</td>
<td>23.0</td>
<td>11.6</td>
<td>6.3</td>
<td>3.9</td>
<td>6.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Limiting</td>
<td>9.2</td>
<td>15.5</td>
<td>15.9</td>
<td>12.5</td>
<td>9.8</td>
<td>8.1</td>
<td>29.0</td>
<td>100.0</td>
</tr>
<tr>
<td>None</td>
<td>9.3</td>
<td>19.7</td>
<td>15.9</td>
<td>11.5</td>
<td>8.3</td>
<td>6.3</td>
<td>28.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Infecund</td>
<td>0.0</td>
<td>2.2</td>
<td>1.8</td>
<td>1.3</td>
<td>1.5</td>
<td>1.6</td>
<td>91.6</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Intention to use**

<p>| | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Using already</td>
<td></td>
<td>13.9</td>
<td>18.6</td>
<td>14.2</td>
<td>9.9</td>
<td>7.3</td>
<td>36.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Intends to use</td>
<td>25.6</td>
<td>29.0</td>
<td>13.9</td>
<td>7.4</td>
<td>4.9</td>
<td>3.5</td>
<td>15.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Does not intend</td>
<td>7.2</td>
<td>13.1</td>
<td>10.6</td>
<td>7.0</td>
<td>5.4</td>
<td>4.5</td>
<td>52.2</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**FIGURE 5.** Distribution of Women by Open Birth Interval by Quarter Within the First Year After Birth, According to Reproductive Health Status: 74 Countries, Latest Demographic and Health Surveys, Various Dates

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360
show a great deal of movement in and out of categories for contraception and by the methods used, as well as in and out of the categories for unmet need and intention to use.

We do not show the systematic shift across the intervals from unmet need for spacing to unmet need for limiting. As noted in the Methods section, alternative definitions of unmet need have been proposed, but we are constrained by the available data to using the standard DHS definition. In the early intervals after birth, the need for spacing births dominates, but the 2 needs are about equal by the third year. Afterward, the need for limiting takes precedence. In the final interval, unmet need for spacing is nearly zero. This finding carries administrative implications for commodity requirements and budgetary adjustments.

Next, Figure 5, which focused on changes within the first year, shows rapid transitions in the mix of statuses. It separates women by the time that has elapsed since their last birth and shows the dominance of amenorrhea in the early months after birth. Its proportion shrinks through the following intervals, being largely replaced by contraceptive use. The 2 unmet need segments grow, leaving very small shares for women with no need and no intention to use and for infecundity.

Supplement 2 provides for each region a set of changes across the intervals for pregnancy, contraceptive use, unmet need crossed by intention to use, and infecundity.

**Key Subgroups Are Spread Differently Across the Intervals**

Above we asked what proportion of women in each interval were using contraception, intending to use, or having an unmet need. Now we ask a different question: how are all contraceptive users distributed across the intervals; how are those women with an intention to use distributed; and how are women with an unmet need distributed (Table 2). For program purposes, it is important to know how these groups are spread according to the age of the youngest child and how they change from one survey to the next. Brief notes follow for each of the 3 groups.

**Contraceptive Use**

The type of contraceptive use changes as women move toward the intervals further from their last birth. Nonusers are concentrated among those pregnant or in the first year after birth; afterward, the decline in nonuse is quite marked, and it continues to fall off until the final group at 60+ months, where it is quite large, partly reflecting the increase in infecundity and menopause. A regular shift occurs among users of traditional methods through time; this shift is also apparent among users of short-acting methods. Balancing these shifts is the pattern for long-acting methods. Their dominance after the 5-year point reflects a dual process: as time goes by, women tend to choose a longer-acting method, and women who choose a long-acting method automatically extend their intervals.

**Unmet Need**

Some pregnant women are considered to have unmet need. Unmet need occurs if they did not want the current pregnancy/last birth at all (unmet need for limiting) or wanted the current pregnancy/last birth to occur at a later time (unmet need for spacing). Otherwise, they are regarded as having no unmet need.

We found that of all women with unmet need, 14.5% were currently pregnant. Another 23% fell within the first year after birth and 19.9% in the second year. These 3 groups accounted for 57.4% of all unmet need. This percentage creates a division of roughly half the unmet need being in the very early intervals for mothers with a child below age 2 and the other half among those with older children.

The need for spacing as opposed to limiting shifts systematically with longer intervals after birth. For currently pregnant women, the ratio is 19.7% for those wanting to space births against 9.2% who want to limit births. That ratio reverses sharply to 6.1% vs. 29.0% in the final interval. These shifts and differences among married women contain significant information for the mix of needed services.

**Intention to Use a Method**

A woman’s own declared intention to use or not to use a contraceptive method has advantages over the unmet need estimate, which is a statistical construct based on several variables. The 2 measures overlap only partly; some women classified with unmet need do not intend to use, and some women who intend to use do not have unmet need.

Over half of those who intend to use a method are in the early intervals, being either pregnant or in the first year after birth. Among those already using a method, 13.9% are in the first year, nearly 47% are within the first 3 years, and a third are in the final interval, a fairly wide spread. The distribution for those not intending to use, with half in the final interval, reflects a mix: some are not

As time goes by, women tend to choose a longer-acting method, and women who choose a long-acting method automatically extend their intervals.

The need for spacing as opposed to limiting shifts systematically with longer intervals after birth.
interested, some lack access to services, some are already menopausal/infecund, and some have other reasons.

Examining the contraceptive method mix in more detail is always useful because it changes in important ways as the youngest child ages. As Figure 6 shows, the injectable, pill, and traditional methods play the strongest roles through most of the intervals, but injectables clearly decline in the later intervals. Condom use also starts strong but declines quickly. Meanwhile, use of the intrauterine device (IUD) increases steadily, as does sterilization (both sexes), which is the most common method by the final interval. All methods add to 100% in each interval.

Thus, women tend to adjust their choice of methods as they and their youngest child age. Although the specific pattern may vary across regions and by personal characteristics, trend information on the open interval can provide useful information for each country regarding changing method preferences. Finally, the pattern pertains to current users, not annual adoptions. The percentage using sterilization reflects an accumulation of past adoptions; that is true to a lesser extent for the IUD and implant. On the other hand, current use of all spacing methods reflects adoptions in the recent past.

Demographic Groups Show Systematic Patterns Across the Intervals

Systematic changes occur across the open intervals according to personal characteristics because they correlate broadly with reproductive health needs (Supplement 3). By age, the older women are, the longer the time that has elapsed since the latest birth. Women aged 15–19 cluster as either pregnant or in the first year, while women aged 45–49 are nearly absent in all intervals except the last one. By number of living children, the pattern mirrors that for age. The shift in the interval since the last birth is perfectly regular: more recent for women with 1 child to more distant for those with 4 or more. By residence, the differences are not large, but they run in the expected direction: rural women with their higher fertility rates fall within the more recent intervals, with more recent births. Finally, by wealth quintiles, the contrasts are entirely regular: the poorer the women, the more likely they are pregnant or have an infant in arms. Among the wealthiest women, the youngest child is older than in any other group. It should be noted that the measure of wealth is defined by the household in which the woman lives.

Changes Over Time for Percentage Distributions Can Mask Changes in Numbers of Women

Changes in the percentages of women within each of the open interval categories do not necessarily translate into similar changes for absolute numbers of women. Trends for numbers arise from both population growth and the trends in the percentages. In general, we expect that the growing number of women in the population will offset

FIGURE 6. Contraceptive Method Mix by Open Birth Interval: 74 Countries, Latest Demographic and Health Surveys, Various Dates

<table>
<thead>
<tr>
<th>Year Ago</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth 5+</td>
<td>25</td>
</tr>
<tr>
<td>Birth 4-4.9</td>
<td>20</td>
</tr>
<tr>
<td>Birth 3-3.9</td>
<td>15</td>
</tr>
<tr>
<td>Birth 2-2.9</td>
<td>10</td>
</tr>
<tr>
<td>Birth 1-1.9</td>
<td>5</td>
</tr>
<tr>
<td>Birth in Last Year</td>
<td>0</td>
</tr>
</tbody>
</table>

Abbreviation: IUD, intrauterine device.
declines in the percentages of pregnant women and often override them. Consequently, the absolute numbers may actually increase, even while the percentages decline for women who are either pregnant or in the first year after birth.

The 4 countries in Figure 7 were chosen to illustrate the various patterns that can arise. The earliest survey serves as an index of 100. The left panel, for pregnant women, contrasts the relative trends for percentages versus numbers, and the right panel, for women in the first year after birth, shows similar contrasts.

- Bangladesh’s long-term increase in contraceptive use has markedly reduced the percentage of women who are pregnant or in their first year after birth. Early and continuing fertility declines have attenuated growth in the number of childbearing women, so the numbers pregnant have stayed roughly stable.

- The picture is far different in Ethiopia and Pakistan. These countries have experienced 30% to at least 35% declines in the percentage of women who are pregnant, with lesser declines for women in the first year after birth. However, the numbers have increased: 10% to 19% for pregnant women and 35% or more for those within a year after birth.

- Peru presents a different case. Both the percentages and the numbers have declined, by roughly 40% for those pregnant or those within a year after birth, accompanied by significant declines in numbers. That pattern emerges from an early and sharp increase in contraceptive use between 1991 and 2000, with a corresponding decline in the total fertility rate that modified the age structure toward relatively fewer women of childbearing age by 2012 (latest survey). Total contraceptive use rose from 40% in 1986 to 70% and higher after 2000, while the total fertility rate fell from 4.1 to about 2.5 in the same years.

These cases show that managers must track numbers, not just percentages, as they change through time. Numbers may grow within all intervals, but not proportionately. Instead, as fertility and pregnancy rates decline they may grow much less in the early intervals.

**Relationships Are Close Between the Open Interval and Other Fertility Measures**

The open interval offers its own advantages compared with the familiar ones of the total fertility rate (TFR), the general fertility rate (GFR), and the age-specific fertility rates (ASFR). These rates commonly pertain to births over the previous 3 to 5 years, as in the DHS reports, but the open interval as a survey snapshot can reflect the current state due to both recent births and the behavior over many past years that produced the older children.

Further, changes in the open interval and in the other rates behave somewhat differently as annual births occur. More births elevate the GFR and TFR, but they affect the open interval distribution mainly only at the start, where the births are located. A burst in the fertility rate tends to increase women in the first interval, but other parts of the distribution can change if births start coming more than usually from women located in the later intervals. In addition, if more women than usual in the final interval age out, that can modify the distribution. In general, however, the shape of the distribution is relatively stable.

Closed intervals, as valuable as they are, omit much reproductive behavior. Many women are actively avoiding pregnancy and birth and will never have another. Most women who have gone 5 years without a birth tend not to have another; 84% of closed intervals are less than 5 years long (mean across 298 DHS surveys in the STATcompiler, accessed July 22, 2018).

A very close correlation exists between the open interval and the usual fertility rates. For the 74 countries in the current study, the correlations are 0.93 to 0.97 between the GFR or TFR and such open interval measures as the percentage of women who are within the first year after birth, or equally, the percentages within 2 years, or 3, 4, or 5 years after birth (Table 3). Those correlations are all positive except the last one: the more women in the earlier intervals, the higher the fertility rate. But for intervals of 5 years or more, the correlation (0.93) reverses direction: the more women going without a birth for a long time, the lower the fertility rate.

Given this close association between the open interval and the TFR or GFR, the single question on when the last birth occurred provides an added picture of fertility behavior, one that has its own advantages and is free of the multiple questions needed to calculate the TFR and GFR.

Finally, the average level of the TFR is clearly associated with the open interval. Countries averaging a TFR below 3 have well over half (56%) of married women with the youngest child over age 5 years.
5. At the other extreme, countries averaging TFRs over 5 have only a fifth (20%) in that bracket. In between the parallels are exact (Table 4).

A Simple Model Captures the Open Interval Distribution
The shape of the open interval distribution is remarkably similar across countries. Because the pattern is nearly universal, a model with just 2 parameters captures the level and the sharpness of the decline in numbers of women as the intervals since the last birth become longer. These 2 parameters, labeled $a$ and $b$ in a power equation, are discussed in Supplement 4 and the values of the parameters are provided for all surveys in the 74 countries. Supplement 4 also shows how the shape of the open interval distribution can change over time; illustrated by Rwanda, which has had a strong anti-natalist national policy with vigorous implementation. On average, between 1992 and 2005, 44% of married women were either pregnant or in the first year after birth; that fell to a remarkable 30% in the 2010 and 2014 surveys.

Women’s Empowerment Is Related to the Age of the Youngest Child
Upon release from child care, women have more options for activities outside of the home. They can explore or widen roles other than

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**FIGURE 7.** Changes in the Percentage of Reproductive Age Women Who Are Pregnant or in the First Year After Birth, in Bangladesh, Ethiopia, Pakistan, and Peru

<table>
<thead>
<tr>
<th>Year</th>
<th>Pregnant</th>
<th>Birth in Last Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>125</td>
<td>75</td>
</tr>
<tr>
<td>1995</td>
<td>100</td>
<td>75</td>
</tr>
<tr>
<td>2000</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>2005</td>
<td>100</td>
<td>75</td>
</tr>
<tr>
<td>2010</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>2015</td>
<td>100</td>
<td>75</td>
</tr>
</tbody>
</table>

Number of Women in Category | Percent of Women in Category
pregnancy—different ones from the homebound duties tied to motherhood. Some of the new options are economic in nature, and one way to examine these changes is by the degree of women’s participation in the labor force. We used data from the International Labor Organization on women’s participation in the labor force to compare the rate of their participation to the proportion of women whose youngest child is over age 5. The results are based on a fixed effects analysis, which controls for spurious cross-country correlations. For example, compared with other regions, Asian countries tend to have both longer intervals since the last birth, suggesting greater female freedom, and lower rates of labor force participation, running counter to the relative levels in other regions. But within individual countries, the association is generally positive between the open interval and female participation in the labor force. When the changes over time within individual countries are averaged, a positive correlation results, for a ratio of 10:4; that is, for a 10 percentage point increase of women whose youngest child is over age 5, there is a 4 percentage point increase of women in the labor force. Against a global average of 39% of women in the labor force, that increment is notable.

The parallel trends of female participation in the labor force and the age of the youngest child are shown in Figure 8, in which 4 countries were chosen to illustrate different country situations from 3 regions. The top panel, drawn from the DHS, is matched by date to labor force information in the lower panel. A faster pace in both respects is evident for Bangladesh in comparison with Pakistan, but Peru outpaces both, especially in the high and rising growth of women in the labor force. Ethiopia represents a sub-Saharan African country with many women in the labor force, despite having the lowest percentage of women whose youngest child is over age 5. These are some of the country contrasts that lie behind the average 10:4 ratio.

In general, the balance of home roles and outside roles changes as the youngest child ages. Women can engage more in formal employment and small business ventures, with more personal income and enhanced power within the family. They can be out in the greater world, with enhanced freedom of movement, seeking job training and further education and making wider social connections. Such changes tend to enhance both gender equity and female empowerment.

### TABLE 3. Correlation Coefficients Between Open Interval and the General Fertility Rate and the Total Fertility Rate: 74 Countries, Latest Demographic and Health Surveys, Various Dates

<table>
<thead>
<tr>
<th>Length of Open Intervals (months)</th>
<th>General Fertility Rate</th>
<th>Total Fertility Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;12</td>
<td>0.96</td>
<td>0.97</td>
</tr>
<tr>
<td>&lt;24</td>
<td>0.96</td>
<td>0.97</td>
</tr>
<tr>
<td>&lt;36</td>
<td>0.96</td>
<td>0.97</td>
</tr>
<tr>
<td>&lt;48</td>
<td>0.95</td>
<td>0.96</td>
</tr>
<tr>
<td>&lt;60</td>
<td>0.93</td>
<td>0.94</td>
</tr>
<tr>
<td>60+</td>
<td>(0.93)</td>
<td>(0.94)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TFR</th>
<th>Pregnant/1–11</th>
<th>12–23</th>
<th>24–35</th>
<th>36–47</th>
<th>48–59</th>
<th>60+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3</td>
<td>14.2</td>
<td>9.4</td>
<td>7.9</td>
<td>6.7</td>
<td>5.8</td>
<td>55.9</td>
<td>100.0</td>
</tr>
<tr>
<td>3–3.9</td>
<td>23.4</td>
<td>13.9</td>
<td>10.4</td>
<td>7.9</td>
<td>6.3</td>
<td>38.1</td>
<td>100.0</td>
</tr>
<tr>
<td>4–4.9</td>
<td>30.6</td>
<td>17.2</td>
<td>11.6</td>
<td>8.2</td>
<td>5.9</td>
<td>26.7</td>
<td>100.0</td>
</tr>
<tr>
<td>&gt;5</td>
<td>37.8</td>
<td>20.0</td>
<td>11.0</td>
<td>6.5</td>
<td>4.5</td>
<td>20.3</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Abbreviation: TFR, total fertility rate.

As the youngest child ages, women gain more opportunities and a greater role in economic development.
The development process can also be hastened by greater female equity in these respects. The World Bank notes that:

... gender equality is a core development objective in its own right. But greater gender equality is also smart economics, enhancing productivity and improving other development outcomes. It urges closing of gender gaps in access to economic opportunities, earnings, and productivity.

Further, the World Bank asks for a reduction of gaps in human capital, specifically those that address female mortality and education. It notes that:

In nearly every country today, women face barriers to fully participate in the work force and earn as much as men. Because of this, women account for only 38 percent of their country’s human capital wealth, defined as the value of the future earnings of their adult citizens—versus 62 percent for men. In low income and lower-middle income countries, women account for just a third or less of human capital wealth.

The development process and the roles of women are intertwined in many respects, including the extent of their involvement in childbearing. To explore this relationship, we examined the association between GDP (gross domestic product) per capita and the percentages of women either pregnant or with an infant (up to 1 year old). The relationships across the 74 counties in our analysis appear in Figure 9A and Figure 9B, first for lower pregnancy rates and second for presence of an infant. The figure shows the negative association between the two with GDP per capita income (R² values 0.40 and 0.48, respectively). All 3 are in turn related to the prevailing fertility rates (not shown) since lower fertility is associated with high GDP per capita and also with the 2 measures of child care. Overall, the associations in the figure are consistent with a link between faster national development and the percentage of women free from early child care.

These issues are intertwined. Reductions in child care encourage labor force participation, which in turn often leads women to postpone or avoid a next birth. Women can bring advantages to the economy and can hasten the development process, which then tends to enlarge job opportunities for more women to enter selected occupations. The results of these processes can serve to advance women’s empowerment.

Program Designs Can Benefit From Open Interval Information

Each part of the open interval distribution tells a story that programs can benefit from.
FIGURE 9. Relationship Between Gross Domestic Product (GDP) per Capita and Women’s Childbearing

A. Relationship Between Per Capita GDP and Percentage of Pregnant Women

B. Relationship Between Per Capita GDP and Percentage of Women With an Infant
the proportions of women who are pregnant or have recently given birth signal necessary modifications in the allocation of the services needed. These pertain especially to maternity care, postpartum services, and early contraceptive offerings. But equally, attention to the numbers in the intermediate and later intervals can clarify the likely need, or market, for the changing mix of contraception shown above between short-acting and long-acting methods.

Absolute numbers within the various intervals are important for planning, as are rapid changes in method mix from one survey to the next in particular intervals, as they have been in sub-Saharan Africa toward the implant and injectable. Close monitoring for these methods, along with the numbers involved, enables modifications to supply lines, personnel allocations, clinic operations, and budgets by type of expenditure.

Asking about the age of the youngest child is useful for service staff who provide family planning. Counselors and fieldworkers may already ask about the age of the woman’s youngest child, but that information is not captured in the usual service statistics systems that are fed upward for management purposes. It is available only in surveys at national and lower levels. Where not already systematically done in client contacts, establishing the youngest child’s age provides a springboard to ask about intentions for spacing or limiting in counseling about contraceptive methods, and it affords an opportunity to enquire about key health services for the child such as immunization.

In rural and peri-urban settlements, where many women lack easy access to services, workers should pay particular attention to women with very young children because they are the most likely to have early, unplanned pregnancies. All outreach activities should recognize that a woman’s need for, readiness for, and interest in contraceptive use is tied closely to the age of her youngest child.

**Postpartum Avenues**

The “extended postpartum period,” the first year after birth, has been of particular interest since the 1960s. Most women after a birth do not want another one quickly, and at delivery most are in immediate contact with the needed services, as well as later at the 6-week checkups. While many women will avoid another conception during much of the first year owing to amenorrhea, delays often occur before adoption of contraception, and the most fecund “early conceivers” will often have unplanned pregnancies. Some overlap of contraceptive protection with amenorrhea can occur, but given the downside risk of an unplanned pregnancy, the better strategy usually lies with adoption of a method relatively soon. Further, access to the method before leaving the hospital is important for those who will not be seen again. Programs must work in the large and cannot be fine-tuned to the return of menses for the individual woman. The rationales for the programs have also included the health benefits of adequate birth spacing, and linkages at or soon after birth to parts of the health system for women, both for themselves and for preventive services for their child, notably immunization.

Meanwhile, attention continues to be focused on “best practices” for the implementation of these programs, as in a review by Cleland et al. They examined the effects of 35 interventions by time and type (antenatal, postnatal, both, and integration with other services), finding generally positive impacts of the interventions. The evidence was regarded as incomplete but still useful for guidance to advance postpartum programs in different contexts.

In general, program implementation can only gain by knowledge of where women are within the open interval distribution and how the distribution has changed over time.

**Program implementation benefits by knowledge of where women are within the open interval distribution and how the distribution has changed over time.**
behavior change communication in communities to enhance information and demand.

The survey data show that substantial percentages of women want to postpone a next pregnancy for 2 years or longer, so even for those who wish to space rather than limit, the reversible long-acting methods have a role to play, especially given their low failure and discontinuation rates. Van Lith et al. found that even in sub-Saharan Africa (18 countries) demand for limiting exists among 14% of women, and for spacing among 25%, and that among all married women, the 2 are nearly equal. Women wishing to limit are an unappreciated subgroup for whom longer-acting methods are being neglected. Jacobstein found that the implant now ranks first or second among all methods in 10 countries, reflecting sizeable price reductions, increased commodity supply, broader World Health Organization eligibility guidelines, and improved service delivery practices. These illustrate the potential of service improvements in combination with long-acting methods that can assist women across all of the open intervals.

Ministries of health have additional channels to broaden access to contraceptive assistance. While family planning efforts have focused on integration with immunization services for children, little attention has been paid to linkages with curative health services for them. Unlike immunization, curative treatments continue throughout childhood at a variety of clinics for such ailments as diarrhea, pneumonia, injuries, and infections. The mothers rather than the fathers usually accompany children needing attention, and finding creative ways to link family planning to these services deserves fresh thinking, especially given current emphases on primary health care. For the mothers, the growth of cancer screenings is an additional service of interest.

**DISCUSSION AND CONCLUSIONS**

The simple question “How long has it been since your last birth?” differentiates women in a fundamental manner, by the age of their youngest child. Easily available over time in national surveys, the open birth interval shows movement through the stages of reproductive behavior, it informs fertility analyses, and it offers guidelines for national action programs. In addition, it relates to women’s movement into the labor force and to policies for women’s empowerment.

For the first time, a large body of empirical information on the open birth interval has been assembled and analyzed. This study shows that the distribution has a characteristic shape, with a substantial proportion of women near a birth or expecting one soon, then declining proportions through 15 years and beyond. While this characteristic shape is present everywhere, the relative proportions between the first year and the later years varies a great deal, from countries with very low fertility and therefore few women either pregnant or in the first year after birth, to countries with high fertility rates and therefore many women who are pregnant or in the first year after birth. The simple model presented in Supplement 4 captures these changes and allows for estimates across countries and over time.

The age of a woman’s youngest child carries important implications for her freedom of action, and it varies greatly across regions. In sub-Saharan Africa at one extreme, and in the European/West Asia countries at the other, women are preoccupied to greater and lesser degrees with pregnancy and childrearing. Correspondingly, they vary in the ages at which they are able to pursue other roles. Much of that is captured in the distribution of delays since the latest birth, as women’s circumstances fundamentally change as their youngest child moves from infancy to childhood to school and finally departs from the home. In between, the needed health and social services evolve in character.

For public programs devoted to reproductive health, the distribution of women along the axis of their youngest child, and the absolute numbers within each of the early intervals, are basic for planning. Information by year within the open interval is unique; it gives insights not present in averages and overall estimates.

Policy makers should examine open birth interval data in making economic development policy. They should recognize that providing voluntary family planning services not only benefits individual women but also advances overall economic development. Considerations of social policy and equity for women can only benefit from information on the proportions of women preoccupied with childbearing and the extent to which women can enter the labor force. Those estimates and the changes from one survey to the next are relevant to advocacy efforts to reduce barriers to equal earnings and opportunities for the advancement of girls and women.

We recommend that national planners for reproductive health programs and social policy examine each new survey for the open birth interval distribution and its correlates, in light of changes since the previous surveys. This information will augment other bodies of information.
currently in use to strengthen both the planning and the implementation of national programs.

Acknowledgments: We thank Michelle Weinberger for detailed suggestions, Anrudh Jain and Al Hermalin for important guidance, and Tom Pullum for helpful early discussions.

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REFERENCES

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Provider Bias in Family Planning Services: A Review of Its Meaning and Manifestations

Julie Solo, a Mario Festinb

Provider bias, including bias regarding client age, parity, and marital status, persists as an important barrier to contraceptive choice and access. Newer approaches to mitigate bias that have moved beyond training and guideline development to more fundamental behavior change show promise.

ABSTRACT
Family planning programs are guided by the principle of informed choice as well as the goal of providing a broad choice of contraceptive methods to clients. Provider bias is an important barrier to realizing this goal, but it must be clearly defined and understood to be effectively addressed. This review presents an overview of the concept of provider bias in family planning, focusing on the following issues: (1) what it is, (2) how widespread it is, (3) its underlying causes, (4) its impacts, and (5) how it can be effectively addressed. The definitions of provider bias include common themes about providers creating barriers to choice, typically based on the characteristics of either a client or a contraceptive method. However, an agreed-upon definition is lacking. Measurement of provider bias has often relied on self-reports by providers but has also included observation and use of mystery clients for supplemental data. The general trend in the data is clear: large numbers of providers impose barriers and restrictions beyond those that are in guidelines or are necessary for any medical reasons. This trend indicates the presence of bias. Providers have shown bias based on age, parity, marital status, and other criteria, with a bias against provision of various contraceptive methods to youth being the most common. Provider bias often stems from broader social norms, particularly judgments about sexual activity among youth and concerns about the impact of hormonal methods on future fertility. Little documentation of the impact of provider bias exists, although method mix skew has been identified as a possible red flag for bias. Newer approaches to address bias that have moved beyond traditional training and guidelines development to more fundamental behavior change efforts show promise, and learning from their lessons will be important. A major question is how to scale up such approaches.

INTRODUCTION
Family planning programs are guided by the principle of informed choice as well as the goal of providing a broad choice of contraceptive methods to clients. However, a number of barriers limit an individual’s access and actual choice, including both supply and demand factors. This situation leads to high numbers of women with an unmet need for modern contraception, which has been estimated to be 214 million women in developing regions.1 Providing choice equally to everyone is a fundamental right (Box)2 and is necessary to meet the diverse needs of clients.

Provider bias has been reported as an important barrier to the right to choice and as a violation of the principle of nondiscrimination, particularly for people with the highest unmet need, such as adolescents and the poor. Provider bias in contraceptive services must be clearly defined and understood to be effectively addressed.

METHODS
This review presents an overview of the concept of provider bias in family planning, including trends over time in its description and measurement as well as the ways to address it. We focused on resources that pertained to key issues in provider bias in family planning: (1) what it is, (2) how widespread it is, (3) its underlying causes, (4) its impact, and (5) how it can be effectively addressed. We conducted searches on “provider bias” and “family planning” in the PubMed (32 resources) and POPLINE (77 resources) databases as well as Google Scholar (732 results, although many were repeats or not relevant beyond simply mentioning the term provider bias). We identified several additional sources by speaking with key informants knowledgeable on the subject, and we also looked at relevant documents on rights and medical eligibility criteria. After removing
Bias can lead to limiting choice directly, while indirectly, it can lead to a provider failing to fully assess a client’s needs and preferences.

### RESULTS

#### What Is Provider Bias?

A landmark paper in 1992 on medical barriers to access family planning gave visibility to the concept of provider bias, and situation analysis studies in many countries in the 1990s made the concept more concrete through measurement. Although frequently cited as an important barrier to choice over the years, provider bias has often lacked a clear definition. According to the New Oxford American Dictionary, bias is:

> prejudice in favor of or against one thing, person, or group compared with another, usually in a way considered to be unfair.

This definition highlights the idea of bias as an attitude and also captures the concept of fairness and a human rights perspective.

Shelton et al. included provider bias as 1 of 6 types of medical barriers: (1) contraindications, (2) eligibility, (3) process hurdles, (4) who provides contraception, (5) provider bias, and (6) regulation. They explained:

> These obstacles to [family planning] are considered practices which may have a medical rationale in some manner but are scientifically unjustified … Provider bias has powerful effects on the methods that clients use. A mistaken medical rationale often underlies provider bias. Such bias influences how providers present and recommend different methods.

Although overlap and interaction exist among these barriers, in this review, we aim to separate out and explore provider bias because addressing it requires specific types of interventions.

One of the earlier definitions of provider bias in the literature came from Bertrand et al. in 1995:

> This barrier includes the practice of favoring some methods and discouraging others in the absence of a sound medical rationale, as well as failing to ascertain and to respect the client’s preference.

Campbell et al. in 2006 described bias as follows:

> Service providers sometimes deny access to a family planning method as a result of their own prejudices about the method or its delivery system.

Sieverding et al. discussed an evolution in thinking about provider bias. They explained that it was initially understood as discouraging use of certain methods by certain populations mostly due to erroneous medical rationales. Over time, a more multidimensional understanding evolved, encompassing the idea that bias could also stem from inadequate technical skills or personal beliefs. Bias can lead to limiting choice directly by not offering a particular method to a particular client, while indirectly, it can lead to a provider making assumptions and failing to fully assess a client’s needs and preferences.

Definitions are particularly blurry at the lines between attitudes and behaviors, which are linked but clearly different. Definitions generally tend to describe the latter, that is, the practices and actions that arise due to bias, such as restricting access to specific types of clients. A 2017 review of provider bias regarding youth noted that “provider bias can exist as both attitude and behavior.” Even if provider bias is taken to encompass both attitude and behavior, it is important to clearly delineate the underlying attitudes, whether based on cultural or religious beliefs or lack of accurate knowledge, and the actions that result from these biases and directly restrict access and choice. In reality, all people have prejudices and biases. What is important is identifying biases and trying to ensure that they do not lead to actions that restrict choice.

Discussion about the difference between implicit and explicit bias has been limited in definitions, although recent references place more emphasis on this distinction. It is important to acknowledge and understand that while some bias is conscious and intentional, some is unconscious and unintentional; both must be recognized and addressed. In looking at bias toward youth,
Starling et al. explained how both explicit biased attitudes (such as belief that youth are less able to make their own decisions) and implicit subconscious beliefs (influenced by social and biographical factors) can result in biased behavior that limits access, including hostile treatment of youth, incomplete counseling, or judgmental expressions. The definitions over time include common themes about providers creating barriers to choice, either based on the characteristics of a client or a contraceptive method. However, the family planning field lacks an agreed-upon definition.

**How Widespread Is Provider Bias?**

To understand provider bias, measurement is needed. A 2006 review of barriers to fertility regulation noted “problems of quantifying barriers limit understanding of their importance.” Most often, provider bias has been measured and documented through in-depth interviews with providers self-reporting on imposing barriers. In some studies, bias is described through client-provider interactions. A number of studies have used simulated or mystery clients to explore specific types of bias, such as toward unmarried or young clients, and to supplement self-reported data on provider behavior. A substantial share of the data collected around provider bias pertains to what providers say they do, or in some cases, what they actually do. But fewer studies have been aimed at more clearly understanding the providers’ beliefs and attitudes that lead them to impose restrictions regardless of whether such restrictions are warranted by normative guidance from scientific and programmatic experts, for example, as found in the World Health Organization’s (WHO’s) Medical Eligibility Criteria for Contraceptive Use.

A number of studies have used multiple methods to obtain a richer picture of provider bias. For example, a study on provider bias toward young people in Nigeria used data collected through mystery client visits and in-depth interviews. The mystery client methodology is useful for observing actual provider behavior without the risk of social desirability bias than can occur in interviews, and in-depth interviews can assess more fully why providers do what they do. This study also employed vignette-based interviews to see how providers would behave in specific situations to better understand provider decision making. A 2017 literature review for the Beyond Bias project mentioned the effectiveness of using such hypothetical clinical vignettes to measure bias and suggested their use within the project.

There are different sources of data around provider bias and different ways of presenting the information. But the general trend is clear: large numbers of providers impose barriers and restrictions beyond those conveyed in normative guidelines or needed for any medical reasons. This trend indicates the presence of bias. Although we divide provider bias into 2 broad categories—client related and method related—the categories are often connected. For example, providers are typically more likely to impose age or parity restrictions on provision and use of provider-dependent methods such as long-acting reversible contraceptives (LARCs; i.e., IUDs and hormonal implants) and permanent methods (vasectomy and tubal ligation) as compared with short-acting resupply methods such as condoms or pills. However, the underlying cause of the bias differs and is guided by attitudes and judgments about methods or particular types of clients, so it is useful to separate them.

**Client-Related Bias**

Descriptions of bias have often focused on providers imposing unjustified restrictions on use of specific methods based on age, parity, marital status, and spousal consent. In some cases, providers are following guidelines, but often many providers go beyond what is required. From 1992 to 1999, situation analysis studies gathered data to measure the extent to which providers impose various restrictions on the availability of contraceptive methods. A review of 5 studies (Botswana, Burkina Faso, Kenya, Senegal, and Zanzibar) looked at staff-imposed restrictions around marital status, spousal consent, parity, and minimum and maximum age with respect to 6 methods (oral contraceptives, condoms, IUDs, injectables, Norplant implants, and female sterilization). Providers were asked about each eligibility criterion in combination with each method. In all 5 countries, marital restrictions were imposed most commonly in prescribing IUDs and female sterilization and least commonly for condoms. A considerable proportion of providers imposed parity requirements for the provision of IUDs and injectables—not surprising at that time, given that restrictions on IUDs were actually required by policy in Burkina Faso, Kenya, and Zanzibar.

To compare across countries, the review authors calculated the percentage of eligibility criteria a provider applied and then the mean score among all providers in each country. As Figure 1 shows, in each of the 5 countries, providers on average...
imposed twice as many eligibility criteria as were required or encouraged by national guidelines. The authors concluded:  

Revised service protocols and training programs may remove the concerns about clients’ well-being but addressing broader societal and cultural concerns will require more careful attention.

Provider Attitudes Against Provision

A study in Malawi in 1994–1995 found that providers’ attitudes had a significant impact on their practices of contraceptive provision. All providers felt that their attitudes had some effect on clients, with 61% describing this effect as large. They acknowledged that their attitudes could influence the number of new and continuing clients, who actually becomes a client, and what method the client chooses. Providers had particular issues with policies around provision of contraception to adolescents, with more than two-fifths saying they would not be comfortable providing services to young, unmarried women without children. These attitudes mostly arose from 2 beliefs: that providing these services would encourage promiscuity and contribute to the spread of HIV. Many providers did not know about or did not agree with new policies that would permit a woman to get tubal ligation whenever she wanted it, irrespective of parity, with one-third believing that tubal ligations should only be performed on women with at least 4 children.

Provider Bias Against Age

Analysis of data from the 1996 Tanzania Service Availability Survey found that high proportions of providers restricted eligibility by age, with between 79% and 81% of medical aides, trained midwives, maternal and child health aides, and auxiliary staff imposing age restrictions for the pill. Among all providers, 10%–13% reported that there was at least 1 modern method they would never recommend. Data from Lesotho also showed that restrictions were common based on parity, marital status, and age, with more than 60% of providers imposing parity restrictions for IUDs and injectables.

More recently, data from the Urban Reproductive Health Initiative (URHI), an initiative implemented in Kenya, Nigeria, Senegal, and Uttar Pradesh, India, between 2010 and 2015, explored the issue of provider bias. This analysis used facility-level data collected in all 4 countries by the Measurement, Learning & Evaluation Project as part of an evaluation of URHI. Results were reported somewhat differently in each paper, so the analysis is more useful for discerning overall trends rather than making direct comparisons among countries (see Table for detailed results). The theme of minimum age being the most prevalent restriction generally holds true for most countries and most types of providers. However, minimum age bias was assessed somewhat differently in each country. In Kenya, minimum or maximum age bias was noted if providers reported refusing methods to women within the age range 15–20 years.
### Table. Selected Data From the Urban Reproductive Health Initiative Surveys: Providers’ Self-Reported Restrictions

<table>
<thead>
<tr>
<th>Country (Reference)</th>
<th>Sample size</th>
<th>Age</th>
<th>Parity</th>
<th>Marital Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uttar Pradesh, India (Calhoun et al., 18)</td>
<td>1,751 (406 public, 1,345 private)</td>
<td>30% of doctors restricted access to pills based on a minimum age; more than 70% restricted access to sterilization and IUD based on a minimum age requirement. More than 70% of nurses and midwives restricted the IUD based on a minimum age. Approximately 50% of doctors said they restrict access to injectables based on a minimum age.</td>
<td>90% of providers restricted access to female sterilization and IUD based on the client’s parity. 65% of these doctors required the client to have 1 child, and 63% of TBAs required 2 children for an IUD. Government of India guidelines require that a client have at least 1 child, but 83% of doctors required a client to have at least 2 children for female sterilization. Parity restrictions were imposed for pills by 66% of nurses versus only 20% of doctors and 25% of TBAs. Almost 50% of these providers required that a client have 2 children.</td>
<td>Nearly 99% of doctors restricted access to sterilization based on marital status, which may be related to Government of India guidelines requiring women to be ever-married. Doctors less frequently restricted access to pills (48%), condoms (29%), and injectables (68%). About 50% of nurses and midwives and only 20% of TBAs restricted a client’s access to condoms. Pill restrictions based on marital status were also common, at 77% of nurses, 72% of midwives, and 62% of TBAs.</td>
</tr>
<tr>
<td>Kenya (Tumlinson et al., 15)</td>
<td>676 (291 public, 385 private)</td>
<td>58% imposed minimum age barriers for 1 or more methods. Minimum age restrictions were commonly imposed on clients seeking injectables, with large numbers refusing to offer injectables to women younger than 20 years. A significantly higher percentage of providers in private facilities imposed minimum age restrictions across all methods (e.g., 55% of private providers vs. 27% public providers for implants and IUDs).</td>
<td>41% restricted access to 1 or more methods based on parity. Less than 2% of providers restricted access to condoms or EC, and 60% restricted access to female sterilization based on parity. For female sterilization, 46% of providers (among those that offer sterilization and restrict on parity) required a woman to have at least 3 or more children before receiving the method.</td>
<td>22% of providers will not offer 1 or more methods to unmarried women. Very few providers restricted access to pills, EC, or condoms based on marital status. Approximately 10% reported that they would not provide injectables, IUDs, or implants to unmarried women, and 40% would not provide female sterilization.</td>
</tr>
<tr>
<td>Nigeria (Schwandt et al., 13)</td>
<td>1,479 health facility providers, 415 pharmacists, 483 patent medicine vendors</td>
<td>Minimum age restrictions ranged between 70% and 93% across method and provider. Restrictions were relatively lower for condoms, EC, and pills (70%–87%), and highest for injectables and IUDs (84%–93%).</td>
<td>Minimum parity restrictions ranged between 3% and 65% across method and provider type. Restrictions were lowest for condoms (3%–6%), followed by EC (12%–20%). Restrictions for injectables were reported by 85% of health facility providers versus 22% of pharmacists.</td>
<td>Marital status restrictions ranged between 7% and 74% across method and provider type. Restrictions based on marital status were lowest for condoms (7%–10%) and EC (17%–26%), and highest for IUDs (67%) and injectables (45%–73%).</td>
</tr>
<tr>
<td>Senegal (Sidze et al., 17)</td>
<td>637 (516 from public facilities, 121 from private facilities)</td>
<td>Minimum age restrictions were common in the public sector for the pill (57%), injectable (44%), and implant (45%). Restrictions were less common for condoms (25%) and EC (24%). Restrictions were slightly lower for private providers: pill (49%), injectable (41%), implant (38%), condom (20%), and EC (21%). On average, providers in both sectors required clients to be at least 18 for most methods.</td>
<td>Not reported</td>
<td>Between 12% and 14% of public sector providers required that a woman be married to receive the pill, injectable, or implant; and 8%–9% had that requirement for condoms and EC. In private health facilities, 21%–30% of providers did not offer unmarried women the pill, injectable, implant, or EC; 12% did not offer condoms.</td>
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**Abbreviations:** EC, emergency contraception; IUD, intrauterine device; TBA, traditional birth attendant.
range allowed by guidelines for all methods (15–49 years). In Nigeria, minimum age bias was defined as providers indicating the minimum age they would offer a method to a client as 15 years or older. In Uttar Pradesh, a minimum age of 18 was considered as a barrier—this more conservative definition was based on the legal age at marriage in India. In Senegal, providers were asked to report the minimum age a client had to be for them to offer a method; if they did not report a minimum age, they were considered as not restricting by age. Regardless of how it was assessed, however, the trend across countries demonstrated a minimum age bias. For example, in Kenya 58% of providers would impose minimum age requirements for 1 or more methods, and in Nigeria minimum age restrictions were imposed by between 70% and 93% of providers across method and provider type. Restrictions based on parity, marital status, or age were more likely to be imposed for longer-acting methods such as the IUD as compared with pills or condoms. Trends were less consistent in terms of public/private differences and differences between cadres.

Provider Bias Against Specific Populations

Bias often is directed toward specific populations or types of clients. The reproductive health community is paying increasing attention to the issue of bias toward youth. But other populations also experience notable bias, including women with HIV, women seeking abortion or postabortion care, women with disabilities, and men seeking permanent contraception. Significant literature exists regarding stigma, particularly around HIV and abortion. Such stigma contributes to biased attitudes and behavior by providers toward these populations.

Increasing attention is being paid to the issue of bias toward youth, but other populations also experience notable bias.

Some studies discuss a population group that is infrequently mentioned in the literature on provider bias—men. In noting this issue, 1 paper defined provider bias as:

the attitude of a provider who provides services only to individuals who he/she is comfortable with, or who does not feel the need to reach out to a particular group with reproductive health information with the understanding that it may not be beneficial to them.

The authors argue that provider bias against men in sexual and reproductive health in developing countries has attracted attention only as part of wider male involvement issues. One of the major obstacles to expanding male-involvement programs is provider bias, described as programs being oriented to women and a sizable proportion of providers, whether doctors, midwives, nurses, or community workers, being women themselves and potentially uncomfortable advising and counseling men. Most of the literature around provider bias in family planning has focused on women because most services focus on women as clients, which is a function of the reality but also a possible reflection of a broader bias regarding male involvement.

Method-Related Bias

Provider bias for or against certain methods can be related to positive or negative attitudes, inaccurate knowledge, inadequate skills, or other service-related factors, such as a method’s relative ease or difficulty of administration. Attitudes seem to play out in particular as a strong bias for or against long-acting methods. Service-related factors are most often noted as a positive bias toward injectables and a negative bias toward IUDs, owing to the former being easy to administer while the latter requires a pelvic exam. Numerous studies have found bias against hormonal methods, particularly for young or nulliparous women, due to unfounded concerns about their impact on fertility. Below, we discuss some of the biases noted in the literature around specific methods. Although program-related biases may also exist—for example, if a new method is being introduced into a system, a provider might promote it more actively—we focus here on bias stemming from provider attitudes and beliefs.

LARCs: IUDs and Implants

A common perception is that provider bias is a key factor in the low use of IUDs in many countries. However, studies show a more complicated picture. A review in Ghana found demand factors and myths in the community were a greater issue and providers actually had a favorable attitude toward the method. A study in Zimbabwe looking at provider attitudes toward IUDs and HIV risk found that high proportions thought the IUD was a good method and it did not increase HIV risk for women, but they were concerned that IUD insertion put the provider at high risk of HIV infection. Providers in Kenya also had this fear of HIV acquisition, and while they were not concerned about safety or efficacy of the method for clients, they were reluctant to provide it due to it being time-consuming and challenging and their fear of potentially being blamed for any fertility
problems. As access to and use of LARCs has increased, some have expressed concern of bias toward overpromotion of these methods. This concern was present, for example, in a U.S. study of users’ attitudes toward or experiences with provider influence and bias regarding LARCs. These qualitative data revealed that many participants believed that providers recommend LARCs disproportionately to socially marginalized women, providing another example that shows the interaction between method and client-related bias.

Emergency Contraception

Despite extensive evidence of its safety, emergency contraception is often perceived as unsafe or inappropriate. Some of the bias around it overlaps strongly with the bias around provision to youth, for example, believing that it leads to promiscuity. A 2015 review of improving access to emergency contraception through workforce interventions found widespread misconceptions among providers, including the belief that it was an abortifacient or that access to it would increase sexual activity among adolescents. Using survey data in Kenya and Ethiopia to explore bias around emergency contraception, Judge et al. found that counseling on and provision of emergency contraception was positively associated with providers’ greater level of knowledge of the method, indicating that increasing provider knowledge can potentially contribute to offsetting some of the bias and improving access.

Vasectomy

Shelton and Jacobstein reported that:

providers themselves often have poor knowledge about vasectomy or bias against it, and so they fail to discuss it or provide accurate information to clients.

Notably, the issue of bias regarding vasectomy does not arise frequently in the provider bias literature, likely in part due to the bias toward the method, its limited use in many programs, and the focus in bias literature around youth populations.

What Are the Underlying Causes of Bias?

Many of the previously mentioned studies describe the existence of bias, but most do not go into detail about the causes. Bias can be caused by lack of accurate knowledge about the method itself or the latest normative guidance about it. Bias may also be influenced by social and cultural norms and/or affected by health systems issues including organizational culture and norms. Without a clear understanding of the causes, the risk of pursuing less effective interventions to reduce provider bias is present. For example, situational or systems factors can lead to the outcome of limiting choice, but the interventions to address these factors differ from those that could effectively address provider bias fueled by attitudes and social norms.

The 1994–1995 study in Malawi explored providers’ attitudes and beliefs in some detail, finding reservations regarding provision of family planning to youth, described earlier, as well as some general misgivings about contraceptives. Two-thirds of providers agreed with the statement “every method could be dangerous to someone” and 41% believed that contraceptive methods could have serious side effects. The authors identified 4 prime issues underlying the negative attitudes of a large number of providers, which resulted in limiting choice to clients: (1) suspecting that access to family planning is not beneficial for everyone of reproductive age; (2) harboring a deep-seated distrust of contraceptives; (3) finding the job of supplying people with contraceptives to be tiresome, unrewarding, and even disgusting; and (4) thinking that the client should not make or is not capable of making decisions about terminating childbearing on her own.

A study in Ghana used situation analysis data as a starting point to identify facilities where providers indicated high levels of imposing barriers based on parity, age, marital status, spousal consent, and other reasons. Interviewers then visited this purposive sample to probe more deeply about the reasons for these restrictions. Concerns about client safety and morals were the most often cited rationales for restricting services according to age and parity. Many providers were especially concerned that contraceptives might cause future fertility problems, and they used minimum age or parity requirements to ensure that only women of proven fertility could obtain contraceptives. Some providers believed in particular that injectable contraceptives cause permanent infertility. The authors concluded the following:

While protecting clients’ health is an admirable goal, providers who lack technical knowledge of contraception may exaggerate the dangers of various methods. In seeking to impose their personal morals on clients, providers violate basic client rights.

Several other studies echoed the themes from Ghana and Malawi. For example, providers in Nigeria explained that one of the main reasons
for an emphasis on promoting condoms among unmarried clients was due to concern about hormonal methods causing delays in pregnancy or leading to infertility. Some of this bias was also due to providers’ lack of up-to-date technical knowledge, or in the case of some private-sector providers, what methods they actually provide since recommending a method they do not provide would cause a loss of business. In Lesotho, focus group discussions with clients highlighted the following frequently heard concern from providers about contraception causing infertility, as described by a married urban woman in her 30s:

At the clinic that I go to, the nurse tells young girls that she does not want to be blamed if they become infertile. She makes no compromise with the injectable; she bluntly refuses.

Like all individuals in a society, providers are influenced by the social norms around them, which can lead to various biases. Sometimes, the norms are against family planning or limiting family size. A study using simulated clients in Nepal found this negative perception of limiting family size among providers, with a particular bias against poor, low-caste clients and pressure to have large families and sons:

[You] must wait for a son, even if you bear 7 or 8 daughters. You must satisfy your husband by making him the father of a son. Go on having babies until you produce a son.

In Senegal, provider-imposed restrictions are most likely a reflection of the country’s long history of restrictive family planning practices and a generally socially conservative environment.

Social norms can influence a provider directly in terms of their own beliefs and also through concern about community reactions. A study of private providers in South-West Nigeria found that many providers wanted to make sure that married clients had permission from their husbands so as to avoid situations that might be harmful to their business:

[Community health workers and providers at pharmacies and patent and proprietary medicine vendors] were particularly likely to mention husband permission in the context of avoiding potential encounters with men upset that their wife was practicing contraception, along with a related desire to avoid creating intrafamilial conflict.

A literature review around provider bias and adolescents described how social norms play a “formidable role” in provider bias that limits choice for adolescents. This review found that:

the most pervasive social norm was the significance of sexual abstinence before marriage. This had iterative expressions and manifestations for both clients and providers. We see this value play out in individual provider negative attitudes, and influence the degree to which clients experience discrimination based on age, marital status, and parity.

Research in Senegal also noted the influence of the strong social norms against premarital sexuality for young women. Tavrow presented a useful conceptual framework of providers’ influence on client utilization of sexual and reproductive health services (Figure 2), which includes the larger context of external influences, such as social norms and structural factors.

Provider bias can also be exacerbated by the hierarchical medical model. As Shelton et al. explained, the belief that “we know better” appears in provider bias, eligibility criteria, process hurdles and regulatory constraints.

This attitude can limit full respect for the client and her wishes. Findings in Uttar Pradesh showed that provider-imposed restrictions stemmed from the fact that providers, at times, make judgments about their clients’ needs and ability to understand [family planning] options thereby imposing unnecessary barriers to [family planning] methods.

A 2003 review of client-provider interactions focused on the idea of client-centered care and involving the client in decisions. The authors emphasized a client’s right in making decisions, suggesting that training, along with good supervision and coaching, can make providers aware of their biases—for example, in favor of a particular method or against switching methods—that threaten clients’ right to make their own decisions.

Quantitative data in Uttar Pradesh were complemented with qualitative data from in-depth interviews with 21 providers, which shed additional light on provider bias and the impact of social norms. While providers spoke about “putting choice and decision making in the hands of clients,” one of the findings from the qualitative interviews was that some providers acknowledged that they perceived many of their female clients as lacking decision making power. This
perception led the providers to infer that women do not need to be offered information about their family planning options. One health worker explained:

“It’s like women have no say in the matter. Mostly they do what their husbands wish to do. Hence women feel that before doing anything they must take their opinion first. Whatever the men desire, happens.”

Of course, bias is not unique to health providers. A qualitative study of 50 young adult women in the United States explored users’ attitudes toward and experiences with provider influence and bias around LARCs. Respondents noted the larger influences—including institutional cultures—that shape providers’ contraceptive recommendations. Importantly, rather than singling out providers for being uniquely biased, several women argued that everyone in American society is affected by racial and social class biases.

What Is the Impact of Provider Bias?
A good deal of evidence indicates that providers impose restrictions that unnecessarily limit a client’s choice. The discussion of impact in the literature, however, has mostly involved anecdotes and assumptions rather than extensive evidence, in part due to the difficulty in measurement. Measuring either bias or choice is a complicated endeavor, and showing a clear causal link between them is even more challenging. It is reasonable to assume that the self-reported and observed biases of providers have led to reduced access for women to a broad choice of methods. As a consequence, no methods may be available, particularly to youth, or a bias may exist toward or against certain methods. In some cases, this situation can mean use of less effective methods if a provider opts to promote only abstinence or possibly condoms to young women, which could in turn lead to higher risk of unintended pregnancy.

The 2017 literature review of provider bias in contraceptive provision to youth found that more than half of the publications they reviewed left outcomes of provider bias “up to reader interpretation or speculation.” The authors explained this lack of documentation of outcomes as being linked to methodological challenges as well as common assumptions of consequences. They also raised the issue of defining and measuring both bias and outcomes along a spectrum:

Notably, bias exists along a spectrum, from condescending or parental attitudes to inappropriate direction or denial of services to outright hostility and even violence, though outcomes of bias are seldom ranked in terms of type or severity.
Ultimately, we want to understand how bias affects choice, but it is challenging to measure. The fundamental importance of method choice has been validated by having “choice of methods” be 1 of the 6 elements of the seminal Bruce-Jain model of quality of care. Bertrand et al. explained that various questions have been used to capture the concept of choice in surveys, such as “Did you receive the method you wished on the day of service?”; however, no standard question is used across existing data sources. The Demographic and Health Surveys (DHS) include a question asking current users of contraception whether they were informed about other methods that could be used for contraception. Using the DHS stat compiler, results from 150 different surveys range from as low as 19.3% in Armenia in 2000 to a high of 90.5% in Burkina Faso in 2010, with an average of 67.2%. However, this measure is simply a crude indicator of choice. Truly measuring choice is complicated by the numerous structural factors that play a role, such as commodity supply or availability of trained providers.

At the macro level, researchers have explored method mix skew as a measure of availability of a range of methods and possibly being indicative of provider bias among other factors. An ideal method mix does not exist, but there may be reason for concern when 1 or 2 methods predominate in a given country. An analysis of method mix in 96 and 109 countries was conducted in 2006 and 2014, respectively, with the authors defining a method mix skew as being skewed when 50% or more of users rely on a single method. Over this period, the proportion of countries with a skewed method mix decreased slightly, from 35% to 30%. The authors concluded:

Method mix skew is not a definitive indicator of lack of contraceptive choice or provider bias; it may instead reflect cultural preferences. In countries with a skewed method mix, investigation is warranted to identify the cause.

Method mix skew can be considered a red flag warranting further exploration to see whether skew is due to lack of availability of methods, provider bias, societal preferences, or other reasons. The advantages of using skewed method mix as a red flag are that it is readily available from standardized data sets and easy to calculate.

**What Are Approaches for Addressing Provider Bias?**

After noting the role of provider bias, publications often concluded that training is needed along with dissemination of updated standards and guidelines. When Shelton et al. first wrote about medical barriers in 1992, they recommended that international experts develop guidelines on family planning practices including eligibility criteria. Just a few years later in 1996, WHO published the Medical Eligibility Criteria for Contraceptive Use (MEC) to serve as guidance for national guidelines. A fifth updated edition was released in 2015, and an estimated 50 national programs have adopted the MEC guidance. Several studies, including those in Tanzania, Uttar Pradesh, and Ghana concluded with the hope that revised guidelines and standards paired with training that emphasizes compliance with them would help reduce barriers. Some studies have shown an impact when guidelines are properly distributed and complemented with training and supportive supervision. However, as shown earlier, providers have regularly imposed barriers far beyond what is required in national guidelines. In addition to highlighting issues around bias, this situation raises questions about how WHO guidance and national guidelines are disseminated and how adherence to guidelines is implemented, monitored, and ensured.

Simply providing evidence about contraceptives and their safety is typically inadequate to reduce provider bias. For example, a study in Jordan found limited impact of an evidence-based medicine program on private providers’ knowledge, attitudes, and practices regarding depot medroxyprogesterone acetate. The authors concluded that evidence-based medicine may not be effective as a stand-alone program targeting a family planning method with a high level of provider and consumer bias. The Kenya URHI data showed that in-service training appeared to reduce provider-imposed barriers related to parity, marital status, and third-party consent, while the data from Tanzania found that provider-determined eligibility barriers appear unrelated to whether a provider received recent in-service training. Results from the study in urban Nigeria showed the mixed and limited impact of training: while training seemed to reduce marital status bias among health facility workers, it did not help with minimum age bias or with bias among pharmacists and patent medicine vendors. The authors noted that given all the different training programs in Nigeria, knowing why this was the case was challenging, but it is possible that the trainings focused more on the proper techniques for administering contraceptives, the limits of what each provider is legally able to do, and the
medical eligibility criteria—as opposed to socially imposed medical barriers.16

A study in India looked at the impact of giving a balanced presentation of all available contraceptive methods to ensure informed contraceptive choice. With a sample of 8,077 clients, the study concluded that this approach could help to over-ride a provider’s bias by encouraging clients to make informed choice. For example, while providers saw Norplant as the first choice for 35% of the women, only 5% of women preferred and accepted Norplant, showing that providers did not always impose their bias.39

Carlough and Jacobstein40 wrote about 5 ways to address provider bias in family planning and captured some important themes: (1) provide regular evidence-based accurate information; (2) identify and use early adopters; (3) promote doing good, not just avoiding harm; (4) promote justice for all clients; and (5) support rather than blame health workers. They first describe the challenge of provider bias:

Health workers do not walk into their client interactions as blank slates. They bring with them their personalities, cultural and socioeconomic backgrounds, understandings of “how the world works,” and biases. These biases may be against a particular method, a client characteristic or situation, or both, and they may not be immediately evident to the providers themselves.

Do Not Blame Providers

Although not always the case, the literature on provider bias often contains a judgmental tone toward providers regarding their biases. Addressing bias should employ a supportive approach to change and not assign blame. This approach includes acknowledging the reality of often challenging working conditions. As Carlough and Jacobstein explained,

Workers do not provide evidence-based, respectful family planning services in a vacuum . . . Health workers—especially those working in difficult conditions—need and deserve our support, particularly when asked to take on even more.

The 1992 piece on medical barriers ended with the idea that a discussion of medical barriers is not an attack on providers, and it acknowledges that “most providers are doing what they think is best for their clients.”3 An important step in addressing bias is explicitly acknowledging that all people have beliefs and attitudes that can be considered biases and we must all work to ensure that these biases do not lead to behavior that has a negative impact on others.

Learn From Early Adopters/Positive Deviants

Some providers can serve as mentors or role models to influence their colleagues. For example, a health facility may at first use 1 or 2 “dedicated providers” to offer clients a new method like an IUD. These providers can then mentor their colleagues to provide the same method or service.40 Dedicated providers for LARCs successfully expanded method choice in Zambia.41 Research in Cote d’Ivoire identified providers—so-called positive deviants—who had a “love for the trade,” which led to greater empathy and offering a full range of methods. While this attitude cannot necessarily be taught, such providers act as role models during training by sharing their experiences to encourage other providers.

Use More Comprehensive Social and Behavior Change Approaches

Over time, the response to addressing provider bias has gotten more sophisticated and comprehensive in recognizing the complicated nature of changing attitudes and behaviors that are often deeply rooted in social and cultural norms. For example, practices such as values clarification have been recognized as important parts of training. Several newer projects are tackling this issue, and lessons from this work can provide important guidance as the field aims to address this longstanding barrier more holistically.

• The Nigeria Urban Reproductive Health Initiative 2 (NURHI 2) is using the principle of human-centered design to address health provider bias, framing the issue as a design challenge of how to encourage providers to offer all clients the full range of methods regardless of a client’s age, marital status, parity, partner consent, or socioeconomic status. Providers have received intensive training that asks them to put themselves in the shoes of clients who want to prevent pregnancy and to help them understand that regardless of their personal beliefs, their job is to help these clients obtain modern contraception. Visits to NURHI clinics have increased significantly between years 1 and 2 of the project, possibly due at least in part to this work.42

• Breakthrough ACTION and Breakthrough RESEARCH are 2 projects funded by the United States Agency for International Development...
that focus on evidence-based behavior change. Breakthrough ACTION uses a range of behavioral science approaches such as market insights, human-centered design, and behavioral economics to improve programs. For example, the project is testing interventions in Malawi to address the problem of providers not counseling clients on appropriate contraceptive options. One hypothesis is that providers rationalize incomplete counseling due to outcome bias; that is, so many women use the injectable that providers assume that must be what women want, rather than recognizing underlying structural issues that lead to that outcome. Breakthrough RESEARCH identified provider behavior change as 1 of the 2 key programmatic themes for the project’s research and learning agenda. The project is developing priority research questions through a consultative process, with the following definition for provider behavior change programming:

**Interventions that seek to positively influence provider behaviors to improve quality of services, improve client experiences, and increase demand for services, to increase adoption or maintenance of desired behaviors among clients and impact health outcomes.**

- **Beyond Bias** is funded by the Bill & Melinda Gates Foundation and is working in Burkina Faso, Pakistan, and Tanzania to address the different types of provider biases and behaviors that translate into barriers for youth access to contraceptive services. The Beyond Bias project developed a Bias Driver Tree that identified 3 categories of bias drivers, with multiple subcategories for each: biographic (attitude, abilities, experience, knowledge), situational (professional, social), and societal (beliefs/norms, law/policy).

### Be Clearer and More Proactive About Nondiscrimination

Findings in Senegal draw attention to the idea of not only having guidelines without restrictions, but also having more proactive and clear messages about the need to not restrict access based on one’s own beliefs. Although current norms and protocols in Senegal do not include restrictions against youth access to family planning services, they also do not include a clear statement that young people should have unrestricted access; therefore:

In the absence of a clear message, providers in Senegal can define their restriction criteria based on their own opinions and values regarding sexuality and contraception.17

An example of clear guidance is the Global consensus statement for expanding contraceptive choice for adolescents and youth to include long-acting reversible contraception, which was developed in 2016 and has been endorsed by 53 organizations.44 The statement cites WHO’s 2015 MEC: “Age alone does not constitute a medical reason for denying any method to adolescents.”35 This statement has been used as a policy advocacy tool, but it could also be used directly with providers to create proactive messages through training and other means.

### CONCLUSIONS

The growing emphasis on a human rights framework in reproductive health programs makes this an opportune moment to focus on addressing provider bias to ensure the right of nondiscrimination for all clients. Ample evidence demonstrates the presence of bias, which is widely recognized as an important barrier. However, there is still a lack of an agreed-upon, clear framework for the issue that would facilitate effectively minimizing the impact of bias on access and choice. Newer approaches to address bias that have moved beyond traditional training and guidelines development to more fundamental behavior change efforts show promise, and learning from their lessons will be important. A major question will be how to scale up these approaches. Success has often come from a multi-faceted “kitchen sink” approach that employs as many intervention tools as available, an unscaleable approach that has neither sufficiently addressed the underlying drivers of providers’ biases towards youth nor led to interventions that can be systematically deployed at scale.

Some important steps moving forward are described below.

**Develop a Clear Definition of Provider Bias.** The field needs an agreed-upon definition, one that separates attitudes and behaviors and focuses on providing choice without discrimination. We have synthesized the common themes from the literature into a proposed working definition as a starting point:

Provider bias refers to attitudes and subsequent behaviors by providers that unnecessarily restrict client access...
and choice, often related to either client and/or contraceptive method characteristics.

It would be useful for a group like WHO to convene experts to reach consensus on a definition for the field to facilitate standard measurement and effective interventions.

Explore Ways to Present Method Options With Minimal Bias. Since most people—including providers—have personal biases about methods, it would be helpful to identify and promote ways to present options with minimal bias, while always ensuring that counseling begins with questions about a client’s reproductive intentions and needs and ensures that a client’s choice is respected. Guidance from the American Academy of Pediatrics in their 2014 policy statement on contraception for adolescents states that pediatricians should counsel about and ensure access to a broad range of contraceptive services for their adolescent patients. This includes educating patients about all contraceptive methods that are safe and appropriate for them and describing the most effective methods first.45

Similarly, others have suggested discussing methods in order of effectiveness, according to the WHO tiered effectiveness model, given that there are often misunderstandings by clients about a method’s actual effectiveness. This approach can help ensure true informed choice and avoid the consequences of “misinformed choice.”46 This is only one possible approach, however, and there is currently not consensus on it.

Monitor Bias. Programs can explicitly monitor whether they are addressing provider bias. For example, a WHO document on monitoring human rights in contraceptive services and programs includes the following recommendation:

Determine whether health workers have been trained in . . . to ensure that users, including adolescents, can make an informed choice, including choosing to accept or not to accept a contraceptive method, without imposing their own views or using coercion (i.e. provider bias).47

Complement Provider-Based Contraceptive Provision With Direct-To-Consumer Efforts. While the field continues to support improvements in client-provider interactions, exploring ways to effectively get evidence-based information directly to potential clients will also be useful. This becomes particularly important with growing efforts around direct-to-consumer marketing and self-care, acknowledging that counseling is not the only way to support informed decision making.

It is critical for the family planning community to more effectively address the barrier of provider bias. Just as we ask providers not to judge a client or a contraceptive method based on their personal biases, we should not judge providers. We must work together to truly achieve the right to choice for all women and men.

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REFERENCES


Unintended Consequences of mHealth Interactive Voice Messages Promoting Contraceptive Use After Menstrual Regulation in Bangladesh: Intimate Partner Violence Results From a Randomized Controlled Trial

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Automated interactive voice messages about post-menstrual regulation contraception delivered to women in Bangladesh via mobile phone were associated with increased reports of intimate partner violence. This finding highlights the importance of taking steps to minimize risk when delivering phone messages on sensitive topics and the need for assessing violence in such situations.

ABSTRACT

Background: Mobile phones for health (mHealth) hold promise for delivering behavioral interventions. We evaluated the effect of automated interactive voice messages promoting contraceptive use with a focus on long-acting reversible contraceptives (LARCs) among women in Bangladesh who had undergone menstrual regulation (MR), a procedure to “regulate the menstrual cycle when menstruation is absent for a short duration.”

Methods: We recruited MR clients from 41 public- and private-sector clinics immediately after MR. Eligibility criteria included having a personal mobile phone and consenting to receive messages about family planning by phone. We randomized participants remotely to an intervention group that received at least 11 voice messages about contraception over 4 months or to a control group (no messages). The primary outcome was LARC use at 4 months. Adverse events measured included experience of intimate partner violence (IPV). Researchers recruiting participants and 1 analyst were blinded to allocation groups. All analyses were intention to treat. The trial is registered with ClinicalTrials.gov (NCT02579785).

Results: Between December 2015 and March 2016, 485 women were allocated to the intervention group and 484 to the control group. We completed follow-up on 389 intervention and 383 control participants. Forty-eight (12%) participants in the intervention group and 59 (15%) in the control group reported using a LARC method at 4 months (adjusted odds ratio [aOR] using multiple imputation=0.95; 95% confidence interval [CI]=0.49 to 1.83; P=.22). Reported physical IPV was higher in the intervention group: 42 (11%) intervention versus 25 (7%) control (aOR=1.97; 95% CI=1.12 to 3.46; P=.03) when measured using a closed question naming acts of violence. No violence was reported in response to an open question about effects of being in the study.

Conclusions: The intervention did not increase LARC use but had an unintended consequence of increasing self-reported IPV. Researchers and health program designers should consider possible negative impacts when designing and evaluating mHealth and other reproductive health interventions. IPV must be measured using closed questions naming acts of violence.

INTRODUCTION

Bangladesh has seen a rapid increase in use of contraception over the last 40 years; however, among married women in Bangladesh, 12% wanted to delay or...
stop childbearing but were not using a method in 2014.1 Furthermore, 48% of all pregnancies in Bangladesh are estimated to be unintended, leading to health, social, and economic costs for women and their families.2,3 The type of contraceptives women use has implications for unintended pregnancies: long-acting reversible contraceptives (LARCs)—intratuterine devices (IUDs) and implants—are the most effective reversible methods, with failure rates of between 0.1% and 0.8% in the first year of typical use.4 In contrast, short-acting methods have higher typical-use failure rates of 4% (the injectable), 7% (the pill), and 13% (male condoms).4 LARCs also have low levels of discontinuation and high user satisfaction.5,6 In Bangladesh, 62% of married women of reproductive age use contraception, but just 2% use a LARC and 30% of contraceptive users discontinue their method within a year.3 Although awareness of contraceptive methods in Bangladesh is high,7 many women lack accurate information on method attributes, particularly for long-acting methods, and fear of negative effects is common.7 Increased information provision about LARCs has been shown to increase uptake of these methods.8

Women terminating a pregnancy are a key group to reach with information about contraception as they usually want to delay or prevent future pregnancies. Legally, abortion is available in Bangladesh only to save a woman’s life,3 but menstrual regulation (MR), “the procedure of regulating the menstrual cycle when menstruation is absent for a short duration,”9 is authorized in public and government-approved NGO and private health facilities up to 12 weeks since the last menstrual period.10 In 2014, an estimated 430,000 MR procedures took place in health facilities in Bangladesh.3 Family planning services are offered following MR procedures, but service quality and the range of available methods vary.11 Furthermore, some women report not wanting to make a decision about contraception on the day of their procedure.12

Mobile phones have the potential for rapidly delivering targeted communications to large and disparate populations at low cost. Evidence shows that mobile phones for health (mHealth) can be effective at changing behavior and improving health outcomes,13 and they are increasingly being used by sexual and reproductive health programs to support clients. In recent years, mHealth interventions have been used to promote safer sex and partner notification of sexually transmitted infections,14,15 increase contraceptive use,16 support antiretroviral adherence and clinic attendance among people living with HIV,17,18 reduce HIV transmission risk among male sex workers,19 support women through the home phase of medical abortion,20 and provide support for pregnant women and new mothers.21,22 Some of these intervention types are still at the feasibility or pilot stages, but others have been scaled up. One of the scaled-up interventions is the Mobile Alliance for Maternal Action (MAMA) approach, which started in 2010 and uses a range of mobile technologies (including text messages, voice calls, and apps) to support maternal and newborn health. By 2016, it had 1.9 million subscribers in Bangladesh, 600,000 in India, and 500,000 in South Africa.22

Moderate-quality evidence indicates that text messages are effective in supporting antiretroviral adherence and clinic attendance for HIV and sexually transmitted infections.18,23 In many other areas of mHealth for sexual and reproductive health, however, the evidence is limited, and mixed and more rigorous trials are needed.16,18,24 With respect to contraception, text message interventions in the United States have successfully increased pill continuation and attendance for injectable appointments, interactive voice messages with counselor phone calls have increased use of LARCs among abortion clients in Cambodia, and phone-based information sessions have increased effective contraceptive use among postpartum clients in Ecuador; however, other interventions have had no effect on contraceptive outcomes or have improved knowledge but failed to change behavior.16,25,26 Feasibility research exploring the use of text message contraceptive reminders among MR and postabortion care (PAC) clients in Bangladesh had promising results, although some concerns were raised about unintended recipients seeing text messages.27

Some evidence shows that communication about sexual and reproductive health and access to services can precipitate intimate partner violence (IPV) toward women in certain relationships.28,29 Furthermore, some studies suggest that women’s empowerment (e.g., through increased earnings) can more broadly result in increased IPV as new roles are negotiated, but the findings on this topic are mixed.30 With respect to phone interventions, a systematic review published in 2013 investigated the effect of mHealth on gender relations and highlighted cases of resulting domestic dispute; however, the authors reported that data were very limited, noting their suspicion that this outcome is not routinely being measured.31

More broadly, evaluations of public health interventions often fail to assess potential harms and their underlying mechanisms.32 Randomized
controlled trials (RCTs) evaluating mHealth family planning interventions have not reported any adverse effects; however, few trials report measuring negative outcomes. Recent systematic reviews of family planning interventions suggest that impacts on partner relations (including violence) are not routinely measured in this field. Monitoring adverse events, and specifically IPV, remains important when evaluating mHealth interventions for reproductive health.

Given the success of the Cambodian intervention and largely positive findings of the feasibility study in Bangladesh, 2 NGOs designed an enhanced mHealth intervention to support post-MR contraceptive use in Bangladesh, with a focus on overcoming barriers to LARC use. The initiative was a partnership between Marie Stopes Bangladesh (MSB), which operates private reproductive health clinics (140 at the time of implementation), and Ipas Bangladesh, which supports government facilities and clinics within the nongovernmental Reproductive Health Services Training and Education Program (RHSTEP) in provision of MR, PAC, and family planning through provider training. The intervention comprised automated interactive voice messages sent to women’s mobile phones in the 4 months after MR. The Cambodia intervention relied heavily on call center counseling, and the cost of this component has been cited as a possible barrier to scale-up. We explored whether an intervention containing more detailed automated content about contraception could be effective. We hypothesized that women who receive a multicomponent mHealth intervention will have a higher rate of LARC use at 2 weeks, 4 months, and 12 months after MR, compared with women who do not receive the mHealth intervention. We also hypothesized that the intervention would increase use of any modern method, reduce subsequent pregnancy or MR, and reduce discontinuation among existing users. The conceptual framework (Figure 1) drew on the COM-B model of behavior change. The aim of this study was to evaluate the effect of the intervention on contraceptive use and to monitor for adverse events, including IPV, which is widespread in Bangladesh; in 2015, 50% of ever-married women reported having experienced physical violence and 27% sexual violence by their current or previous husband.

### METHODS

#### Study Design
This study was a single-blinded, multisite RCT of an interactive voice message intervention delivered via mobile phone designed to support post-MR contraceptive use. Women were recruited from 41 health facilities sampled from 93 eligible clinics: clinics located in Chittagong, Dhaka, or Sylhet division (chosen for having lower modern contraceptive prevalence than other divisions at 47%, 54%, and 41%, respectively). were an MSB facility or a government facility supported by Ipas Bangladesh, had a minimum monthly MR case load of 20, and had no other intervention study underway at the start of recruitment. Facilities were stratified according to size: primary clinics were located in rural and peri-urban areas; secondary clinics, located in urban areas, were larger and provided a wider range of services; and tertiary facilities were hospitals located in large cities. Seventeen units of 19 women were sampled from each strata (N=969 women), using probability proportional to MR client load with some higher-volume facilities being sampled multiple times. During recruitment some clinics had lower client flow than expected and an additional 4 units were sampled to enable the sample size to be reached during the recruitment period. Twenty-five of the sampled clinics were MSB and 16 were government and nongovernment RHSTEP facilities supported by Ipas Bangladesh. Thirteen sampled clinics were in Chittagong, 23 in Dhaka, and 5 in Sylhet. The trial protocol was published in 2017. Ethical approval was received from the Bangladesh Medical Research Council, the London School of Hygiene and Tropical Medicine Research Ethics Committee, the Marie Stopes International Ethical Review Committee, and the Population Council Institutional Review Board.

#### Participants
Women were eligible to participate if they had had an MR procedure from a participating clinic during the recruitment period, were 18 to 49 years of age, did not receive general anesthesia for their MR procedure (since recruitment took place immediately after the MR procedure at which time general anesthetic clients may not have been well enough to give informed consent), were physically and emotionally able to consent, reported that they had a personal mobile phone, consented to receive voice messages about family planning on their phone, and did not intend to become pregnant or use a permanent method of contraception in the next 6 months. The latter group were excluded as the intervention focused on supporting uptake and continuation of and switching
FIGURE 1. Conceptual Framework for the Mobile Phone Intervention Designed to Support Post-Menstrual Regulation Contraceptive Use in Bangladesh

<table>
<thead>
<tr>
<th>Barriers to contraceptive uptake, continuation, and correct use</th>
<th>Intervention</th>
<th>Behavior Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capability</strong></td>
<td><strong>Motivation</strong></td>
<td><strong>Opportunity</strong></td>
</tr>
<tr>
<td>Psychological Capability</td>
<td>Reflective Motivation</td>
<td>Social Opportunity</td>
</tr>
</tbody>
</table>
| - Lack of accurate knowledge of contraceptive methods: how to access insertion and removal and how they are done, safety, how to use correctly, side effects, LARC and short-term method effects on fertility are reversible | - Health concerns about contraception:  
  - Exaggerated perception of risks (e.g., weight gain, cancer, headaches, infection, bleeding during/after insertion)  
  - Changes to menstruation are harmful  
  - Interferes with sex or sexual satisfaction  
  - Longer-acting methods are only suitable for older, multiparous women/women who have completed their families  
  - Low-self efficacy/empowerment in:  
    - Asking for provider support (e.g., with information gaps, side effects/method selection)  
    - Discussing fertility intentions and contraception with husband/partner/family | - Social norms:  
  - Short-acting methods used by peers  
  - Fear/stigma (LARCs)  
  - Community/provider norms: LARCs for older multiparous women  
  - Religious opposition (LARCs)  
  - Negative attitudes in family towards LARCs or long-term use of short-acting methods |
| - Poor/limited communication with providers and partner | - Automatic Motivation  
  - Remembering to take/use method | Physical Opportunity |
| - Method selection: Uncertainty about which method is suitable after MR | | - Social restrictions on movement and lack of income restrict access to clinic services |

| Behavior change techniques (BCT Taxonomy v1) in messages*: Feedback on behavior, social support (unspecified), instruction on how to perform the behavior, information about others’ approval, prompts/cues, credible source, restructuring the physical environment, verbal persuasion about capability, information about health consequences, information about emotional consequences. *Messages were tailored to participants’ contraceptive method and some content was optional so all participants may not have received all BCTs. |

<table>
<thead>
<tr>
<th>Factual content – Call Center Counseling – Personal Testimonies – Celebrity Endorsement</th>
<th>Capability</th>
<th>Motivation</th>
<th>Opportunity</th>
</tr>
</thead>
</table>
| - Information about methods, covering insertion and removal, use, effects, safety, and access points, delivered by a trustworthy source  
  - Support contraceptive decision making (via call center)  
  - Suggest information sharing with husband/partner  
  - Encourage communication with call center/providers | - Provide examples of contraceptive use from satisfied users  
  - Share information about side effects and safety from trustworthy source  
  - Regular messages are a prompt for use and prompt to speak to call center/provider/husband/partner  
  - Share strategies to aid regular use  
  - Emphasize benefits of methods | - Share personal experiences of women who are happy with their contraceptive method  
  - Share personal endorsement from celebrity  
  - Provide information on the benefits of contraception that can be shared with family members  
  - Remind participants that call center counselors can speak to family members |

**Behavior Outcomes**  
- Uptake of effective contraception including LARCs  
- Correct use of contraception  
- Reduction in discontinuation

**Abbreviations:** LARC, long-acting reversible contraceptive; MR, menstrual regulation.
between contraceptive methods, which was information not deemed to be relevant to women using permanent methods. The study was introduced to women by the clinic provider after completing MR services. Interested participants were referred to a clinic-based research assistant (RA) for screening and recruitment, which took place within 2 days of the MR. All participants gave written informed consent in the presence of a witness of their choice.

Study recruitment ran between December 19, 2015, and March 1, 2016. We screened 1919 MR clients, 947 refused to take part or were ineligible, and 972 were recruited (Figure 2). We do not have a breakdown of the number according to refusal or ineligibility. We also do not have quantitative data on the reasons for refusal or ineligibility; however, RAs reported that the most common reasons for nonparticipation were refusal due to not having time, concern from the woman that her family would find out about her MR, and lack of approval from the woman’s husband. The most common reasons for ineligibility were wanting to conceive within the next 6 months, planning to use sterilization, and having received general anesthesia for the MR procedure.

### Randomization and Masking

Participants were allocated with a 1:1 ratio to the intervention (mobile phone interactive voice messages) or control group (no voice messages). The allocation sequence was generated remotely prior to the start of enrollment and kept by an independent researcher based in Dhaka using the Microsoft Excel formula “=RANDBETWEEN(1, 2)”. No minimization was used. Allocation concealment was achieved via the following steps:

1. Participants were entered into the mHealth platform by recruiting RAs using a secure app following enrollment.

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**FIGURE 2.** Flowchart of Participants in a Randomized Controlled Trial of a Mobile Phone Intervention Designed to Support Post–Menstrual Regulation Contraceptive Use in Bangladesh (2015–2016)
2. At the end of each day, a list of new participant IDs was downloaded from the system by a technical officer at MSB and sent to the independent researcher, who had no contact with RAs or participants.

3. The independent researcher assigned the IDs sequentially to the pregenerated allocation list.

4. The independent researcher sent the ID list with allocations to the technical officer, who activated calls for intervention participants.

RAs recruiting and interviewing participants, clinic staff, and participants were not informed of participant allocations. Participants were told that if they were in the intervention group they would start receiving messages within a few days of recruitment.

A total of 969 participants were randomized correctly, 485 and 484 to the intervention and control groups, respectively. Enrollment paperwork was lost for 5 participants, and 2 participants were excluded at baseline due to age ineligibility.

**Procedures**

All participants received existing standard care at the clinic, which included family planning counseling and offer of available methods, and were provided with the number of a paramedic-led reproductive health call center operating 24/7 and established at MSB for the study. Calls to the call center were charged at the price of a call to a mobile phone. Intervention participants were sent automated interactive voice messages to their mobile phone over the 4-month period after their MR; the intervention is summarized in Box 1 and full details are given in Supplement 1. Sample message content is provided in Box 2 and all messages are included in Supplement 2. Control participants were not sent any voice messages. Participants were interviewed in person at baseline and via phone at 2 weeks and 4 months post-MR. Responses were recorded on paper at the time of interview and entered into a Microsoft Access database by a data entry clerk at a later date. RAs

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**BOX 1. Summary of the Mobile Phone Intervention**

**Intervention Development and Aims**

The intervention development drew on formative and feasibility research conducted in Bangladesh,16,22 behavior change theory,20 and literature on evidence for mHealth globally and barriers to contraceptive use in this population.14 The aim of the intervention was to address information gaps and misconceptions about contraception, particularly for long-acting reversible contraceptives (LARCs), increase motivation for family planning uptake among nonusers, support continuation among users, and encourage method switching for those unhappy with their method.

**Intervention Structure**

The intervention comprised 11 interactive voice messages delivered to the participant’s mobile phone over the 4 months post-menstrual regulation (MR). The first 7 messages were delivered at weekly intervals and the remainder at fortnightly intervals. Participants were asked at recruitment to select 1 of 5 time slots when they would prefer to receive the messages. When the message was sent, if switched on and in network coverage, the phone would ring. If it was answered, the automated content would start to play. If the message was not delivered or answered it would be resent twice after 30-minute intervals. After 3 failed attempts, no further calls would occur until the next scheduled message. It is uncommon in Bangladesh for mobile phones to have voicemail capacity, so messages were not stored for later access.

**Intervention Content**

Seven generic messages were sent to all clients, aiming to increase motivation for contraceptive use and address common fears and information gaps, particularly for LARCs, and 4 messages were tailored to the method of contraception (or no method) chosen by the participant after their MR procedure. If use of a different method was reported in the 2-week survey or to the call center, the woman’s message group was updated and messages restarted. Consequently, women who switched methods received more than 11 messages over a duration longer than 4 months. Messages included factual information delivered by a “doctor apa” (female doctor), 2 personal stories in which women told of their experience using an implant or IUD, and a message recorded by a local celebrity endorsing LARCs.

**Interactive Features**

Each message ended with a menu allowing participants to use their keypad to repeat the initial content, listen to further content (a factual message about each modern method of contraception available in Bangladesh), connect to the call center to receive personalized counseling, indicate they did not need further information at that time, or opt out from receiving further messages.

**Cost and Management of the Intervention**

Messages, including connecting calls to the call center, were free to call recipients. The intervention was built and hosted by “I am digital” (Dhaka), and messages were scheduled to be sent out on a daily basis by a technical officer based at MSB in Dhaka. Members of the study team were enrolled into the intervention to monitor its functioning.

For additional details about the intervention, see Supplement 1.
Effects of Phone Messages to Support Contraceptive Use in Bangladesh

Procedures to Minimize the Risk of Harm

The study was designed with the following procedures to minimize the risk of harm. Many women in Bangladesh report needing to obtain permission from their husband before making decisions. At recruitment, women were given the additional options of enrolling with their husband or other individual of their choice, discussing the study with others before enrolling, having the RA call their husband or someone else to explain the study, and enrolling at a location of their choice. During enrollment, women listened to an example of an automated voice message about family planning and were asked if receiving similar messages on their phone was acceptable to them, what would happen if their husband or partner heard the message, and what would happen if someone else such as an in-law or other family member heard the message. If concerns were raised, the participant was advised not to participate. The intervention did not mention MR or abortion, the participant’s visit to a clinic, or the source of the messages being MSB or Ipas Bangladesh. At the end of each automated voice message, participants had the option of pressing 5 on their keypad to opt out from getting further messages. They could also opt out of the intervention by calling the call center or study number, both of which they received at recruitment.

Outcomes

The primary outcome was self-reported LARC (IUD or implant) use at 4 months post-MR. Secondary outcome measures were use of a LARC at 2 weeks; use of any effective modern contraceptive method, defined as methods with <10% 12-month pregnancy rate (pill, injectable, implant, IUD, or sterilization), at 2 weeks and 4 months post-MR; and subsequent MR, pregnancy, adverse events including experience of violence, or contraceptive discontinuation at any point during the 4-month intervention period. Contraceptive discontinuation was measured using an adaptation of the Demographic and Health Survey contraceptive calendar. At 4 months, participants were also asked about intervention use. Adverse events were measured using an open question: “Did anything happen to you as a result of you being in this study? Good or bad?” Participants who said yes were asked what happened. In addition, violence was measured using 3 closed questions that named specific acts:
1. Physical IPV: “In the last 4 months since the MR when you joined this study, has your husband/partner hit, kicked, slapped, or otherwise physically hurt you?”

2. Sexual IPV: “In the last 4 months since the MR when you joined this study, has your husband/partner physically forced you to have sexual intercourse with him even when you did not want to?”

3. Physical violence perpetrated by the participant’s in-laws: “In the last 4 months since the MR when you joined this study, have your in-laws hit, kicked, slapped, or otherwise physically hurt you?”

No data and safety monitoring board was set up for this study because the intervention was behavioral, not clinical, and the negative effects of mHealth were thought to be minimal. The ethics committees that reviewed the study and the STEP-UP Consortium Advisory Group advised on safety aspects when follow-up data were analyzed.

Statistical Analysis
Using data from MSB and government clinics supported by Ipas Bangladesh, we estimated that 9.4% of control participants would be using a LARC after 4 months. Therefore, assuming equal numbers of women in the intervention and control group, we calculated that a minimum of 960 participants would be required to detect an increase in LARC use of 7% in the intervention group to 16.4% at 4 months of follow-up (a relative risk of 1.74), with .05 significance level and 80% power, allowing for 25% loss to follow-up. A similar intervention in Cambodia revealed an increase in LARC use from 9% to 29% after 4 months; however, a smaller difference could be important given the low cost of sending phone messages.

We conducted analyses on an intention-to-treat basis using Stata version 14.2 (StataCorp LLC, College Station, TX) and followed the prespecified analysis plan. Two independent analyses were conducted, and one analyst [JC] was blinded to the allocation groups. We calculated the effect of the intervention on the primary and secondary outcomes as an odds ratio with a 95% confidence interval using multivariate logistic regression to allow us to adjust for any baseline imbalances among prespecified variables that we hypothesized may be associated with the outcomes: baseline method use (method taken on the day of the MR) or experience of violence in the past year, age, and socioeconomic status (SES) measured using the Poverty Probability Index (PPI). We used multiple imputation (MI) to impute missing outcome and baseline data separately for the 2 allocation groups during analysis of the primary outcome: we used baseline, 2-week, and 4-month LARC use; baseline age; and SES (PPI score) to impute 100 data sets. We then fitted the logistic regression of 4-month LARC use on allocation group and baseline LARC use to each imputed data set and combined the results for final inference using Rubin’s rules.

As a check on our imputation analysis, we conducted logistic regression of 4-month LARC use on allocation group without multiple imputation, adjusting for age, SES (PPI score), and baseline LARC use. This analysis therefore makes a slightly stronger missing at random assumption than the MI analysis. Where there was some evidence (from a simple association test) for an intervention effect on a secondary outcome, we conducted a model-based analysis using MI (which was not specified in the analysis plan). The MI model included the secondary outcome under consideration; intervention; baseline use/experience of secondary outcome being investigated; baseline, 2-week, and 4-month LARC use; baseline age; and SES (PPI score). Logistic regression of secondary outcome on intervention and baseline was then fitted to each imputed data set, and the results were combined for final inference using Rubin’s rules. Because there were imbalances in some baseline data, we carried out additional logistic regression of imputed data sets, adjusting for baseline variables that were prespecified in the protocol or where there was a significant difference between groups: use or experience, age, SES, and education.

We carried out a subgroup analysis to examine any difference in effect of allocation on the primary outcome using logistic regression controlling for age, SES, and baseline use where these were not subgroup categories. Six subgroups were prespecified, and 1 was added during analysis (facility type). We assessed contraceptive discontinuation among participants who started using an effective contraceptive method during the first 4 weeks post-MR, using Kaplan-Meier survival analysis and the log rank test. We defined discontinuation as stopping a method and not starting another effective modern contraceptive method within 2 weeks. We present curves by method for the pill and injectable individually and a combined curve for LARCs due to the low numbers of participants.
who discontinued these methods. We carried out an additional (not prespecified) subgroup analysis to examine any difference in effect of allocation on physical IPV using logistic regression controlling for age, SES, and baseline experience of physical IPV where they were not subgroup categories.

The trial has been registered with ClinicalTrials.gov (NCT02579785) since October 16, 2015.

Role of the Funding Source
The funder of the study had no role in study design, data collection, data analysis, or data interpretation or in writing of the report. The corresponding author had full access to all study data and had final responsibility for the decision to submit for publication.

RESULTS

We analyzed baseline data for 962 participants (Table 1). Follow-up was completed in July 2016 and primary outcome data were collected and used from 772 participants, an 80% follow-up rate; 389 (80% follow-up rate) from the intervention arm, and 383 (79% follow-up rate) from the control arm.

No evidence was found for an effect of the intervention on the primary outcome of LARC use at 4 months post-MR: 48 (12%) of intervention participants and 59 (15%) of control participants reported using a LARC at 4 months (P= .22). After imputing missing data, we found no evidence that participants in the intervention arm had higher odds of using a LARC than women in the control arm (adjusted odds ratio [aOR]= 0.95; 95% confidence interval [CI]= 0.49 to 1.83). The prespecified analysis under a weaker missing at random assumption also revealed no evidence that odds were higher in the intervention arm (aOR=1.06; 95% CI=0.53 to 2.13). There was also no evidence for an effect of the intervention on use of any effective modern contraception at 4 months, subsequent pregnancy, subsequent MR, or on LARC and any effective modern method use at 2 weeks post-MR (Table 2).

The log rank test indicated that there was no evidence for a difference in contraceptive discontinuation rates between the allocation groups (Supplement 3). We found no evidence for a difference in effect of the intervention on LARC use between subgroup categories (Supplement 4).

The intervention appeared to have an effect on reported physical IPV measured using a closed question asking about specific acts (Table 2): 42 (11%) of participants in the intervention arm reported physical IPV in the 4 months post-MR versus 25 (7%) in the control arm (aOR=1.97; 95% CI=1.12 to 3.46; P=.03). A post-hoc analysis using MI (under a weaker missing at random assumption) to handle missing data found participants in the intervention group had 2.16 (95% CI=1.16 to 4.02) times higher odds of reporting physical IPV as participants in the control group. There was no evidence in crude or adjusted models that the intervention had an effect on self-reported sexual IPV (47 [12%] vs. 36 [10%]; aOR=1.25; 95% CI=0.78 to 2.02; P=.23) or self-reported physical violence perpetrated by in-laws (6 [2%] vs. 4 [1%]; aOR=1.20; 95% CI=0.31 to 4.62; P=.54). Reports of adverse outcomes also did not differ when participants were asked whether something happened to them as a result of participating in the study: only 4 participants (2 per group) reported something negative, and all 4 reported pain or other effects of the MR or contraception. Additional analysis of imputed data sets adjusting for imbalances in baseline data had no effect on the scientific conclusions. We found no evidence for a difference in effect of the intervention on physical IPV between subgroup categories (Supplement 5).

During the 4-month follow-up survey, 319 (85%) intervention and 89 (25%) control participants reported that they received voice messages about family planning since they joined the study. Among intervention participants who received messages, 170 (54%) said they listened to all the messages, 141 (45%) listened to some, and 5 (2%) listened to none. A small number of participants (12 intervention and 1 control participant) reported that they pressed 5 to opt out from receiving further messages.

DISCUSSION

Women allocated to receive interactive messages about contraception (the intervention group) were more likely to report physical IPV compared with the control group receiving usual care, but there was no evidence of an effect on self-reported LARC or effective modern contraceptive use. The increase in reported physical IPV was observed when measured using a direct question that named specific acts of violence, but no conflict was reported in response to an open question about positive or negative effects of being in the study.

Strengths and Limitations
A key strength of this study is the randomized controlled design, which allowed us to identify an increase in a rare negative outcome; it is unlikely
<table>
<thead>
<tr>
<th>Baseline Characteristics of the Intention-to-Treat Population</th>
<th>Intervention Arm (n=484)</th>
<th>Control Arm (n=478)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, years, mean (SD)</strong></td>
<td>28 (6)</td>
<td>28 (6)</td>
</tr>
<tr>
<td>Missing&lt;sup&gt;a&lt;/sup&gt; No. (%)</td>
<td>1 (&lt;1)</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Education, No. (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to end of primary</td>
<td>150 (31)</td>
<td>115 (24)</td>
</tr>
<tr>
<td>Over primary</td>
<td>334 (69)</td>
<td>362 (76)</td>
</tr>
<tr>
<td>Missing&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0 (0)</td>
<td>1 (&lt;1)</td>
</tr>
<tr>
<td><strong>Poverty status (PPI), No. (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood of living below US$1.25</td>
<td>17 (17)</td>
<td>15 (15)</td>
</tr>
<tr>
<td>Missing&lt;sup&gt;a&lt;/sup&gt;</td>
<td>16 (3)</td>
<td>21 (4)</td>
</tr>
<tr>
<td><strong>Division recruited from, No. (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dhaka</td>
<td>286 (59)</td>
<td>295 (62)</td>
</tr>
<tr>
<td>Chittagong</td>
<td>141 (29)</td>
<td>127 (27)</td>
</tr>
<tr>
<td>Sylhet</td>
<td>57 (12)</td>
<td>56 (12)</td>
</tr>
<tr>
<td><strong>Location of residence, No. (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City</td>
<td>173 (36)</td>
<td>182 (38)</td>
</tr>
<tr>
<td>Town</td>
<td>119 (25)</td>
<td>120 (25)</td>
</tr>
<tr>
<td>Village</td>
<td>192 (40)</td>
<td>175 (37)</td>
</tr>
<tr>
<td>Missing&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0 (0)</td>
<td>1 (&lt;1)</td>
</tr>
<tr>
<td><strong>Number of living children, No. (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>67 (14)</td>
<td>58 (12)</td>
</tr>
<tr>
<td>1–2</td>
<td>280 (58)</td>
<td>292 (61)</td>
</tr>
<tr>
<td>≥3</td>
<td>137 (28)</td>
<td>127 (27)</td>
</tr>
<tr>
<td>Missing&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0 (0)</td>
<td>1 (&lt;1)</td>
</tr>
<tr>
<td><strong>Marital status, No. (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married or cohabiting</td>
<td>478 (99)</td>
<td>470 (98)</td>
</tr>
<tr>
<td>Separated/divorced/widowed</td>
<td>1 (&lt;1)</td>
<td>3 (&lt;1)</td>
</tr>
<tr>
<td>Never married or cohabited</td>
<td>5 (1)</td>
<td>5 (1)</td>
</tr>
<tr>
<td><strong>Religion, No. (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Islam</td>
<td>437 (90)</td>
<td>438 (92)</td>
</tr>
<tr>
<td>Hinduism</td>
<td>38 (8)</td>
<td>30 (6)</td>
</tr>
<tr>
<td>Buddhism</td>
<td>8 (2)</td>
<td>7 (1)</td>
</tr>
<tr>
<td>Christianity</td>
<td>1 (&lt;1)</td>
<td>3 (1)</td>
</tr>
<tr>
<td><strong>Who makes decision whether participant uses contraception, No. (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self only</td>
<td>84 (17)</td>
<td>79 (17)</td>
</tr>
<tr>
<td>Self and someone else</td>
<td>337 (70)</td>
<td>346 (72)</td>
</tr>
<tr>
<td>Someone else</td>
<td>63 (13)</td>
<td>53 (11)</td>
</tr>
<tr>
<td><strong>Type of MR received at baseline, No. (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical</td>
<td>353 (73)</td>
<td>348 (73)</td>
</tr>
</tbody>
</table>

*Continued*
this effect would have been detected in a noncomparative study. The randomization process was conducted remotely, and clinic and research staff involved in recruitment were blinded to allocation as was 1 analyst. While some bias may have been introduced through lack of full blinding in the 4-month survey, steps were taken to ensure that RAs conducting this follow-up interview were blinded during reporting of primary and secondary outcomes, which were placed at the beginning of the questionnaire. Loss to follow-up was relatively small and was similar across arms, and MI (assuming missing at random) was used to handle missing data.

Table 1 shows that baseline differences existed between the 2 allocation groups, which occurred by chance during the randomization process. We adjusted for these differences, and although some residual confounding may have remained, it is very unlikely to affect the results.51 Notably, a higher proportion of patients in the control arm than the intervention arm were using LARCs at baseline (14% vs. 10%, respectively). This is the principal reason why the point estimate from

<table>
<thead>
<tr>
<th>TABLE 1. Continued</th>
<th>Intervention Arm (n=484)</th>
<th>Control Arm (n=478)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical</td>
<td>131 (27)</td>
<td>130 (27)</td>
</tr>
<tr>
<td>Chose an effective method of contraception on day of MR, No. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, chose a LARC (IUD or implant)</td>
<td>46 (10)</td>
<td>65 (14)</td>
</tr>
<tr>
<td>Yes, chose a short-acting method (pill or injectable)</td>
<td>233 (48)</td>
<td>227 (47)</td>
</tr>
<tr>
<td>No</td>
<td>203 (42)</td>
<td>186 (39)</td>
</tr>
<tr>
<td>Missinga</td>
<td>2 (&lt;1)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Facility type, No. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public-sector clinic supported by Ipas Bangladesh</td>
<td>229 (47)</td>
<td>245 (51)</td>
</tr>
<tr>
<td>MSB clinic</td>
<td>255 (53)</td>
<td>233 (49%)</td>
</tr>
<tr>
<td>Facility size, No. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>172 (36)</td>
<td>148 (31)</td>
</tr>
<tr>
<td>Secondary</td>
<td>155 (32)</td>
<td>171 (36)</td>
</tr>
<tr>
<td>Tertiary</td>
<td>157 (32)</td>
<td>159 (33)</td>
</tr>
<tr>
<td>Experience of physical IPV in the last year, No. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>58 (12)</td>
<td>65 (14)</td>
</tr>
<tr>
<td>No</td>
<td>425 (88)</td>
<td>411 (86)</td>
</tr>
<tr>
<td>Missinga</td>
<td>1 (&lt;1)</td>
<td>2 (&lt;1)</td>
</tr>
<tr>
<td>Experience of sexual IPV in the last year, No. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>123 (25)</td>
<td>129 (27)</td>
</tr>
<tr>
<td>No</td>
<td>361 (75)</td>
<td>346 (73)</td>
</tr>
<tr>
<td>Missinga</td>
<td>0 (0)</td>
<td>3 (&lt;1)</td>
</tr>
<tr>
<td>Experience of violence perpetrated by in-laws in the last year, No. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13 (3)</td>
<td>20 (5)</td>
</tr>
<tr>
<td>No</td>
<td>440 (97)</td>
<td>416 (95)</td>
</tr>
<tr>
<td>Missinga</td>
<td>31 (6)</td>
<td>42 (9)</td>
</tr>
</tbody>
</table>

Abbreviations: IPV, intimate partner violence; IUD, intrauterine device; LARC, long-acting reversible contraception; MR, menstrual regulation; MSB, Marie Stopes Bangladesh; PPI, Poverty Probability Index; SD, standard deviation.

a Not included in denominator for calculation of percentages.
TABLE 2. Effect of the Mobile Phone Intervention on Primary and Secondary Outcomes at 2 Weeks and 4 Months Follow-Up

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Intervention Arm n/N (%)</th>
<th>Control Arm n/N (%)</th>
<th>P Value ($\chi^2$)</th>
<th>Unadjusted OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LARC use at 4 months</td>
<td>48/389 (12%)</td>
<td>59/383 (15%)</td>
<td>.22</td>
<td>0.77 (0.51, 1.17)</td>
<td>1.06 (0.53, 2.13)$^b$</td>
</tr>
<tr>
<td>LARC use with MI at 4 months (100 imputations)</td>
<td>55/484 (11%)</td>
<td>72/478 (15%)</td>
<td>.11</td>
<td>0.73 (0.49, 1.08)</td>
<td>0.95 (0.49, 1.83)$^c$</td>
</tr>
<tr>
<td><strong>Secondary outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4-month follow-up</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective modern method use (any method)$^d$</td>
<td>214/389 (55%)</td>
<td>204/383 (53%)</td>
<td>.63</td>
<td>1.07 (0.81, 1.42)</td>
<td>1.04 (0.75, 1.43)$^b$</td>
</tr>
<tr>
<td>Subsequent pregnancy</td>
<td>6/389 (2%)</td>
<td>10/383 (3%)</td>
<td>.30</td>
<td>0.58 (0.21, 1.62)</td>
<td>0.48 (0.16, 1.43)$^a$</td>
</tr>
<tr>
<td>Subsequent MR or abortion</td>
<td>2/389 (&lt;1%)</td>
<td>4/383 (1%)</td>
<td>.40</td>
<td>0.49 (0.09, 2.69)</td>
<td>0.43 (0.08, 2.41)$^e$</td>
</tr>
<tr>
<td><strong>2-week follow-up</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LARC use</td>
<td>48/413 (12%)</td>
<td>56/411 (14%)</td>
<td>.39</td>
<td>0.83 (0.55, 1.26)</td>
<td>1.57 (0.68, 3.62)$^b$</td>
</tr>
<tr>
<td>Effective modern method use</td>
<td>223/413 (54%)</td>
<td>221/411 (54%)</td>
<td>.95</td>
<td>1.01 (0.77, 1.33)</td>
<td>1.07 (0.74, 1.54)$^b$</td>
</tr>
<tr>
<td><strong>4-month contraceptive calendar (log rank test)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>LARC discontinuation</td>
<td>2/661 (&lt;1%)</td>
<td>2/844 (&lt;1%)</td>
<td>.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injectable discontinuation</td>
<td>20/620 (3%)</td>
<td>14/517 (&lt;3%)</td>
<td>.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pill discontinuation</td>
<td>27/1693 (2%)</td>
<td>32/1555 (2%)</td>
<td>.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4-month follow-up</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical IPV</td>
<td>42/386 (11%)</td>
<td>25/382 (7%)</td>
<td>.03</td>
<td>1.74 (1.04, 2.92)</td>
<td>1.97 (1.12, 3.46)$^b$</td>
</tr>
<tr>
<td>Physical IPV with MI (100 imputations)$^f$</td>
<td>57/484 (12%)</td>
<td>31/478 (6%)</td>
<td>.03</td>
<td>1.87 (1.07, 3.27)</td>
<td>2.16 (1.16, 4.02)$^c$</td>
</tr>
<tr>
<td>Sexual IPV</td>
<td>47/386 (12%)</td>
<td>36/379 (10%)</td>
<td>.23</td>
<td>1.32 (0.83, 2.09)</td>
<td>1.25 (0.78, 2.02)$^b$</td>
</tr>
<tr>
<td>Physical violence from in-laws</td>
<td>6/384 (2%)</td>
<td>4/380 (1%)</td>
<td>.54</td>
<td>1.49 (0.42, 5.33)</td>
<td>1.20 (0.31, 4.62)$^b$</td>
</tr>
<tr>
<td><strong>Adverse outcomes at 4 months</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nothing</td>
<td>335/385 (92%)</td>
<td>366/381 (96%)</td>
<td>.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Something good</td>
<td>28/385 (7%)</td>
<td>13/381 (3%)</td>
<td>2.22 (1.13, 4.36)</td>
<td>2.25 (1.14, 4.44)$^g$</td>
<td></td>
</tr>
<tr>
<td>Something bad</td>
<td>2/385 (&lt;1%)</td>
<td>2/381 (&lt;1%)</td>
<td>1.03 (0.14, 7.36)</td>
<td>2.10 (0.19, 3.60)$^g$</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; IPV, intimate partner violence; IUD, intrauterine device; LARC, long-acting reversible contraception; MI, multiple imputation; MR, menstrual regulation; OR, odds ratio; PPI, Poverty Probability Index; SES, socioeconomic status.

$^a$ Total number varies due to missing data on baseline covariates included in the model (see Table 1).

$^b$ Adjusted for baseline use of these methods/experience of this outcome, age, and SES (PPI Score).

$^c$ Adjusted for baseline use/experience only.

$^d$ Pill, injection, implant, IUD, or sterilization. At 4 months, participants were asked about how regularly they take the pill and were only classified as pill users if they reported always or usually taking it on time.

$^e$ Adjusted for baseline LARC use, age, and SES (PPI score).

$^f$ Analysis not specified in study protocol.

$^g$ Adjusted for age and SES (PPI score).
The measures of violence used did not capture frequency or severity.

adjusted analysis for LARC use at 4 months and 2 weeks is greater than the corresponding unadjusted point estimate. Given the baseline imbalance, the adjusted results are preferred; however, the difference between the 2 must be interpreted cautiously as the 95% CI from the adjusted analysis includes the unadjusted estimate in each case.

The proportion of control participants using a LARC at 4 months (15%) was higher than predicted during sample size calculations, slightly reducing the power; however, the loss to follow-up was less than expected. Post-hoc power calculations indicate that we had a sample size that was large enough to detect an increase of 9 percentage points at 4 months of follow-up, from 15% in the control group to 24%, and of 8 percentage points to 23% when using multiple imputation. The study was not powered for the subgroup analyses, so we were unlikely to find any significant results in these analyses; however, the results do not appear to explain the increase in IPV.

The main limitation of this study is that all outcomes are self-reported and may have been affected by a number of types of reporting bias; however, self-reporting is standard for trials of interventions to support contraceptive use. Recall bias is likely to have affected both allocation groups in the same way, but social desirability bias may have had a differential effect; for example, participants in the intervention group may have felt more pressure to report something positive happened to them as a result of study participation because they received the intervention. Another possibility is that the intervention may have increased trust in the study team, leading intervention participants to feel more able than control participants to report violence.

Control participants were not sent placebo or dummy messages to their phone without active content, which limits our ability to identify whether the increase in IPV was a response to the message content or to getting messages at all. However, given that both the message content and format were integral to the intervention design, we do not consider this as limiting our finding that this mHealth intervention led to an increase in violence. A noteworthy proportion of control participants reported receiving messages about family planning during the study period; it is not clear if these were messages from another source, or whether some participants considered the reminders about the follow-up interviews as family planning messages. Initial analysis of interactive voice response system process data suggest minimal contamination was present, but this possibility is being explored further.

The measures of violence used did not capture frequency or severity, and addition of these outcomes may have provided more insight into the relationship between the intervention and this adverse outcome.

Discussion in Relation to Existing Literature

No adverse outcomes were reported in a similar study in Cambodia, which improved contraceptive use among postabortion clients using interactive voice messages; however, only a single open question was used: “Did anything happen to you ‘positive or negative’ as a result of participating in the trial?” (personal communication with the study principal investigator). In an RCT evaluating instant messages delivered by a mobile phone app designed to increase the acceptability of contraception among young people in Tajikistan, 4 of 470 participants interviewed at follow-up reported experiencing physical violence since being in the study, but there was no evidence for a difference between the control and intervention groups. A trial of text message support for adolescents and young adults in the United States using an injectable contraceptive stated that no adverse events were reported by participants; however, no information was given on how such events were measured. Other trials of mHealth interventions for contraception have not reported on conflict or violence. A 2013 systematic literature review of the effects of mHealth interventions and interventions aimed at increasing mobile phone ownership and use among women on gender relations in developing countries found evidence for both positive and negative effects.

The included literature suggest that mobile phone interventions can increase women’s decision-making power and social status and can increase male participation in health areas usually targeted to women. However, in a study in which participants had been given phones as part of the intervention, some tensions over phone use were reported, and an intervention supporting mobile retail business among women led to tension and abuse when a participant’s husband’s role as the highest earner was challenged. The authors identified only 7 articles on this topic that met their inclusion criteria, and they concluded that effects of mHealth on gender relations are often not being measured. Qualitative research in Ghana conducted between 1994 and 1996 found that in addition to having many positive effects, the introduction of family planning services in the region led to tensions in gender relations.
For example, some men reported fears that women using contraception will be unfaithful. There are anecdotal reports of similar attitudes in Bangladesh.

**Meaning and Mechanisms**

Although a possibility, it is unlikely that the increase in self-reported IPV is a chance finding: the $P$ value of .03 equates to a 1 in 33 chance. As discussed in the limitations section, the result could possibly be due to reporting bias if receipt of the intervention made women feel more able to disclose IPV. The result may reflect a true increase in IPV by one of the following mechanisms. It is plausible that although participants agreed to messages being sent to their phone about contraception and were played an example at recruitment, messages were more troublesome when received at home: messages may have been overheard by others who found the content to be unacceptable, messages may have disclosed contraceptive use, or they may have led to suspicion of infidelity. The messages did not mention the participant’s MR or study participation; however, such information may have been revealed if she was questioned about the calls. Notably, concern about family finding out about an MR was a common reason for potential participants refusing to take part in the study.

In Bangladesh, not seeking a husband’s permission before making a decision is often reported to warrant wife-beating, and a husband’s lack of approval was also given as a reason for refusal to participate in the study. Women were given the opportunity of enrolling with their husband or of informing him before they agreed to participate, but some of those who did not get their husband’s consent could have experienced IPV. Conflict may also have resulted from increased phone use, from calls coming from an unknown number, or from the timing or repetitive nature of calls. IPV may plausibly occur in interventions that empower women to use contraception, thereby challenging existing power dynamics; however, there is no evidence to support this mechanism in this trial.

No participant reported violence in response to the open question about study effects, and intervention participants were more likely than control participants to report a positive experience. This result may reflect acquiescence bias, social desirability bias, or concerns that the conversation was being overheard. It is also possible that participants did not attribute violence that they may have experienced to the intervention. Reported levels of violence were higher at baseline than at 4 months but this is to be expected for the following 2 reasons. First, different time frames were used for the baseline and 4-month surveys; at baseline participants were asked about violence in the past year in order to be able to compare the level of violence in this population with other surveys and because a 12-month follow up was planned, as explained below. At follow-up, participants were asked about violence during the intervention period—the past 4 months—in order to examine any difference in relation to study participation. Second, there is evidence demonstrating unintended pregnancy and abortion are associated with partner violence. Therefore, we may expect to see higher than normal levels of violence when interviewing women at the time of an MR procedure.

The study protocol included a quantitative 12-month phone follow-up and in-depth interviews with a small number of participants. The 4-month primary outcome data were analyzed before the 12-month survey was conducted in order to inform programming at MSB. After observing the increase in physical IPV and the lack of benefits from receiving the intervention, the findings were shared with the 4 ethics committees who had approved the protocol. A decision was made not to proceed with the 12-month survey due to safety concerns; although the intervention had ended, it was unclear whether the study participation itself was a potential cause of risk. The in-depth interviews, which had been planned as part of a mixed-methods process evaluation, were redesigned to explore the violence outcome and to increase safety protocols when recontacting and interviewing trial participants. The interviews, conducted in 2017, are currently being analyzed and full results will be reported elsewhere. No in-depth interview participant reported conflict or violence resulting from study participation. However, the possibility exists that anyone who experienced conflict may not have agreed to an in-person interview. In the interviews, women reported that phone sharing with husbands was common, so the possibility of messages being overheard was high. There was some evidence of women’s phone calls being monitored, and there were a few cases of marital conflict due to phone use more broadly. A number of participants reported not talking about the study due to concern that it would result in other family members or people in the local community finding out about their MR. The majority of participants interviewed had informed their husband about their
Caution is needed when conducting follow-up of clients who have accessed sexual and reproductive health services.

MR and the study, but many had not shared this information with their in-laws or others. Many reported opposition to MR among other family members and the wider community. The lack of effect of our intervention on contraceptive use is also important. This finding contrasts with results from voice call interventions that increased contraceptive use among postabortion clients in the study in Cambodia discussed earlier and among postpartum clients in Ecuador.\(^8,26\) The lack of effect in our study may be due to differences in the intervention design, the context, or both. Self-reported process data indicate that the majority of participants listened to some or all of the messages, suggesting that the lack of effect was not due to non-receipt of messages. Both the Cambodian and Ecuadorian interventions relied heavily on individualized counseling, and although our messages linked participants to a call center, we aimed to explore the effect of automated content and placed this at the start of the call because counselor-intensive interventions are more costly to provide at scale.\(^26,43\) Furthermore in Cambodia, but not in Bangladesh, counselors were able to book clinic appointments, which may have helped to translate behavioral intentions into actions.\(^5\)

Text and voice-based interventions with proven effectiveness have used messages that are short in length,\(^8,16\) and recipients have reported that getting only small amounts of information at a time facilitates the assimilation of new content.\(^15\) In contrast, each of our messages contained many ideas. The temporary nature of automated voice messages may make them unsuitable for delivery of complex information because they cannot be revisited after the call has ended and content may be missed if the call comes at an inconvenient time.

Our messages may not have contained the correct content or a sufficient amount of information to adequately address established individual or social barriers to contraceptive use in this population, such as health concerns.\(^1,7\) However, interpersonal factors and social norms may limit the effectiveness of interventions targeting the individual in Bangladesh, where 35% of married women report that decisions about their own health are made mainly by their husband or someone else.\(^1\) This influence may be particularly relevant for LARCs; in a recent survey in one area of the country, 64% of women reported that their husband disapproves of the implant and the IUD, compared with 8% for the pill.\(^7\)

Twenty-five percent of control participants reported receiving voice messages about family planning during the study period. Prior to the trial, some MSB trial clinics made phone calls to MR participants after their procedure to provide follow-up support, including for contraceptive use. Clinics were asked to stop this practice during the trial, but it is possible that some calls may have been made. Such calls may have weakened any intervention effect.

**Implications for Research and Services**

Caution is needed when conducting follow-up of clients who have accessed sexual and reproductive health services, both for programming and research purposes, and with development of other mHealth interventions in this field. A simple call from a provider, rather than automated content, would allow the caller to check who is speaking before revealing their identity and the purpose of the call. The use of “withheld” numbers are recommended for outbound calling as are scripts ensuring confidentiality. Where appropriate, callers may be trained to give a “cover story” in case the call is interrupted. It is vital that mHealth reproductive services are “opt in” and that participants have adequate opportunity to opt out once the intervention has started. Programmers may also consider the possibility of offering alternative delivery mechanisms to women who think their partner may object to the phone calls. With respect to family planning, content that does not reveal contraceptive use may be less personal but could be safer. However, it may be preferable, and still effective,\(^8\) to avoid any reference to the topic of the call and to use neutral outbound messages only as a way to maximize call center use, particularly when targeting women at a sensitive time in their lives such as post-MR. Studies need to explore how call center counselor-intensive interventions could be financed at scale, for example, via government support, discounted mobile operator charges, corporate sponsorship, and user payment, although the latter must be investigated carefully to ensure it does not negatively affect use or exclude certain groups.\(^22\) Where smartphones are widely available and illiteracy is not a barrier, apps that can be password protected may offer more options for privacy because women will be able to seek information on their own terms. When developing theoretical frameworks of intended intervention mechanisms, it is also important to consider what unintended and harmful outcomes are possible and how they could occur.\(^32\) In addition to supporting efforts to reduce intervention risks during the design phase, this
consideration can inform the rigorous measurement of potential adverse outcomes and exploration of the mechanisms behind them.32

### CONCLUSIONS

The increase in self-reported violence against women who received automated, interactive voice messages about contraception, despite strong privacy and screening measures, demonstrates the importance of carefully considering the potential for negative outcomes and their underlying mechanisms when developing interventions on sensitive reproductive health topics. The findings also highlight the need to routinely include specific measures with named acts of violence when evaluating mHealth interventions on sexual and reproductive health. We recommend that future mHealth studies set up data safety monitoring boards or make a data and safety monitoring plan to review preliminary effects of the intervention on safety outcomes. Analysis of process data from this trial to explore the mechanism behind the violence outcome and reasons for the noneffect on contraceptive use will be reported elsewhere. That report will include process data from the interactive voice response phone system and from in-depth interviews with study participants.

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**Competing Interests:** KR, FT, TDN, SB, PF, KK, MD, YR, and KC were employed by Marie Stopes International or Marie Stopes Bangladesh and KA, EP, KB and JM by Ipas or Ipas Bangladesh as staff members and/or consultants while working on this study. Marie Stopes International, Marie Stopes Bangladesh, Ipas, and Ipas Bangladesh were responsible for the design and implementation of the intervention being evaluated. The other authors declare no conflict of interest.

### REFERENCES


Evidence-Based Process for Prioritizing Positive Behaviors for Promotion: Zika Prevention in Latin America and the Caribbean and Applicability to Future Health Emergency Responses

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To maximize the impact of Zika prevention programming efforts, a prioritization process for social and behavior change programming was developed based on a combination of research evidence and programmatic experience. Prioritized behaviors were: application of mosquito repellent, use of condoms, removing unintentional standing water, covering and scrubbing walls of water storage containers, seeking prenatal care, and seeking counseling on family planning if not planning to get pregnant.

Résumé en español al final del artículo.

ABSTRACT
Since the 2015 Zika outbreak in Latin America and the Caribbean, a plethora of behavior change messages have been promoted to reduce Zika transmission. One year after the United States Agency for International Development (USAID) initiated its Zika response, more than 30 variants of preventive behaviors were being promoted. This situation challenged social and behavior change (SBC) programming efforts that require a coordinated response and agreed upon set of focus behaviors to be effective. To support USAID implementing partners in harmonizing prevention efforts to reduce Zika infection, we developed an evidence-based process to identify behaviors with the highest potential to reduce Zika infection and transmission. We compiled a full list of behaviors and selected the most promising for a full evidence review. The review included systematic keyword searches on Google Scholar, extraction of all relevant published articles on Aedes-borne diseases between 2012 and 2018, review of seminal papers, and review of gray literature. We examined articles to determine each behavior’s potential effectiveness in preventing Zika transmission or reducing the Aedes aegypti population. We also developed assessment criteria to delineate the ease with which the target population could adopt each behavior, including: (1) required frequency; (2) feasibility of the behavior; and (3) accessibility and cost of the necessary materials in the setting. These behaviors were refined through a consensus-building process with USAID’s Zika implementing partners, considering contextual factors. The resulting 7 evidence-based preventive behaviors have high potential to strengthen SBC programming’s impact in USAID’s Zika response: (1) apply mosquito repellent, (2) use condoms during pregnancy, (3) remove standing water, (4) cover water storage containers, (5) clean/remove mosquito eggs from water containers, (6) seek antenatal care, and (7) seek family planning counseling. This case study documents a flexible process that can be adapted to inform the prioritization of behaviors when there is limited evidence available, as during many emergency responses.

INTRODUCTION
Zika virus is a communicable disease primarily transmitted by the Aedes aegypti mosquito, a vector that also transmits other arboviruses including dengue, chikungunya, West Nile virus, and yellow fever. The first outbreak of Zika detected in the Americas occurred in 2015, with a spike in suspected congenital malformations and other neurological complications such as Guillain-Barré syndrome.1 By August 3, 2017, there were approximately 217,000 confirmed Zika cases, and about 3,400 cases of associated congenital Zika syndrome.2 Zika is now considered endemic throughout Latin America and the Caribbean (LAC), parts of Africa, and Asia. Between 29% and 82% of Zika infections are asymptomatic according to the U.S. Centers for Disease Control and Prevention (CDC).3 Infection during pregnancy is linked to congenital Zika syndrome in newborns, which is characterized by severe microcephaly (small head size), decreased brain tissue mass, and subcortical calcification.4 Other health abnormalities,
including developmental delays, associated with the Zika virus have been reported. Research on the impact of the virus on mothers and children is ongoing.2

The outbreak in LAC demanded a concerted regional response, given the wide distribution of the mosquito vector, the lack of population-level immunity, the absence of a vaccine or rapid diagnostic test, uneven access to water due to low quality water and sanitation infrastructure, water shortages, lack of information about the disease, and inadequate health systems to respond to the health impacts.3 On February 1, 2016, the World Health Organization declared Zika a Public Health Emergency of International Concern.4 The United States Agency for International Development (USAID) and other U.S. government entities and international partners began working together through existing country systems to reduce the risk of new Zika infections, particularly in pregnant women, and to provide care for those affected through interventions in vector control, social and behavior change (SBC), and health service delivery.6 The focus for this process was SBC for individuals, households, and communities in Zika-affected regions, only.

USAID’s SBC programming was comprised mainly of mass and social media, community engagement, and interpersonal communication, with the goal to “raise awareness, reduce misinformation, and address the barriers that prevent individuals, families, and communities from practicing lifesaving behaviors to improve health outcomes.”7 The SBC literature suggests that behavior change is more likely to occur when clear and concise messaging is repeated frequently through multiple channels.8–9 When too many preventive behaviors are promoted or messages lack precision, adopting prevention behaviors can be inhibited or done in a way that is either ineffective or counterproductive.8 Messaging can be particularly challenging during emergency responses when data may be unavailable to inform programming and time constraints inhibit collective planning, leading to the promotion of messages before a concerted and harmonized response can be organized. In a non-systematic, rapid desk review of SBC messages approximately 1 year after the USAID Zika response began, we identified more than 30 variants of prevention behaviors that were being promoted. The prevention messages for these behaviors were not consistently presented, lacked cohesion in their packaging, and offered little specificity regarding how the behavior should be implemented to effectively reduce Zika infection and transmission. Too many behaviors with insufficiently specific instructions in the messages could have resulted in confusion, information overload, and incorrect performance of the behaviors among individuals and communities. The behaviors promoted were also not always based on available evidence around their effectiveness in relation to Zika transmission.

Facing an outbreak of a disease new to the Americas, public health institutions and organizations found themselves conducting research while simultaneously launching interventions and programs. At the time programs were rolling out, there were limited data to guide SBC programming and messaging for the most effective preventive actions for individuals and communities. These circumstances often led to a lack of cohesion in promoted behaviors and SBC messages. To more effectively coordinate the Zika response among implementing partners and increase the rate of behavior adoption among target populations, the Breakthrough ACTION + Research Projects, in collaboration with USAID, developed an evidence-based process to identify priority behaviors with the highest potential for preventing Zika acquisition and transmission. Stakeholders across disciplines and involved in various levels of programming were engaged throughout to ensure buy-in, harmonize priority behaviors and their SBC messages, and ensure a more effective Zika response. Existing research could be leveraged because the transmission dynamics for Zika were similar to other arboviruses and sexually transmitted infections; preventive behaviors targeting the vector (the *Aedes aegypti* mosquito) and practices to reduce sexual transmission had already been identified in the literature and could be assessed for Zika. Understanding the transmission dynamics was critical to identifying behaviors to consider for prevention. The exercise, referred to as the “behavior prioritization process,” focused on a range of individual- and household-level behaviors to reduce the risk of Zika acquisition and transmission. Messages were developed by partners based on the set of behaviors identified and prioritized in this process.

Establishing an evidence base and a refined set of preventive behaviors tailored to the specific context can greatly improve the success of SBC programming by reinforcing promotion of consistent behaviors and using evidence to add specificity to the desired actions. The process combined available evidence and a consensus-building approach to allow for adaptation based on local

An evidence-based process identified priority behaviors with the highest potential for preventing Zika.
context. This article summarizes our experience in prioritizing the behaviors with highest potential for Zika prevention, identifies specific target audiences for each behavior, and documents the design and implementation of the behavior prioritization process developed to achieve these aims in a flexible way. We also consider the applications of this process for strengthening future public health emergency responses.

**METHODS**

A list of more than 30 Zika preventive behaviors (or their variants) that USAID implementing partners across USAID-supported countries were promoting was compiled by informally reviewing numerous project materials and documents. All of these preventive behaviors were related to the transmission dynamics of Zika virus—transmission by a vector (Aedes aegypti) that also transmits arboviruses such as dengue and sexual transmission. A team of experts in SBC programming and vector control was enlisted to categorize and refine the behaviors. All of the Zika prevention messages were first grouped together by behavior to create a condensed version of about 15 behaviors. Through an iterative review process including experts and discussions with partners, the list was distilled to 7 key behaviors (Table 1). Behaviors were excluded if they had limited effectiveness preventing Aedes aegypti-borne diseases (such as Zika) or reducing Aedes aegypti mosquito populations (after a quick literature scan and input from experts) or due to other criteria.

**TABLE 1. The 7 Zika Preventive Behaviors Selected for Prioritization**

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Summary of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal Protection</strong></td>
<td></td>
</tr>
<tr>
<td>Applying mosquito repellent (DEET, picaridin, IR3535, or lemon eucalyptus oil, only), using each product as directed, for duration of pregnancy, to reduce risk of Zika transmission through mosquito bites.</td>
<td>Application of mosquito repellent is highly efficacious in preventing mosquito bites, and thus the potential of vector transmission of Zika to an individual. This behavior is within the control of pregnant women and their male partners. Users should be thoroughly counseled on proper product application. Women intending to become pregnant should also consider using repellent.</td>
</tr>
<tr>
<td>Using condoms to prevent sexual transmission of Zika in pregnancy.</td>
<td>Condom use to prevent sexual transmission of Zika is highly efficacious, but sexual transmission may be a small portion of overall transmission. This behavior should be prioritized for pregnant women and their partners because pregnant women are at risk for negative pregnancy outcomes.</td>
</tr>
<tr>
<td><strong>Household and Community Vector Control</strong></td>
<td></td>
</tr>
<tr>
<td>Regularly removing unintentional standing water both inside and outside the house and in communal areas.</td>
<td>This is a potentially efficacious behavior to reduce mosquito populations, and thus reduce the potential for individual- and population-level risk of Zika transmission. Promotion of the behavior must be accompanied by specific, focused instructions that target the highest density breeding sites and be conducted weekly in homes and communal areas to be effective. Efficacy is highest in areas where there is strong community engagement, including active mosquito searches in homes and communities and awareness of the mosquito life cycle.</td>
</tr>
<tr>
<td>Covering water storage containers at all times with a tight-fitting cover that does not warp or touch the water.</td>
<td>Covering long-term water storage containers has moderate potential efficacy in reducing breeding sites if a tight-fitting, long-lasting lid is available. Covering short-term water storage containers has less potential efficacy, as frequent lid use can result in wear and tear and render the lids ineffective or counterproductive.</td>
</tr>
<tr>
<td>Scrubbing walls of water storage containers weekly to remove mosquito eggs.</td>
<td>Scrubbing walls of water storage containers weekly is efficacious in removing mosquito eggs and can thus reduce the potential for individual- and population-level risk of Zika transmission. However, the specific cleaning steps that eliminate mosquito eggs must be explicitly described.</td>
</tr>
<tr>
<td><strong>Behaviors That Enable Prevention</strong></td>
<td></td>
</tr>
<tr>
<td>Seeking antenatal care to monitor pregnancy and discuss Zika risk and prevention.</td>
<td>Seeking antenatal care enables providers to counsel pregnant women on Zika prevention, which can increase the chances of pregnant women taking protective measures and reducing the risk of vertical transmission of Zika from mother to child.</td>
</tr>
<tr>
<td>Seeking counseling from a trained provider on modern family planning methods if not planning on getting pregnant.</td>
<td>Family planning use (for those not intending on getting pregnant) is directly linked to reducing the risk of vertical transmission of Zika. Family planning counseling should be done by a trained health care provider.</td>
</tr>
</tbody>
</table>
In determining the most promising behaviors to review further, behaviors were excluded from the list if:

1. The behavior was largely outside the control of the individual or household (e.g., indoor residual spraying or applying larvicide, which require trained technicians).
2. There was limited evidence of the behavior’s efficacy (e.g., bed net use as the *Aedes* mosquito mainly bites in the daytime).
3. The behavior had only been implemented in a geographically limited pilot stage intervention (e.g., larvivorous fish in water storage containers).
4. The behavior was not supported by USAID (i.e., USAID was not procuring or distributing required materials to carry out the behavior) because of the lack of effectiveness of the behavior (e.g., bed nets are not considered effective for Zika because of the vector behavior) or because it was not feasible.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Outside Locus of Control</th>
<th>Limited or No Evidence of Effectiveness</th>
<th>Challenging in This Setting</th>
<th>Behavior Is in Pilot Phase</th>
<th>USAID Not Supporting</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of insecticide-treated bed nets</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>This behavior has limited efficacy, as most people sleep during the night and <em>Aedes aegypti</em> mosquitoes bite mainly during the day, limiting the time nets might provide Zika protection to daytime naps. Additionally, USAID is not procuring mosquito nets for Zika since they are not effective because of the daytime biting behavior of <em>Aedes</em> mosquitoes.</td>
</tr>
<tr>
<td>Wearing long sleeves, light colors</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>In the climate where Zika is transmitted, implementing this behavior with sufficient consistency (all day, every day) is unlikely to be feasible, reducing its potential to make an important contribution to Zika prevention. There is also limited evidence that wearing regular clothing that has not been treated with insecticide is effective in preventing mosquito bites.</td>
</tr>
<tr>
<td>Application of larvicide</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>While considered highly efficacious, larvicides should be applied by vector control technicians, rather than household members, so control over implementation of this behavior does not lie at the household level.</td>
</tr>
<tr>
<td>Larvivorous fish</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>Application of larvivorous fish to water storage containers is still in the pilot phase; limited data available on efficacy. Additionally, USAID is not procuring larvivorous fish, and the behavior is outside the locus of household control since it is currently being done by vector control specialists who visit the home.</td>
</tr>
<tr>
<td>Indoor residual spraying</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>This behavior is implemented by vector control technicians and therefore does not lie within the control of the household. There is limited literature on the efficacy of this intervention as it is traditionally only used for anopheline mosquitoes; some pilots are in progress to test for effectiveness for <em>Aedes</em> mosquitoes.</td>
</tr>
<tr>
<td>Use of insecticide-treated curtains/screens</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>There is some evidence that insecticide-treated curtains or screens are effective in preventing <em>Aedes</em> abundance indoors; however, USAID is not procuring these.</td>
</tr>
<tr>
<td>Use of coils to repel mosquitoes</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>Efficacy appears limited upon initial review, with some studies even suggesting they increase dengue risk.</td>
</tr>
<tr>
<td>Planting basil plants</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>While some research suggests that essential oils extracted from plants may have a repellent effect, no studies were identified that assess the repellent effect of basil plants.</td>
</tr>
</tbody>
</table>
Evidence-Based Prioritization Process to Identify Behaviors for Zika Prevention

Evidence Review

To conduct a systematic evidence review for the 5 personal protection and vector control preventive behaviors, Google Scholar results were compiled for articles on Aedes-borne diseases published between 2012 and 2018. Any seminal papers published before 2012 and Zika-related gray literature and unpublished data (from sources including UNICEF, the CDC, and USAID implementing partners) were also reviewed. Because of the recency of the Zika outbreak, a limited number of relevant papers had reached publication, so relevant articles on any Aedes-borne diseases (dengue, chikungunya, yellow fever, West Nile) were also compiled. Literature on malaria was excluded because it is transmitted by Anopheles mosquitoes, not Aedes, calling for different interventions. A PRISMA diagram (Figure) shows the selection criteria and screening process results for articles included in the review. Each article was summarized in an annotated bibliography.

As noted in the top panel of Table 3, each behavior’s efficacy and, if available, effectiveness in preventing Zika transmission were investigated through the literature review process. We considered a behavior efficacious if it had one of the following impacts: a reduction in mosquito bites, a reduction in the mosquito population (as measured by number of eggs, pupae, or adult mosquitoes), or a reduction in the sexual transmission of Zika. We considered a behavior effective if programs promoting the behavior had an impact on the outcome at the population level and/or measured a public health impact. The effectiveness or public health impact was not always measured or reported in the published literature; in those cases, other sources were explored for reasonably extrapolating this information. If gray literature was available, this was explored. Otherwise, logical assumptions were tentatively made; for example, if a study found that mosquito abundance was reduced, we extrapolated that Zika transmission may also be reduced.

The evidence regarding efficacy and effectiveness from the literature for each behavior was assessed against each criterion as being “high,” “medium,” or “low.” The evidence was also qualitatively weighted by the rigor of the studies reviewed and how recently the study was conducted. Our literature review also considered the locus of control (who was primarily responsible for implementing the behavior); how the outcome was measured (e.g., number of mosquito bites, population density); whether programs targeted specific sub-populations (e.g., pregnant women, male partners); and whether interventions targeted multiple behaviors (e.g., larvicide application, removing stagnant water). These additional factors were considered to guide interpretation of the study findings based on context and better understand the generalizability of results (e.g., if a study assessed multiple behaviors being promoted at once and the impact of a single behavior could not be isolated). If the article had insufficient detail, we also contacted research authors to clarify the specific steps required in the behaviors assessed in their studies.

Programmatic Assessment

In addition to efficacy and program effectiveness criteria, a third criterion was developed to assess whether the behavior was easy to do and amenable to change to consider the contextual realities of how behaviors were being promoted and adopted. As noted in the bottom panel of Table 3, this criterion was defined by the (1) frequency of performance required to be effective; (2) feasibility of the behavior (e.g., single versus multiple steps, required negotiation or engagement of others); and
(3) availability and accessibility of required materials (e.g., a brush to scrub a water-storage container). The locus of control was also considered here and whether an individual could carry out the behavior independently. As was done in the evidence review, each behavior’s ease of use/amenability to change was rated as “high,” “medium,” or “low” (except for feasibility, which was ranked as “easy,” “medium,” or “complex”). To evaluate each behavior against this programmatic criterion, a consensus-building approach was implemented at meetings of the USAID Partners Zika SBC Technical Working Group and through consultations with technical experts. The SBC Technical Working Group aims to support collective SBC efforts by creating a forum to coordinate, share, and discuss challenges, solutions, and best practices for Zika prevention and promote evidence-based SBC practices. Members include USAID, UNICEF, and implementing partners working directly with households and communities in the region. Implementing partners are NGOs receiving USAID funding for the implementation of the Zika response.

To summarize, the prioritization process took place over 7 months between October 2017 and April 2018. More than 30 variants of behaviors and messages were identified and narrowed down to 7 through extensive discussion with the technical working group and input from technical experts to reach an initial consensus. To narrow down to these 7 behaviors, we used a combination of expert opinion, initial scan of available evidence, and factors such as whether USAID was supporting the behavior by procuring the materials necessary. Two of the final 7 behaviors were considered enabling behaviors and recommended but not included in the evidence review, given the substantial existing evidence on these behaviors. Five behaviors were explored in a full literature review to ascertain their relative effectiveness. During the literature review phase, partners provided additional gray literature where applicable.
The full findings were presented at a subsequent SBC Technical Working Group meeting to ensure a consensus on the findings. The initial purpose of presenting the findings was to further narrow down the prioritized behaviors, but after partners expressed significant pushback, the full list of 7 behaviors were agreed upon. Any feedback from implementing partners regarding how behaviors were carried out, contextual challenges, or unpublished effectiveness findings was integrated into the final recommendations, and the results were disseminated to all USAID implementing partners.

### RESULTS

The findings and conclusions for Zika SBC programming drawn from this process are presented below for each of the 5 preventive behaviors reviewed, as well as the 2 enabling behaviors.

#### Personal Protective Behaviors

**Applying mosquito repellent:** Application of mosquito repellent is highly efficacious in preventing mosquito bites, and thus the potential of vector transmission of Zika to an individual. This behavior is within the control of pregnant women and male partners of pregnant women. It is recommended that users be thoroughly counseled on proper product application. Women intending to become pregnant should also consider using repellent.

Applying mosquito repellent (DEET, picaridin, IR3535, or lemon eucalyptus oil) and using each product as directed is a highly effective method in preventing mosquito bites and reducing risk of Zika transmission. DEET is considered the gold standard repellent, showing greater than 95% efficacy in preventing mosquito bites and reducing risk of Zika transmission.
bites for 5–11 hours. USAID and CDC approved 3 additional repellents (picaridin, IR3535, lemon eucalyptus oil) based on evidence suggesting they have an efficacy comparable to DEET. These 4 repellents are the only ones for which evidence of effectiveness has been recorded. The use of these repellents was also considered safe for use during pregnancy. We did not find program or intervention studies that assessed the impact of mosquito repellent on arbovirus disease transmission, but deduced a strong likelihood of effectiveness because it prevents mosquito bites. Concerning the third criterion—“easy to do and amenable to change”—repellent must be applied frequently (multiple times per day) to be effective, particularly if the person is sweating, swimming, or changing clothes. The use of repellent was considered to have medium feasibility because individuals decide whether to use repellent and therefore have control; however, those who have low literacy or limited access to trained antenatal care or pharmacies may have a disadvantage in following the written package instructions. Mosquito repellents are sold on the market in most countries in LAC and generally available in these settings. Contextual information regarding repellents was reported from partners working in the field with local knowledge. USAID also has procured repellents for distribution at antenatal care clinics in a few select countries. The price may be a barrier, particularly for low-income households.

Using condoms to prevent sexual transmission: Condom use to prevent sexual transmission of Zika is highly efficacious, but sexual transmission may be a small portion of overall transmission. This behavior should be prioritized for pregnant women and their partners because pregnant women are at risk for negative pregnancy outcomes.

There is evidence that Zika is transmitted sexually. According to our evidence review, condoms are highly effective in preventing sexually transmitted infections. Condom use is the only behavior that can prevent sexual transmission of Zika to sexually active women who may become pregnant or already are pregnant. Although statistical modeling suggests that sexual transmission of Zika is only 4%–5% of total transmission in the general population, the attributable risk of exposure among sexually active women may be twice as high. This increased risk of exposure, combined with the severity of outcomes in pregnancy, led to the identification of pregnant women and their partners as a target population for messaging about condom use. We found that condom-use behavior had a mixed amenability to change for 3 reasons: first, condoms must be worn consistently and correctly to be effective (on the basis of findings from the sexually transmitted infection literature), including throughout pregnancy; second, the behavior is complex, requiring negotiation between partners, and third, since condom use is not considered a normative behavior during pregnancy, it may be challenging to promote and adopt. Condoms are widely available in pharmacies and health centers in LAC, but access may be limited for women of low income.

Household and Community Vector Control

Regularly removing unintentional standing water both inside and outside the house: This is a potentially efficacious behavior to reduce mosquito populations and reduce the potential for individual- and population-level risk of Zika transmission. Promotion of the behavior must be accompanied by specific, focused instructions that target the highest density breeding sites and be conducted weekly in homes and communal areas to be effective. Efficacy is highest in areas with strong community engagement, including active mosquito searches in homes and communities and awareness of the mosquito life cycle.

According to the evidence, performing this behavior is highly efficacious in reducing the adult Aedes mosquito population. One study found a greater than 70% reduction in the adult mosquito population following a very strict intervention, involving community campaigns and visits from trained volunteers, to remove stagnant water. However, individuals and households may find it challenging to perform this behavior correctly and consistently. To have an impact on the Aedes mosquito population, and thus Zika transmission, it requires an ongoing, collective effort, including households as well as common areas, such as schools, clinics, cemeteries, and others. To maximize the potential impact, efforts need to focus on the highest-density mosquito-breeding sites as identified by entomological data collection. General clean-up campaigns in which communities receive information to clean their yards or communal areas without specificity on targets for removal often are only effective if they target the most productive breeding sites. In addition, these kinds of interventions are challenging to measure since clean-up campaigns are often conducted in conjunction with other
interventions, and studies do not isolate the effect of any one of them. Despite these concerns, when instructions are clear and focused, regular removal of standing water is relatively easy to do and amenable to change; special materials are unnecessary in most cases. However, the feasibility is somewhat complex; the targeting of breeding sites should depend on how productive they are (to identify the highest-density breeding sites), and those sites are often either difficult to access (e.g., in storm drains) or located in communal areas requiring collective effort and engagement to attempt (e.g., in schools or construction sites). In addition, this behavior requires weekly action, based on the life cycle of Aedes mosquitoes.34

Covering water storage containers at all times with a tight-fitting cover that does not warp or touch the water: Covering long-term water storage containers has moderate potential efficacy in reducing breeding sites if a tight-fitting, long-lasting lid is available. Covering short-term water storage containers has less potential efficacy, as frequent lid use can result in wear and tear and render the lids ineffective or counterproductive.

The focus of this behavior is on long-term storage items such as barrels or other large household water-storage containers used less than once per week. A small number of studies suggest that the correct use of lids is associated with a significant reduction in pupal infestation if the containers are used infrequently.35 However, correct use and adequate lids are critical; if the lid is broken or touches the water in the container, the lid itself can spawn a breeding site for Aedes mosquitoes.34 The beneficial effect of correctly using a lid is mixed or even reversed if the water-storage container is used very often, constantly opened and closed, or often left open.34 This behavior, when done correctly, may reduce transmission at the population level, but in most published evidence, it is combined with community mobilization and cleaning of containers, making it challenging to isolate its effect.35 The behavior itself is relatively easy to implement. For long-term storage containers (from which water is accessed infrequently), the frequency of removing lids is low34 and relatively feasible, assuming the lids are used correctly.34 However, as research is ongoing to determine what type of lids are the most effective, access to proper lids was rated low. For short-term water storage, the frequent opening and closing of lids and additional requirement of monitoring the quality of the cover reduces ease of implementation, and therefore, its effectiveness. Long-term water storage containers coupled with correct use of tight-fitting, long-lasting lids, may enable this behavior to have moderate potential efficacy in reducing Aedes breeding sites.

Eliminating mosquito eggs from water-storage container walls weekly: Thorough cleaning of water-storage containers can remove mosquito eggs, significantly reducing the population and, thus, Zika transmission, but easy access to effective materials cannot be assumed. Aedes aegypti mosquitoes lay their eggs in water storage containers, such as washbasins and metal drums, located inside or outside the house, increasing the risk of transmission of diseases such as Zika to households. As a result, cleaning containers is often recommended, but historically a lack of specific instruction has led to mixed results. For example, the World Health Organization recommends scrubbing containers with a brush, but does not mention whether a cleaning solution (such as bleach or detergent) should be applied, and cites studies that do not isolate the effect of cleaning from other behaviors (such as using lids).36 Research from the early 1990s reported manual cleaning of containers was ineffective in removing mosquito eggs, but it is unclear exactly how the containers were being cleaned and if eggs were targeted incorrectly.37-38 Since that time, several new methods have been developed. In our review, we judged 4 methods to be effective based on available efficacy evidence and consultations with entomologists with field experiences in the region (listed here in decreasing order of effectiveness).

1. The Untadita method, tested in a randomized controlled trial,39 was found to be more effective than scrubbing alone. In this method, a specific bleach and non-ammonia detergent mixture is applied to container walls that are then scrubbed with a brush and rinsed out after 10 minutes.39 Although this method has been promoted, there have been concerns in the field regarding potential toxicity of mixing non-recommended types of detergent with chlorine and the need to fully empty the container, which is challenging in water-scarce areas. In one study, 82% of surveyed households stored water and cited interruption of water services, poor water pressure, or cost-saving concerns as reasons for not wanting to empty their water-storage containers.30

2. The second method, developed in the Negociación de Prácticas Mejoradas trial,40 requires applying bleach to water-storage container walls without being emptied if they...
are partially filled. No field-based results on effectiveness or the intervention at scale were available, but small and experimental tests suggested positive ovicidal results.

3. If the first 2 cleaning methods are not possible to carry out due to lack of bleach, the third technique of cleaning the walls of the container with detergent alone (using a brush, if available) should be implemented. This technique requires fully emptying the container.

4. Lastly, scrubbing the container walls with a brush (only) is recommended if neither detergent nor bleach is available.

**Enabling Behaviors**

**Seeking antenatal care.** Seeking antenatal care is known to contribute to healthy pregnancies. In this setting, seeking antenatal care enables counseling on Zika prevention by trained health care providers, allowing for early diagnosis and treatment, as well as access to information about effective protective measures to reduce the risk of transmission of Zika from mother to child.

**Using contraception voluntarily.** Seeking family planning (for those not intending to get pregnant) is also a critical behavior, linked to prevention of sexually transmitted infections and prevention of sexual transmission of the Zika virus. Both of these behaviors—seeking family planning and antenatal care—are routinely promoted for adoption of healthy behaviors among pregnant women and women of reproductive age.

**Results Dissemination**

The results of the literature review and the consultative process discussed in this article helped to identify behaviors with the greatest promise for preventing the acquisition and transmission of Zika. A critical part of this process was the consensus-building process with partners, ensuring input from those working on the ground. The SBC Technical Working Group engaged partners throughout the process. Partners requested focusing on behaviors that families and communities could do themselves (“locus of control” at the household). Points of contention often centered around behaviors that were being promoted already and were perceived by partners to be effective but had mixed evidence. For example, covering water storage containers was found to be effective in the literature only for long-term water storage containers, but ultimately short-term containers were included in the guidance based on conversations with partners. This was mainly because partners perceived this behavior (covering water storage containers with a lid) to be effective based on this behavior being implemented already and being received positively. However, for other behaviors, for example use of bed nets, we clarified that although these are effective for malaria, they are not effective for Zika, and this was ultimately agreed upon and the guidance accepted. Through the process, partners were reminded that choices had to be made to prioritize key behaviors; although all of them were potentially effective, we were looking for relative effectiveness to prioritize the most effective ones and focus on them. Where there was pushback, we asked for field data to inform the decision to modify the final guidance.

These results were summarized in the Zika Prevention Behavior Matrix, a document widely disseminated through the Zika Communication Network (ZCN), a platform for sharing Zika-related resources and media products in the LAC region. A Technical Specifications Content Guide (a companion to the matrix) was also developed to detail the evidence-based technical requirements and steps to follow for each of the 7 behaviors (described here in Table 1, and in more detail in the Technical Specifications Content Guide) to reduce transmission. The guide was made available on the ZCN website to guide implementing partners in developing SBC content. Both documents, available in English and Spanish, guide prevention messages and prioritize calls to action to harmonize partner efforts and clarify specific messages to families, communities, and health care providers targeted by SBC programs for prioritized behaviors. The documents will be available to the public via an interactive digital platform that will guide users through the evidence, messaging, and technical specifications in a user-friendly way. Because *Aedes aegypti* vector control and mosquito bite prevention behaviors are included in this resource, partners working on dengue and chikungunya can use it. The documents will be continually updated as new developments emerge, reflecting input from implementing partners, to ensure that the materials address realities on the ground. For example, based on input from the field, guidance on correct disposal of repellents was recently added.

Additional resources have been developed by Breakthrough ACTION to support the promotion of the prioritized behaviors with the needed specificity described in the Technical Specifications Content Guide. SBC program teams in the field
can use these tools to adapt their efforts to the latest findings and recommendations. A job aid has been developed to guide outreach workers and volunteers during household visits to better target audience segmentation for behaviors to maximize the uptake of the recommendations in the Zika Prevention Behavior Matrix. To facilitate effective use of the job aid and messaging around the prevention behaviors, a training-of-trainers curriculum on interpersonal communication skills for outreach workers has also been developed. This curriculum has been used to train health promoters, volunteers, and field technicians in 5 LAC countries and adapted for context-specific variation with USAID implementing partners and/or Ministry of Health personnel. Both the job aid (in English and Spanish) and curriculum are available on the ZCN. Country-specific adaptations to the job aid, such as including language for dengue and chikungunya prevention, are also available on the ZCN.

**DISCUSSION**

The conditions brought on by climate change, international travel, urbanization, deforestation and other global and regional trends may result in new emerging diseases, as well as the spread of existing diseases to previously unexposed populations. Ministries of Health, international organizations, and NGOs must respond rapidly to outbreaks by coordinating an effective public health response. Under these circumstances, institutions rarely have sufficient data to guide SBC messaging for the most effective preventive actions for individuals and communities and may be forced to launch interventions or programs at the same time data are being gathered, assessed, and synthesized. This situation often leads to a lack of cohesion in the promoted behaviors and SBC messages. The behavior prioritization process documented in this article was developed to help USAID implementing partners identify focal behaviors for prevention to harmonize SBC programming efforts for greater impact. The process combined available evidence and a consensus-building approach to allow for adaptation based on local context. The consensus-building approach was critical for selecting behaviors and necessary coordination across all stakeholders involved in the response across disciplines (e.g., public health, entomology, medical, and other technical area experts) and across response partners (e.g., those involved in mass media, service delivery, and community engagement). Types of behaviors were selected based on the transmission dynamics of the disease; Zika is transmitted by vector (mosquito) and sexually, highlighting preventive behaviors to consider. Behavior change is complex, and each behavior is comprised of many different behaviors and decisions that have to be addressed to successfully change. Each behavior we identified was rated against 3 criteria, 2 related to supporting evidence and 1 related to feasibility and amenability of the behavior to change.

The first 2 criteria of the process assessed the state of the evidence available for selecting key behaviors to promote. The availability and quality of evidence depends on how long the disease has been around and whether it is occurring in a new region or sub-population. For example, in the 2002 severe acute respiratory syndrome outbreak, there was no evidence as the world was contending against a newly encountered disease. During the West Africa Ebola outbreak, researchers were attempting to understand the behaviors to target to interrupt transmission, while programmers were developing prevention and treatment programs and messages in real-time; research and evidence generation came later. In the case of Zika, the disease was previously known in east Asia and the Pacific but was entirely new to LAC. However, other *Aedes aegypti* mosquito viruses were prevalent in the region, specifically, dengue, which had been circulating in the region for more than 50 years, and chikungunya had emerged in 2013. Thus, information regarding best practices to prevent transmission could be gleaned from previous mosquito control and behavior change programming from LAC and southeast Asia and could be adapted to Zika prevention efforts.

Two unique characteristics of Zika presented themselves when applying the evidence. First, unlike dengue or chikungunya, Zika is mostly asymptomatic or presents mild symptoms; LAC is the first setting where it has been widely associated with adverse pregnancy outcomes (and Guillain-Barré syndrome). Second, it was found that Zika can be transmitted sexually, but other arboviruses, such as dengue and chikungunya, cannot. Although we were able to adapt an extensive evidence base for vector control of the *Aedes aegypti* population, there were little to no published data available regarding sexual transmission of Zika or its impact on pregnancy outcomes. Sexual transmission and the link with congenital malformations meant we needed to consider specific behaviors and messaging directed to pregnant women and women of reproductive age. To address this gap, evidence was gleaned and adapted...
from the literature on sexually transmitted infections and from research findings as they emerged from the field (before publication).

The third criteria of the process comprised a set of 3 components related to behavior amenability to change in the LAC setting. This step was an important contextual step because the effectiveness of a behavior is largely dependent on whether people are able and willing to perform it and was additionally complicated because Zika was new to the region. Because the behavior prioritization process was started after a year of Zika response, local partners had field experience to advise on which priority behaviors were feasible to implement and which materials were available and affordable. A consensus-building approach with USAID and its implementing partners was developed to categorize the relevant behaviors by criteria. Although the evidence review highlighted behaviors with potential to prevent diseases with the same modes of transmission or reduction of the same vector population as Zika, it was critical for each focal behavior to be assessed through the lens of this third criteria to ensure partner buy-in—that recommendations were realistic and reflected the context on the ground. The result of the process was a set of priority behaviors based on a combination of research evidence and context from partners with local knowledge.

The behavior prioritization process was developed to streamline the Zika response but began mid-implementation, by which time many partners were already deploying various behavior change recommendations. Any suggested changes to SBC programming that stemmed from the findings of this necessitated midcourse corrections. All 5 behaviors were prioritized by the USAID Zika response across 20 countries, and included interventions such as regional mass media campaigns, household and school-based SBC activities, household visits by vector control technicians, community fairs, and health care provider counseling. Several key products were developed and made available to implementing partners to facilitate the incorporation of the findings of the process, including a list of priority behaviors and detailed guidance on how to correctly perform each behavior for maximum effectiveness (through a Behavior Matrix [Supplement 1], Technical Specifications Content Guide [Supplement 2], and a job aid). These products were useful for SBC programs to reconfigure and refine their messages as they continued to implement their SBC interventions. Many partners reported that the guidance provided a basis to focus their limited remaining resources and to attain the needed specificity for each behavior to be effectively implemented. The iterative, collaborative process of defining behaviors across all stakeholders was critical to ensuring a more harmonized and feasible response. This process strives to incorporate evidence where it is available and was refined as the work developed, allowing it to be responsive to new evidence and contextualized based on input and expertise from those on the ground. This process can identify and select behaviors with the most potential to reduce transmission, is designed to be adapted to local contexts, and is flexible and based on consensus building with local and international stakeholders. Our experience developing this process provides a potential model for future public health emergencies, as it highlights a way forward in prioritizing behaviors in evidence in situations where direct evidence is limited or absent, time is constrained, and there are many key stakeholders.

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Evidence-Based Prioritization Process to Identify Behaviors for Zika Prevention


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PrevenCIÓN del Zika en América Latina y el Caribe Priorización de comportamientos clave basado en la evidencia y su aplicabilidad a futuras respuestas de emergencia de salud pública

En el propósito de maximizar el impacto de los esfuerzos de prevención del Zika, se estableció un proceso de priorización para los programas de cambio social y de comportamiento en base a una combinación de evidencia sólida y proveniente de investigaciones y experiencia programática. Los comportamientos priorizados fueron: aplicación de repelente de mosquitos, uso de condones, eliminación de agua acumulada alrededor de la casa y comunidad, cubrir los recipientes de almacenamiento de agua, fregar las paredes de los recipientes de almacenamiento de agua, asistencia a las consultas de atención prenatal, y la búsqueda de consejería sobre planificación familiar si no planea un embarazo.

Resumen

Desde el brote del Zika de 2015 en América Latina y el Caribe, se venían promoviendo una gran cantidad de mensajes de cambio de comportamiento para reducir la transmisión del Zika. Un año después de que la Agencia de los Estados Unidos para el Desarrollo Internacional (USAID) iniciara su respuesta al Zika, se encontró que se venían promoviendo más de 30 variantes de conductas preventivas. Esta situación planteó un desafío a los esfuerzos de los programas de cambio social y de comportamiento (CSC) que requieren de una respuesta coordinada y de común acuerdo sobre el conjunto de comportamientos a promover para lograr mayor efectividad. Para apoyar a los socios implementadores de USAID en la armonización de los comportamientos de prevención para reducir la infección por Zika, se desarrolló un proceso basado en evidencia que identificara aquellos comportamientos con mayor potencial en reducir la infección y transmisión del Zika. Se recopiló una lista completa de comportamientos y se seleccionaron los más prometedores para luego llevar adelante una revisión de la evidencia presentada. La revisión incluyó búsquedas sistemáticas de palabras clave en Google Scholar, identificación de todos los artículos publicados entre 2012 y 2018 que fueran relevantes a las enfermedades transmitidas por el mosquito Aedes, y revisión de documentos pioneros y de literatura gris. Se examinaron una serie de artículos para determinar la efectividad potencial de cada comportamiento en prevenir la transmisión del Zika o en reducir la población de Aedes aegypti. Igualmente se desarrollaron criterios de evaluación para medir la facilidad con la que la población objetivo podría adaptar cada comportamiento, incluyendo: (1) frecuencia requerida; (2) viabilidad del comportamiento; y (3) accesibilidad y costo de los materiales necesarios en el contexto inmediato. Estos comportamientos se reforzaron con los socios implementadores de USAID de la respuesta al Zika a través de un proceso de creación de consensos considerando factores contextuales. El resultado fue la selección de 7 comportamientos preventivos que según la evidencia presentaban el mayor potencial para lograr el impacto de los programas de CSC en la respuesta al Zika de USAID: (1) aplique repelente de mosquitos, (2) use condones durante el embarazo, (3) elimine agua acumulada alrededor de la casa y comunidad, (4) cubra los recipientes de almacenamiento de agua, (5) elimine los huevos de mosquito de los recipientes de agua, (6) busque atención prenatal, y (7) busque consejería en planificación familiar si no planea un embarazo. El presente Estudio de Caso documenta un proceso flexible que puede ser adaptado para llevar adelante ejercicios de priorización de comportamientos cuando se cuenta con una evidencia limitada, como bien sucede en muchas de las respuestas de emergencia.

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Providers, managers, and clients valued the integrated service delivery model. Trends indicated slightly higher family planning uptake in intervention facilities, but that difference was not statistically significant. Intrafacility referrals by postpartum women did not negatively affect immunization utilization rates.

ABSTRACT

Background: Integration of family planning and immunization services provides an opportunity to meet women’s need for postpartum family planning and infants’ vaccination needs through client-centered care, while reducing financial and opportunity costs for families. The United States Agency for International Development’s Maternal and Child Survival Program (MCSP) supported the Liberia Ministry of Health to scale up integrated family planning and immunization services as part of a broader service delivery and health systems recovery program after the Ebola epidemic.

Methods: We conducted a mixed-methods program evaluation in 22 health facilities in Grand Bassa and Lofa counties. Family planning uptake and immunization dropout rates at project sites were compared to rates at 18 matched health facilities in the same counties. We conducted 34 focus group discussions with community members and 43 key informant interviews with health care providers and managers to explore quality of care and contextual factors affecting provision and use of integrated services including postpartum family planning.

Results: From November 2016 to July 2017, 1,066 women accepted referrals from immunization to family planning counseling (10% of all vaccinator-caregiver interactions); the majority of women who were referred (75%) accepted a family planning method the same day. Trends indicated slightly higher family planning uptake in intervention over nonintervention facilities, but differences were not statistically significant. Pentavalent vaccine dropout rates did not increase in intervention compared to nonintervention facilities indicating no negative impact on utilization of immunization services. Clients and providers expressed that the integrated services reduced costs and time for the clients, educated mothers about postpartum family planning, and ensured infants were completing their vaccinations.

Conclusion: Although scaling up integrated family planning-immunization services may be programmatically feasible and acceptable to clients and providers, the intervention’s success and ability to understand and quantify impact are driven by the effect of contextual factors and fidelity to the intervention approach. Contextual factors need to be understood before implementation, measured during implementation, and addressed throughout implementation to maximize the approach’s impact on service utilization and health outcomes.

BACKGROUND

Even before the 2013–2015 Ebola epidemic that severely limited access to and trust in the health system, Liberia’s maternal mortality ratio and child mortality rate were among the highest in the world, at 1,072 deaths per 100,000 live births and 94 deaths per 1,000 live births, respectively. An analysis of data from 21 low- and middle-income countries demonstrated that 61% of all postpartum women have an unmet need for contraception. In Liberia, one-third of all married women have an unmet need. Although the overall modern contraceptive prevalence rate increased from
19% in 2013\(^1\) to 31% in 2016,\(^3\) these figures still reflect low contraceptive use. Modern postpartum family planning (PPFP) use at 6 months postpartum in Liberia is extremely low at 4%, and an estimated 14% of women of reproductive age are postpartum in a given year.\(^4\) These statistics highlight opportunities for investments in PPFP use to improve overall modern contraceptive prevalence in the country. Low use of family planning in the period after childbirth results in frequent, closely spaced pregnancies and increased risk of adverse maternal and child health outcomes.\(^4,5\)

Liberia also has concerning gaps in immunization coverage, especially following the Ebola epidemic. Nationwide coverage of the third dose of the pentavalent vaccine (Penta3) remained low at 68% in 2016\(^5\) compared to 71% in 2013.\(^1\)

Missed opportunities exist for providing comprehensive health care to caregivers and children during contacts with the health system. The concept of “missed opportunities” resonates for both immunization and family planning sectors alike. The Statement for Collective Action for Postpartum Family Planning\(^6\) highlights how a “no missed opportunities approach” leverages contacts across the continuum of care through a woman’s pregnancy postpartum period to offer family planning counseling and services. For immunization, according to the World Health Organization, a missed opportunity is:\(^7\)

> any contact with health services by an individual (child or person of any age) who is eligible for vaccination (e.g. unvaccinated or partially vaccinated and free of contraindications to vaccination), which does not result in the person receiving one or more of the vaccine doses for which he or she is eligible.

Each caregiver is expected to seek vaccination services for their child 5 times in the first year of life. These visits present opportunities to discuss and offer health care services beyond immunization, such as family planning. Similarly, family planning counseling and service delivery visits are opportunities for providers to review a client’s health card and that of their child to ensure they have received all the necessary care, including vaccines, on schedule. Addressing missed opportunities may enhance efficiency for clients and the health system, provide a more client-centered care approach to service delivery, and contribute to reducing maternal and child mortality.

Integrating routine infant immunization and family planning services has been identified as a promising high-impact practice for family planning.\(^4\) Prior studies demonstrated a positive effect of family planning and immunization service integration on family planning outcomes.\(^8–10\)

Evidence of the effect on immunization outcomes is less clear, although at least 2 studies have demonstrated no negative impact.\(^9,10\) At the global level, more evidence is needed to understand how integration affects provision and use of family planning and immunization services in different health systems and contexts.

## PROGRAM DESCRIPTION

The United States Agency for International Development (USAID)/Maternal and Child Survival Program (MCSP) worked with the Ministry of Health (MOH) from 2015 to 2018 to restore confidence in the health system following the Ebola epidemic, increasing quality of and demand for maternal and child health services. MCSP expanded an approach to optimize and integrate immunization and family planning contacts to align with the Government of Liberia’s Investment Case for RMNCH for 2016–2020\(^11\) commitment to:

- optimize efficiency through improved productivity, and integrating RMNCAH [reproductive, maternal, newborn, child, and adolescent health] service delivery with other vertical programs, while ensuring continuum of care.

The objective of the approach was to reduce missed opportunities for care in 22 hospitals and clinics in Grand Bassa and Lofa counties.

We built on experience generated by the USAID/Maternal and Child Health Integrated Program (MCHIP) and MOH pilot in 2012, whereby vaccinators were trained to share brief family planning messages and refer postpartum women to same-day co-located family planning services at 10 health facilities in Bong and Lofa counties.\(^9\) This earlier initiative contributed to impressive increases in the number of new contraceptive users, but the approach did not focus on referrals to immunization from family planning, and the effect of integration on immunization outcomes was less clear. In 2015, when routine service delivery resumed post-Ebola epidemic, MOH endorsed expansion of the approach to additional counties, pending some adjustments to the approach to strengthen and monitor immunization outcomes and ensure the intervention had no negative impact on the likelihood that mothers would return for vaccination services.

MCSP expanded the former MCHIP-MOH integrated approach to include intrafacility referrals for women and their children from the family planning provider to the vaccinator, in addition to
We conducted a mixed-methods program evaluation in health facilities where the integrated approach was introduced in 2016 and in matched, nonintervention facilities.

the referrals from immunization to family planning. In this expanded model, family planning providers reviewed the child health cards of postpartum women who had come with their infant to the health facility primarily for family planning services, if available, and provided reminders about their child’s next vaccination date. If the date had already passed, they referred the woman and child to the vaccinator for same-day immunization services. Vaccinators continued to share family planning messages and refer postpartum women for same-day family planning counseling from the family planning provider, similar to the MCHIP model. They also provided PPFP leaflets to clients who were interested but needed more time to discuss the possibility with their families before deciding to visit the family planning provider. Both vaccinators and family planning providers indicated in their registers if they provided or received a referral. We also introduced a mechanism for tracking referrals to family planning that were completed on a different day, whereby women who did not accept a family planning method were given a special referral card along with a leaflet about the benefits of family planning and asked to return with the card if they decided to come back for family planning services on a different day. Family planning providers used special symbols in their register to track same-day versus different-day referral completion. Under the MCHIP approach, facilities where immunization services were offered in a public space were provided privacy screens because formative inquiry revealed norms discourage return to sex and seeking family planning before the baby walks, resulting in a concern about being seen going for this referral system to be used only in health facilities and not during immunization campaigns or outreach services in communities.

The MCSP implementation approach was designed to be a scalable version of the MCHIP-MOH approach integrated into existing routine service delivery and supervision structures. In October 2016, MCSP together with MOH conducted a 1-day supervisor training for county- and district-level clinical supervisors and facility officers-in-charge. This training was immediately followed by a 2-day skills-based training for vaccinators and family planning providers from intervention facilities in each county, including a 1-day practical exercise in health facilities that focused on use of the communication tools and techniques and the referral mechanisms. Providers carried job aids, posters, brochures, and referral cards back to their facilities and initiated the integrated services. MCSP and county health team staff conducted on-site mentoring and coaching at each health facility monthly throughout the 9-month study period as part of routine supervision to ensure continuity and quality of the integrated services approach. This approach differed from the MCHIP intervention in which separate project supervision visits were conducted specifically to follow up on family planning–immunization integration.

MCSP included a pragmatic evaluation to glean additional insights into implementation of service integration in a fragile health system and to assess the effect of integration on immunization outcomes. It was designed to examine clients’ and health workers’ perspectives regarding the quality of care provided with the integrated approach, contextual factors affecting the implementation of the approach, and the effect of service integration on immunization and PPFP service use through the extended postpartum period in intervention facilities in Lofa and Grand Bassa counties. This case study presents qualitative evaluation findings, along with select quantitative findings, to illustrate lessons that can guide design and implementation of future health service integration programs and evaluations.

**METHODS**

**Study Design and Facility Selection**

We conducted a mixed-methods program evaluation in the 22 health facilities in Grand Bassa and Lofa counties, where the integrated approach was introduced in 2016, and an additional 18 matched, nonintervention facilities in the same counties.

We compared service utilization at intervention and nonintervention facilities within the constraints of MCSP workplans for the 2 counties. The study design was guided by programmatic opportunities, not calculation of sample sizes and study duration required to detect an effect in family planning or immunization outcomes. In Lofa and Grand Bassa counties, 40 of 47 purposively selected health facilities receiving MCSP support were eligible for integrated immunization-family planning services at the time of study site selection (September 2016); eligibility was defined as having at least 1 vaccinator and at least 1 family planning provider on staff.
at the facility providing Expanded Programme on Immunization (EPI) and family planning services and recording data from these services in ledgers. Of these facilities, 36 had pair-matches based on the following criteria (in order): county; level of health facility (i.e., hospital, health center, or clinic); type of health facility (i.e., public or private); Penta3 coverage (June to August 2016); and facility catchment area. (If Penta3 coverage was similar for >2 health facilities, selected pairs were based on most similar catchment population.) Paired facilities were assigned to either intervention or comparison arms using a coin toss. We integrated family planning and immunization services in the 18 matched health facilities and the 4 nonmatched health facilities. The majority of facilities were public clinics. Overall, catchment populations were higher in Grand Bassa County facilities compared to Lofa County facilities (Table 1).

**Quantitative Data Collection and Analysis**

We used routine health management information systems (HMIS) data to monitor family planning and immunization outcomes at all 36 matched study sites over a 15-month period, including 6 months before intervention and 9 months of program implementation. We intentionally did not introduce a supplementary PPFP data collection register because it would be neither scalable nor sustainable outside of MOH’s routine HMIS. Instead, providers made markings in existing registers when referrals were made or completed. We also collected and analyzed monthly data on referrals between the immunization and family planning service points, including the number of referral acceptors (immunization to family planning and family planning to immunization), the proportion of those referrals that were completed on the same or a later date, and the proportion of referral completers who accepted a family planning method on the same day from all intervention facilities.

To assess trends in family planning and immunization service utilization across all health facilities, we reviewed changes in aggregate monthly service delivery statistics before and after integration of family planning and immunization services, disaggregating by county. Primary outcome indicators included number of first and third pentavalent vaccine doses administered at fixed and outreach facilities, pentavalent vaccine dropout

<table>
<thead>
<tr>
<th>TABLE 1. Baseline Characteristics of Intervention and Comparison Facilities in Liberia, by County, May to October 2016</th>
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</thead>
<tbody>
<tr>
<td>Facility Characteristics</td>
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<tr>
<td>---------------------------------------------------------------</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Catchment population (2016), No.</td>
</tr>
<tr>
<td>Facility type, No.</td>
</tr>
<tr>
<td>Hospital</td>
</tr>
<tr>
<td>Health center</td>
</tr>
<tr>
<td>Clinic</td>
</tr>
<tr>
<td>Facility ownership, No.</td>
</tr>
<tr>
<td>Public</td>
</tr>
<tr>
<td>Private faith-based</td>
</tr>
<tr>
<td>Facility monthly client load{a}</td>
</tr>
<tr>
<td>Immunization clients: Pentavalent 3 doses administered, mean (SD)</td>
</tr>
<tr>
<td>Family planning clients: Total family planning users, mean (SD)</td>
</tr>
</tbody>
</table>

Abbreviation: SD, standard deviation.

{a} Median facility catchment population among all facilities in the study group.

{b} Monthly mean number of clients among all facilities in the study group during baseline period: May to October 2016.
rate, and total number of family planning users. Total number of family planning users was defined as the total number of new and continuing modern contraceptive users, excluding vasectomy and condom users, who were excluded for consistency with previous studies and to isolate the effect of the intervention on the target population. Total family planning users served as the primary family planning indicator rather than new users alone because facilities varied greatly with regard to how the indicator “new family planning users” was understood and captured in HMIS. In this article, descriptive findings are presented with further explanation of methodological limitations to highlight lessons learned regarding challenges in measuring results of integration efforts in real-world settings.

Additionally, we attempted to assess if a statistically significant difference existed in the use of family planning between intervention and comparison facilities. Although we present findings from this analysis in Supplement, we note a poor model fit. This poor fit may be due to a high variation in baseline service utilization levels between facilities, the relatively small sample size dictated by the geographic scope and duration of the project, lack of data available to match facilities on sociodemographic characteristics of facility catchment populations, or other unobserved confounding factors.

MCSP and MOH staff verified both HMIS and referral data quality during routine supervision visits. Outlier data including instances in which the monthly number of family planning users exceeded the total number of women of reproductive age in the catchment population were excluded from analysis along with their paired facility. This resulted in the exclusion of 1 pair of facilities from the family planning analysis. During routine supervision, we discovered notable spillover of the intervention to comparison facilities in Lofa that hindered our ability to detect intervention effects. The intervention spillover occurred in almost all nonintervention facilities in Lofa (6) and none in Grand Bassa, as a result of facility staff and MOH supervisors discussing the approach at quarterly review meetings and carrying the idea from one facility to the next to introduce it outside the scope of our project intervention.

**Qualitative Data Collection and Analysis**

To explore perceptions of family planning-immunization service quality and understand how contextual factors affected integration, we conducted 34 focus group discussions (FGDs) (see Table 2) during the ninth month of program implementation in 4 comparison and 12 intervention facilities purposively selected to include low-, average-, and high-performing facilities in each county. For the purpose of qualitative sampling, performance was determined based on the percentage of mothers whose children received vaccination and were referred to family planning and the percentage of mothers who received a family planning method and received referral for same-day immunization services in February to March 2017. Eligible FGD participants were mothers with infants under 1 year of age who attended either family planning or EPI services at an intervention or comparison study site and fathers with infants under 1 year of age in the communities around these health facilities who were prospectively recruited in June 2017. Homogenous FGDs included mothers from intervention facilities who either accepted or did not accept a referral to family planning from EPI or mothers/fathers with children under age 1 in the community. The study team was unable to convene any focus groups with women who accepted referrals to immunization from family planning because these referrals were not as well tracked in practice as the referrals to family planning.

We also conducted 43 key informant interviews (KIIs) with family planning providers, vaccinators, managers, and clinical supervisors. Providers were from sampled health facilities, and managers and supervisors were convenience sampled from participating counties and districts. Providers and supervisors who had assumed their posts within the 3 months prior to recruitment were excluded from the sample due to their limited experience with the integration activities. All participants were over the age of 18 and provided written informed consent prior to enrollment. Those who were not literate had a witness to the informed consent process. Focus groups lasted on average 75 minutes (max: 120 minutes), and KIIs lasted 45 minutes (max: 90 minutes). All FGDs and KIIs were conducted in a place with visual and auditory privacy. No participants withdrew before the end of the study.

FGDs had a moderator and note-taker; 31 of 34 FGDs consented to be audio recorded. FGD questions were asked in Liberian English and further explained in local dialects (Kissi, Lorma, and Bassa) when necessary. All KIIs were conducted in English and audio recorded.
The qualitative research team included 5 external consultants with experience conducting qualitative research; all participated in a 3-day training and 1-day pilot. The team reviewed and expanded on KII and FGD notes within 48 hours and provided further details after listening to the audio recording. The lead researcher developed an initial coding structure aligned with the research objectives, applied it to all notes, elaborated to incorporate emergent subthemes, and then conducted a second round of analysis. Divergence between participant type and geography were noted. Illustrative quotes representing majority and minority opinions were identified and included in the results where possible. Both rounds of coding and analysis were conducted using Excel.

### Ethical Considerations

Ethical approval and oversight in Liberia was provided by the University of Liberia Institutional Review Board (IRB) (Protocol No. 17-01-022) and in Baltimore, Maryland, United States, by the Johns Hopkins Bloomberg School of Public Health IRB (IRB No. 00007524).

### RESULTS

#### Referral Rates at Intervention Facilities

During the 9-month study period, 1,066 women accepted same-day referrals from immunization to family planning in the intervention facilities. Ten percent (1,066/10,519) of all vaccinator-client interactions.
resulted in a caregiver accepting a same-day referral to family planning. (“Total interactions” is defined as the total number of Penta1 + Penta2 + Penta3 + measles vaccine doses administered at fixed sites, meaning if a child is fully vaccinated, each child-caregiver pair has 4 interactions with the vaccinator after the initial birth-dose vaccinations.) Of those who were referred, 89% (948 of 1,066) completed the referral to the family planning provider on the same day and were counseled by the family planning provider, and 75% (799 of 1,066) accepted a family planning method on the same day. On average, 5.3% of clients (monthly range: 0.7%–11%) who interacted with the vaccinator for their child’s vaccines accepted a family planning method on the same day. From month to month during the study period, 70%–100% of women who accepted a referral for family planning counseling accepted a method on the same day (Figure 1a). An additional 164 women (1.6% of 10,519 vaccinator-client interactions) were documented to have completed the family planning referral on a different day.

During the 9-month study period, 456 mothers with infants were referred by a family planning provider to a vaccinator on the same day. The total number of postpartum women eligible for referral was not tracked due to limitations of data available in the routine health information system. Of those who were referred for a same-day vaccination, 71% (323) completed the referral and their child received vaccines on the same day. Referral completion rates were 90% or greater for the majority of facilities that were correctly tracking referrals. Documented referral completion rates were higher in Lofa (94%) than in Grand Bassa (58%). An increasing trend occurred in the number of referrals per month throughout the intervention period (from 15 in November 2016 to 77 in July 2017). Findings from KIIs and FGDs revealed that family planning providers more commonly provided vaccination date reminders rather than same-day referrals to infant immunization because it was uncommon for the child’s vaccination date to be on the same day the mother came for family planning counseling.

**FIGURE 1. Family Planning Outcomes**

- **a:** Postpartum FP acceptance rate among those who accepted same-day referral from EPI to FP at intervention facilities: November 2016 – July 2017
- **b:** Total monthly FP users at intervention (n=11) and comparison facilities (n=11) in Grand Bassa County, May 2016 – July 2017
- **c:** Total monthly FP users at intervention (n=6) and comparison (n=6) facilities in Lofa County: May 2016 – July 2017

Abbreviations: EPI, Expanded Programme on Immunization; FP, family planning; PPFP, postpartum family planning.
Effect of Intervention on Service Utilization

The total number of family planning users at intervention facilities increased during the implementation period in intervention facilities across both counties. Trends indicated slightly increased family planning uptake in intervention facilities over the nonintervention facilities in a comparison of the periods before and after integration (Table 3 and Figure 1b-c). Total family planning users at intervention facilities increased by 19% in February to April 2017 (4–6 months after integration) compared to May to July 2016 (4–6 months before integration) in Grand Bassa, compared to an 11% decrease in total family planning users in comparison facilities in the same period. In Lofa, intervention facilities experienced a 160% increase in total family planning users in a comparison of the same time periods, while the comparison facilities only experienced a 12% increase (Table 3). There did not appear to be a statistically significant difference in likelihood of family planning uptake over these 3 periods in a comparison of nonintervention to intervention facilities (Supplement). Periodic spikes in monthly family planning users corresponded to family planning contraceptive weeks, wherein family planning counseling and services were promoted through community outreach. Quarterly, rather than monthly, comparisons were made to take such spikes into account. Due to a lack of funding, a contraceptive week did not take place in the May to July 2017 quarter (Q5). This prevented our comparison of family planning utilization between Q1 and Q5.

No statistically significant difference was apparent in contraceptive method mix between intervention and comparison facilities, nor between pre- and postintegrated service delivery (data not shown). Across all comparison and intervention facilities, the preferred family planning methods were injectables (61% of women) and oral contraceptives (34%). Note that although providers were encouraged to counsel on lactational amenorrhea method (LAM) as part of the method mix, LAM use was not tracked through the routine health information system and thus LAM users are not included in the analysis.

The trends in doses administered of first and third dose pentavalent vaccine were similar in intervention and comparison facilities in Lofa and Grand Bassa Counties (Figure 2a-d). In Grand Bassa, a slight decreasing trend occurred in the number of Penta1 and 3 doses administered over the baseline and intervention periods. This decreasing trend was consistent with trends observed in other counties not implementing integrated service delivery. Quarterly spikes in vaccination rates corresponded to the periodic intensification of routine immunization campaigns carried out by MOH.

In Grand Bassa, the dropout rate was mostly constant in intervention facilities before and after the integrated approach was introduced at approximately 15%; the dropout rate in comparison facilities was consistently higher than in intervention facilities. The dropout rate was also constant in intervention facilities in Lofa at approximately 8% before and after the

### TABLE 3. Total Family Planning Users in Intervention and Comparison Facilities, by Quarter and County, Liberia, 2016–2017

<table>
<thead>
<tr>
<th>Country</th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grand Bassa County</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison facilities</td>
<td>3,363</td>
<td>2,914</td>
<td>3,365</td>
</tr>
<tr>
<td>Intervention facilities</td>
<td>4,862</td>
<td>4,378</td>
<td>5,998</td>
</tr>
<tr>
<td>Lofa County</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison facilities</td>
<td>1,566</td>
<td>1,924</td>
<td>2,062</td>
</tr>
<tr>
<td>Intervention facilities</td>
<td>1,174</td>
<td>2,059</td>
<td>2,323</td>
</tr>
</tbody>
</table>

* The Ministry of Health conducted Family Planning Contraceptive Week in Q1–Q4, but not in Q5 due to resource constraints.
An intervention was introduced; the dropout rate dramatically increased in comparison facilities during the same time period (Figures 2e-f). These results demonstrate no negative impact of the intervention on immunization doses administered or dropout.

**Perceptions of Quality of Services**

**Client Perspectives**

Clients generally expressed positive feedback about their experience with the integrated services and with immunization and family planning services more broadly. However, some concerns...
were noted regarding embarrassment to accept family planning referrals in a public setting, including being seen walking from one service room to the other. Both acceptors and nonacceptors expressed appreciation for the convenience of receiving both services on the same day, for being reminded on an ongoing basis about the availability of both services, and for having an opportunity to learn more about a service other than the one they originally sought.

Before when we used to come, the vaccinator used to vaccinate our children, but he never used to tell us about family planning. But this time, now as soon as we finish with the vaccine, they can show us a poster and tell us about the family planning. That it is good. —Mother, age 18–19, family planning referral nonacceptor, Lofa County

I feel happy with [integrated service delivery] because this time when I come I can just use my two cards and get my baby vaccine and family planning. —Mother, age 35–39, family planning referral acceptor, Lofa County

Most mothers indicated that they felt the service integration should continue. Even several of the family planning referral nonacceptors indicated that they hoped the vaccinator would continue to encourage them about family planning during future visits to potentially change their minds. Minority opinions expressed among a few family planning referral nonacceptors were that mothers had already made up their minds to not use family planning and they did not want to continually have it raised, vaccinators should simply focus on providing immunization services, and other mothers might feel overly pressured to accept a family planning method with it being brought up repeatedly.

The main reasons cited by family planning referral nonacceptors for not following through on referral from immunization to family planning services were concerns about partner opposition to use of family planning and about being seen in a public setting agreeing to meet with the family planning provider. The latter concern was particularly noted where immunization services and family planning information are provided in a group format or where a client must walk through the waiting area to get to the family planning services area.

The reasons why some agree to come on different day for family planning may be because at first the person who was telling them about family planning was telling them among the group of people, so they were ashamed and decided to come on different day. —Mother, age 20–24, family planning referral nonacceptor, Grand Bassa County

The family planning will be good for you, but when I tell my man, he [is] always saying no. Every time he says, “We will go so you can get it,” but to no avail. —Mother, age 25–29, family planning referral nonacceptor, Lofa County

When asked whether other mothers might feel reluctant to return for immunization if the vaccinator talks about family planning, most respondents said there was no concern and they liked that the vaccinator explained the benefits of birth spacing and encouraged them to visit the family planning provider. However, a few referral nonacceptors mentioned that women might feel embarrassed or upset because they do not want to talk about family planning due to the perceived negative health effects. One mother mentioned,

Some will feel bad because when they bring their children for vaccine[s], family planning will be discussed, and some don’t want to talk about family planning. —Mother, age 35–39, family planning referral nonacceptor, Grand Bassa

Other family planning referral nonacceptors felt that women would not be discouraged but would instead be pleased to hear about family planning: for example:

Other women will feel good because they are telling them about family planning and at the same time vaccinating their children. —Mother, age 20–24, family planning referral nonacceptor, Lofa County

For referrals from family planning to immunization, mothers widely mentioned that the family planning provider had checked their child’s vaccination card and reminded them when to return or referred them immediately if their child was overdue for a vaccine. Mothers welcomed this support from the family planning provider to remind them when to come back for their child’s vaccines.

Mothers were asked their overall perspectives on the immunization and family planning services at the health facilities. Most mothers had a positive impression of immunization services, with some commenting that vaccines are regularly available, that services are free of charge, that mothers appreciate receiving regular reminders about when to return for the next vaccine, and that they appreciated the way the vaccinator spoke to them. For example:

Most mothers indicated that they felt the service integration should continue.

Mothers welcomed the provider reminding them when to return for their child’s vaccines.
Mothers felt positive about the services, but noted privacy, provider communication, and education could be improved.

Providers said a benefit of service integration was the ability to reach more clients for both services.

We can feel good. The vaccine man can smile with us, give us seat, and also explain the importance to us about the vaccine. —Mother, age 35–39, family planning referral nonacceptor, Grand Bassa County

Several mothers also mentioned gaps in immunization services, including long waiting time and lack of availability of certificates for immunization schedule completion and vaccination cards.

Regarding family planning services, mothers (including the family planning referral nonacceptors) felt largely positive about the services. They appreciated the way the family planning provider discussed the subject, that services are free of charge, and that providers allowed women to take their own choices on which method to use. A couple of mothers mentioned areas that need to be addressed, including improvements in privacy, better explanations of family planning side effects by family planning providers, improvements in the family planning providers’ interpersonal skills, and prevention of stock-outs of contraceptives.

As for me where they are giving the family planning, the curtain should be closed because it is short, and when people are passing to go to the vaccine place while the family planning woman is talking to you, they can see and hear you. —Mother, age 30–34, family planning referral acceptor, Lofa County

Recommendations suggested by mothers for service improvements include having more health education and behavior change efforts at the community level, addressing privacy concerns, and increasing space for provision of immunization services.

Service Provider Perspectives

Vaccinators and family planning providers expressed largely positive views about the integrated approach. Service providers mentioned broad benefits for clients as well as a number of benefits of the service integration for the service providers themselves, including helping them locate “lost” mothers and children for each service and enabling them to reach more clients for both services. One vaccinator mentioned that “it has made mothers to be more free with us,” and another expressed that he appreciated learning more about family planning and assisting with family planning service provision. Several health workers said they saw improvements in record-keeping systems, with increased focus on using the data to make decisions at the facility.

Vaccinators and family planning providers widely described having positive working relationships with each other, with many indicating that the relationships had improved with the intervention. Service providers generally indicated that they coordinate to ensure that mothers receive both services, compare registers on a regular basis, and support each other to ensure both roles are covered if one provider is called offsite.

The new approach has affected our interaction positively, in that we both compare all of our EPI [immunization]-family planning record[s] on a daily basis. —Vaccinator, Grand Bassa County

As noted by a program manager in Lofa:

... the EPI and the family planning providers are closer now as compare to before in terms of relationship... I think because they both receive the same training to provide the services together. They are now working together. —Program Manager, Lofa County

Vaccinators, in particular, saw great value from the family planning and immunization integration training, largely around improving their understanding of family planning and enabling them to play a role in family planning service provision. For example:

The major change is that I never knew young baby mothers could take family planning and I did not think mothers were going to accept, but now the young mothers are accepting beyond what I expected. —Vaccinator, Lofa County

The main implementation challenges mentioned by health workers included perceived increased workload, documentation challenges to keep track of referred clients, resistance to family planning use among some clients, and commodity stock-outs.

Several supervisors and service providers indicated that the service integration had increased their work responsibilities and time required to provide services. One vaccinator mentioned now spending more time on each client, and a nurse discussed the challenge of juggling antenatal care, family planning, immunization, and other clients, which resulted in increased wait time and dissatisfaction among some clients. For example, one nurse from Lofa noted:

Many of the patients complain on the waiting time because we can leave our big belly [antenatal care clients] and other patients to take care of the family planning and EPI clients.

Respondents revealed that the heavy workload occasionally led to “services not being fully implemented” and to gaps in the recordkeeping.
Overall, respondents indicated that in spite of the workload challenges, they had come to see integrated family planning–immunization services as part of their job functions. One supervisor noted, for example:

Well, they [vaccinators and family planning providers] are saying that the new approach ... is very good and that many clients are coming for those services as compared to before, but ... they complain a lot on workload. They are saying the work is too much, but at the end of the day I make them to understand that it is [in] our duties. —Supervisor, Grand Bassa County

Despite the challenges, all vaccinators and family planning providers indicated that they would like to see the integrated approach continue. Two vaccinators mentioned that future efforts should engage community health workers to increase engagement on PPFP and immunization at the community level. Others said the approach should be scaled up to additional facilities and counties.

**Contextual Factors Affecting Integrated Service Delivery Outcomes**

Contextual factors affecting service integration outcomes included social stigma, misconceptions and concerns about negative health effects of family planning, human and material resource availability, and organization of services within the facility. Mothers and fathers expressed misconceptions regarding the health effects of family planning methods, including on their own health, the quality of breastmilk, and the health of their child. Stigma and fear of social judgment for using PPFP, especially while mothers have small babies (i.e., during a period of socially prescribed postpartum abstinence), were repeatedly raised as a concern across the client respondent groups. Several respondents indicated that they had not known prior to the intervention that “family planning is good for young baby mothers.” Several mothers discussed how use of family planning was seen as a violation of a traditional norm for women to wait to resume sexual activity until after the baby walks or the child is weaned, as illustrated here:

Some people will say in the community you want [to] do plenty man business [sex], so you do not want to wait for your child to walk. —Family planning referral nonacceptor, age 30–34, Grand Bassa County

The view that postpartum women are seen in a negative light if they use PPFP pervaded the FGDs, especially among the family planning referral nonacceptors. Along with this pressure to not be seen using family planning before the baby walks, women indicated that they also feel pressure from their husbands to return to sexual activity:

They will say it is because of man business, and we, the Muslims, we have 40 days after you deliver, and after that you [are] forced to have sex with your husband, and I don’t want my man to go to different woman. —Family planning referral nonacceptor, age 25–29, Lofa County

Men will always want to have sex with women who have young children, [but] the breastmilk will spoil and the child will not walk [early]. —Family planning referral nonacceptor, age 20–24, Lofa County

Most fathers expressed a positive general impression about family planning, although many were hesitant to endorse postpartum family planning. Fathers expressed concerns that family planning might lead to side effects, that it might facilitate infidelity, or that they may incur judgment from others in the community for using family planning soon after childbirth:

Because the baby is still small, the shame will come on the man.” —Father, age 35–39, Grand Bassa County

Most fathers also indicated that they feel comfortable speaking with their wives about family planning. Fathers widely recognized the importance of immunization services for their children. When asked how they felt about women receiving both family planning information and services while bringing children for vaccination at the health facility, the vast majority of husbands participating in the focus groups were supportive. They described benefits such as convenience to the mother (“It saves time”), increased knowledge for the mother that she can share with the father, and the reinforcement of information from both service areas as an additional motivator:

It also helps women to educate husbands who are not knowledgeable about family planning. —Father, age 30–34, Lofa County

For me, I feel happy because they are coming and getting two services at the same time. —Father, age 20–24, Grand Bassa County

Only 1 husband expressed reservations about the service integration:

I am not happy with the idea because some of our mothers and sisters are not educated. So, therefore, they
Respondents indicated that provision of integrated services was affected by human and material resources as well as the facility setup. Specific factors that they identified included commodity availability, staff attrition, and availability of separate rooms for provision of each service.

Several respondents noted the need for refresher training and for orienting new staff due to staff turnover.

Some of those that were trained to implement the integration services have left some of the facilities…The new ones are not able to do the work properly, and they also do not have that much interest in it because they did not get the training. We still need periodic training to get the new staff involved. —Program Manager/Supervisor, Lofa County

Supervisors recognized the need for additional staff, and one reported having advocated for more staff, but “the only reply you can get is, ‘no money.’”

Service providers and supervisors expressed mixed experiences with whether or not stock-outs had posed a challenge. Overall, respondents had no major stock-out concerns, but a few noted occasional shortages of family planning commodities; for example:

There is always shortage in the commodities before the month ends. —Facility Supervisor, Grand Bassa County

At least 1 facility supervisor indicated increasing commodity projections due to increased demand for vaccines and family planning commodities as a result of the intervention. Several respondents also indicated that the facility setup did not allow for sufficient privacy, affecting client uptake of referrals from one service to the other because clients did not want to be seen walking from the immunization area to the family planning area. They suggested having both services in the same private place; for example:

There is no specific place for this service. —Program Manager/Supervisor, Lofa County

One thing that will help to improve this service is to have all of the resources, logistics, [in] a private room for clients. —Facility Supervisor, Grand Bassa County

**Discussion**

Our study’s qualitative results demonstrate that both providers and clients view the integration of family planning and immunization services as a positive development that reduces the time and cost for families seeking health services, improves coordination and implementation of services at health facilities, and promotes client-centered care. Although we were not able to demonstrate statistically significant changes in overall family planning outcomes, our findings demonstrate no negative impact on immunization dropout rates. Given the lack of clear findings from MCHIP on the impact of the intervention on immunization dropout rates, this study provides reassurance that service integration does not negatively affect immunization service utilization and uptake. Our results reinforce that integration of family planning and immunization services has the potential to be a promising strategy for encouraging postpartum contraceptive uptake. Even in a post-emergency setting with a shortage of health workers, where social norms stigmatize the practice of PPF and immunization coverage is relatively low, integrated referrals were positively received and did not adversely affect immunization outcomes, indicating using the reciprocal referral approach provides added value.

A few factors limited our ability to detect statistically significant changes in overall family planning outcomes, including (1) the use of “total family planning users” as the primary outcome of interest (rather than “new family planning users” which would be more sensitive in capturing postpartum use), (2) not tracking LAM users in the number of total family planning users, (3) the small sample size as a result of small health facility catchment areas and client loads, and possibly, (4) the reduced intensity of supervision specifically for this intervention through this scaled approach compared to the MCHIP approach. LAM use had contributed to a substantial portion of the family planning method mix among immunization-referred clients within the MCHIP approach. LAM use had contributed to a substantial portion of the family planning method mix among immunization-referred clients within the MCHIP approach. Fluctuations in service utilization due to family planning and immunization campaigns and seasonality affecting accessibility during heavy rains also affected our ability to detect significant changes in family planning utilization data. Prior studies of efforts to integrate family planning and immunization services in Togo, Nepal, and Rwanda demonstrated positive results on family planning outcomes with no negative effects on immunization outcomes.

To our knowledge, this article is the first immunization and family planning integration publication to document the results and challenges of bidirectional integration with referrals.
to immunization as well as to family planning. While the cumulative numbers of clients with same-day referrals from family planning to immunization were relatively small, the more frequent appointment reminders through the family planning platform may have contributed to complete and timely immunizations, although timeliness should be further explored.

**Design and Implementation Considerations of Future Integration Efforts**

Questions remain regarding the most effective approaches for expanding and sustaining the effectiveness of service integration efforts within resource-constrained environments. Challenges with maintaining continuity and fidelity of family planning and immunization service integration implementation to intervention design were noted by studies in Rwanda and Ghana. Many of the contextual factors affecting service integration through this expanded approach in Liberia, such as stigma and privacy concerns, were consistent with those identified in the MCHIP study.

Many women accepted referrals from immunization to family planning and received the information about PPFP positively. For other women, however, lack of privacy within the health facility was a major barrier to accept and follow through on referrals to family planning. Health workers noted the importance of continued education and engagement on the topic of PPFP to address misconceptions. Although family planning–immunization integration is an avenue to reduce missed opportunities for family planning uptake, addressing social stigma and norms through community-based activities could further improve PPFP uptake. Uptake could also be improved by resolving privacy concerns at the facility, including altering patient flow and protecting privacy during both immunization and family planning consultations. Additional programming with a focus on both provider and community behavior change and community engagement would complement the facility-level integration of services.

Providers also noted the benefits of increased team collaboration, although human resource shortages often affected providers’ ability to expedite family planning clients referred from immunization. At the facility level, a team dynamic was evident at many of the intervention facilities. The family planning provider and vaccinator were perceived as “married”—they met regularly to discuss clients’ use of postpartum services and how to increase referrals and ensure quality services were being provided and recorded. This teamwork should be emphasized in future programs because it improved the quality of services, particularly the vaccinator’s family planning counseling and strategies to improve referral follow-through, and contributed to the sustainability of integrated efforts. Notably, although providers perceived increased workload as a result of the intervention, referred clients represented a small proportion of all clients and the data do not reflect dramatic increases in service uptake. The perceptions of added workload more likely reflect the effort of coordination with the other service providers and additional tracking requirements, as well as shifts in workflow, rather than increases in workload due to an increased demand for services.

Future programmatic efforts in Liberia should incorporate reflection on findings from the intensive MCHIP effort and MCSP’s more scalable model. From these experiences, the most essential inputs and activities that we believe should be included within future expanded implementation efforts are summarized in the Box.

The integrated approach can be scaled once a cadre of trained clinical supervisors exists and resources exist for a brief, on-site training and the few inputs described in the Box. We have demonstrated this approach is possible even in the context of a fragile health system. Once the integration is successfully operating at scale, we would suggest minimal intrafacility referral tracking in order to minimize the burden on health workers. Importantly, implementers

**BOX. Key Inputs and Activities for Success of Family Planning and Immunization Service Integration**

- Conducive policy environment and strong engagement at national and sub-national levels
- Formative assessment to inform program strategy
- Training for service providers and orientations for supervisors which includes values clarification, increasing knowledge of postpartum family planning (PPFP) and addressing misconceptions, and practical skills application
- Routine supportive supervision (as part of existing supervision mechanisms) with attention to improving quality of integrated service delivery and data trends
- Dedicated space for immunization and family planning service provision, including addressing privacy concerns through altered patient flow, privacy screens, or other means
- Availability and use of communication materials for clients and job aids for providers
- Tracking and regularly monitoring immunization and PPFP outcomes (including lactational amenorrhea method) at facility and subnational levels
- Community-level activities to increase knowledge and acceptance of PPFP
should further explore opportunities to align facility service integration with community engagement to address barriers to uptake, namely social norms around postpartum abstinence.

**Considerations for Monitoring and Evaluation of Integrated Services**

To rigorously assess the effect of the intervention on uptake of family planning among women bringing their children for routine immunization services, it is necessary to specifically monitor trends in PPFP and, if possible, to monitor LAM use as part of the family planning method mix. Due to our focus on implementing a scalable intervention, we chose to rely on HMIS indicators. As PPFP acceptors and LAM users were not captured in the routine HMIS, we were unable to monitor these potentially very valuable data. The addition of PPFP-specific indicators to the HMIS is critical to effective monitoring of the effect of interventions on PPFP at scale. In addition, promoting use of PPFP, especially in contexts with entrenched stigma around its use, is a long-term behavior change intervention. Additionally, longer observation time periods may be necessary to detect these shifts in PPFP perceptions and intentions and the resultant impact on PPFP uptake. The full effect of the intervention is neither realized nor reported by capturing same-day referral data only because the effects of the intervention may be indirect and at times delayed. For example, conversations within families and communities (such as those sparked by the leaflets) may result in other women in the community deciding to seek PPFP, even if they were not the ones who originally interacted with the vaccinator. On the other hand, some women may also choose to seek PPFP services long after the day they received PPFP information from the vaccinator and therefore may not be captured as a referral acceptor if they do not mention their interaction with the vaccinator as their reason for seeking services.

The extent of the intervention spillover to comparison facilities in Lofa County demonstrated buy-in and interest from the county health teams and the scalability of the approach because the intervention was organically carried to new facilities by supervisors and staff moving between different facilities. However, it resulted in a diluted effect of the intervention between intervention and comparison facilities. Future initiatives should consider study design variations that maximize internal and external validity. Factors to consider include appropriate data source selection, client caseloads in the study area, and adequate study duration to detect statistically significant changes in service utilization, as well as the conditions required for more advanced multilevel analyses measuring contamination and spillover effects.

A recent commentary exploring lessons to date regarding integration of health services noted the complexities of these efforts and highlighted that the wide variation in how services are implemented, depending on the context, poses challenges in “rigorously evaluating” these initiatives. Future efforts should focus on application of “complexity aware” measurement approaches, which align monitoring and evaluation of program interventions with implementation realities. As noted by the CORE Group in its Complexity Matters Call to Action:

**But while outcome evaluation may usefully generate hypotheses, it generally reveals little about the process of change. In the real-world of implementation, controlling for context is not possible. Retrospectively knowing “what worked” in a particular program... does not reliably answer the question of “what works” in general and what will work in future programs.**

Our understanding of family planning–immunization service integration could benefit from future studies that consider interdisciplin ary approaches that allow for more exploration of context, the “how” of implementation, intervention costs, and the drivers of social and behavior change. These approaches must also elucidate and model incremental changes that may underlie routine service data trends over longer time horizons. Future studies could examine communities’ and clients’ exposure to the intervention and their knowledge, intention, and motivation for seeking PPFP and immunization services.

**CONCLUSION**

Overall, this intervention capitalizes on existing resources to improve the quality of services for women and children and minimize missed opportunities to improve health outcomes. This service integration approach was focused on process improvement and was neither resource intensive nor difficult to implement. This study demonstrates that although scaling up integrated family planning-immunization services may be programmatically feasible and acceptable to clients and providers, the success of the intervention and ability to understand and quantify impact are driven by the effect of contextual factors and fidelity to
the intervention approach. Contextual factors need to be understood to the greatest extent possible before implementation, measured through complexity-aware measurement approaches during implementation, and addressed throughout program implementation to maximize the impact of the approach on service utilization and health outcomes. This study contributes to learning on the “how” of family planning and immunization service integration, that is, the local contextualization of an integrated service delivery model, the requirements for program inputs and implementation, fidelity to intervention design and adaptations that occur in the real world, a larger-scale approach, and the influence of health systems and social factors on the adaptation and effectiveness of the integrated approach. Understanding all these context-specific factors describing the “how” is critical as we consider the future of family planning-immunization integration as a “promising” high-impact practice for promotion of PPFP. Now that this integration approach has been adopted by the Government of Liberia and incorporated into the Liberia Family Planning Costed Implementation Plan: 2018–2022, our ambition is for the government and other stakeholders to apply and build on this learning within programs at scale, with attention to the essential elements we have highlighted, as part of a toolbox of approaches to further address gaps in PPFP uptake and promote more holistic care for women and children.

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REFERENCES


Role of Male Sex Partners in HIV Risk of Adolescent Girls and Young Women in Mozambique

Jenifer Chapman, a Nena do Nascimento, b Mahua Mandal c

ABSTRACT
Adolescent girls and young women (AGYW) ages 15–24 years are disproportionately affected by HIV/AIDS, particularly in East and Southern Africa. One strategy to reduce HIV among AGYW, proposed through the Determined, Resilient, Empowered, AIDS-free, Mentored, and Safe (DREAMS) Initiative, is to prevent and manage HIV among their male sexual partners. To implement this strategy and reach men, programs need information about AGYW’s potential sexual partners at the local level. To support DREAMS programming in Mozambique, we undertook a study to characterize this population of men in 3 districts with ongoing DREAMS programming. In mid-2017 we conducted 15 focus group discussions with AGYW (N=102) and a venue-based intercept survey of men (N=1,140). Male sexual partners of AGYW who took the survey were diverse in age, education level, and socioeconomic status. Older AGYW focus group participants sought partners who could provide for them financially. Multiple sexual partnerships and inconsistent condom use were widely reported, with AGYW emphasizing that gender norms disempowered them from negotiating condom use. Reported condom use varied by AGYW and male-partner demographic characteristics, as well as by their relationship type. Condom use rates were much higher than national and regional estimates. AGYW who were less educated/not-in-school, were pregnant, or single mothers were particularly disempowered in sexual relationships. Less educated men were less likely to use condoms than educated men, and condom use was least likely in marriage. Study findings underscore the importance of reaching the diversity of male sexual partners of AGYW with HIV services as part of a strategy to reduce HIV risk among AGYW. They also support an enhanced focus on female-controlled HIV prevention methods that do not require negotiation with a male partner and special efforts to reach out-of-school/less educated AGYW, as well as pregnant AGYW and single mothers.

INTRODUCTION
Adolescent girls and young women (AGYW) ages 15–24 years are disproportionately affected by HIV/AIDS. In sub-Saharan African countries with generalized HIV epidemics, adolescence marks an increase in HIV prevalence and the emergence of gender disparities in HIV. Recent estimates from 7 African countries found that the prevalence of HIV among girls and women ages 15–25 is more than twice that of their male counterparts.

Despite the epidemiological and human rights imperative to help AGYW remain AIDS-free, programming in this area has resulted in uneven and slow progress in reducing HIV infection rates. Fewer than half of AGYW living with HIV know their status, and treatment uptake and global viral suppression rates among adolescents and young people, especially among females, are extremely low. Furthermore, although other age groups have experienced declines in AIDS-related deaths, adolescent AIDS-related deaths increased by about 50% globally between 2005–2012.

Over recent years, vulnerable AGYW have participated in direct prevention interventions, such as small-group educational and skills-building initiatives, that have been shown to strengthen confidence, self-efficacy, access to sexual reproductive health services, and other related outcomes. Despite these efforts, AGYW remain at high HIV risk. Another strategy to reduce HIV among AGYW, proposed through the Determined, Resilient, Empowered, AIDS-free, Mentored, and Safe (DREAMS) Initiative and the new MenStar Coalition (both funded by consortia of global partners), is to prevent HIV among currently HIV-negative male sexual partners of AGYW.
Reducing HIV among adolescent girls and young women requires understanding the profile of their potential partners.

We surveyed men ages 18 and older to identify and characterize males who have adolescent girls and young women as partners.

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and reduce the transmission by male partners who are HIV-positive (by controlling their viral load). This strategy requires understanding the profile of sexual partners of AGYW, particularly males at high risk of acquiring or transmitting HIV. Although research on cross-generational and transactional sex among AGYW and older male partners has been ongoing in sub-Saharan Africa, understanding the characteristics of the male sexual partners of AGYW in general is a new area of inquiry.

In Mozambique, which has benefited from DREAMS funding and targeted prevention efforts, HIV prevalence among AGYW is 9.8%—more than 3 times higher than among males of the same age group (3.2%).\textsuperscript{16} AIDSInfo/SPECTRUM estimates that 28,000 AGYW were newly infected with HIV in 2017, comprising one-quarter of new infections among those ages 15 years and older. To support DREAMS work in-country, we undertook a study to characterize men who have recently engaged in sexual activity with AGYW and identify relationship characteristics that influence sexual risk-taking behavior.

\section*{METHODS}

This study was conducted in 3 districts in Mozambique—Quelimane, Beira, and Xai-Xai—that receive targeted AGYW prevention support services. These urban/peri-urban districts are located in the northern, central, and southern regions of the country, respectively, with high rates of HIV prevalence. Quelimane and Beira are both port cities that sit along major inland transport routes. Xai Xai district is a major point along the major North/South transport corridor.

We conducted a mixed-methods study involving focus groups with AGYW and a venue-based survey of males who had AGYW as sexual partners. Ethical clearance was obtained from Health Media Labs, Inc., in the United States, and the Comitê Nacional de Bioética para a Saúde in Mozambique.

\subsection*{Data Collection and Analysis Focus Group Discussions}

In each study district, we conducted 5 focus group discussions (FGDs) in mid-2017 with the following subgroups of AGYW: (1) in school, ages 15–17 years; (2) out of school, ages 18–19, and not pregnant, postpartum, or breastfeeding; (3) out of school, ages 15–19, married, and pregnant, postpartum, or breastfeeding; (4) ages 20–24, and not pregnant, postpartum, or breastfeeding; and (5) ages 20–24, and pregnant, postpartum, or breastfeeding. The subgroups were defined based on target subpopulations for the DREAMS intervention districts.

We developed a topic guide to elicit information from AGYW on the characteristics of male sexual partners of AGYW, how risk-taking varies by type of relationship and sexual partner, and gender dynamics in sexual relationships. With the support of local DREAMS implementing partners, trained female data collectors recruited AGYW participants from girls’ groups, schools, and health centers. Before collecting information, data collectors sought and documented informed consent/assent from each participant (and from the caregivers of minors).

In Beira, FGDs were held at a local partner facility; in Quelimane, at a secondary school; and in Xai Xai, at a primary school. In Xai-Xai and Beira, discussions were held in a mix of Portuguese and the local languages (Changana and Sena, respectively). In Quelimane, the discussion was held in Chuwabe and Portuguese, and a local resident translated for the participants and study team. All discussions were audio-recorded.

Data collectors transcribed the FGD recordings, translated all local languages to Portuguese, and expanded on the transcripts with field notes. All identifying data were redacted to protect participants’ privacy. Two qualitative analysts followed a collaborative qualitative analysis approach through the 5 interrelated steps for data analysis: reading, coding, displaying, reducing, and interpreting.\textsuperscript{19,20}

\subsection*{Venue-Based Survey}

In mid-2017, we conducted a short quantitative survey in public venues with men ages 18 and older to identify and characterize males who have AGYW as sexual partners, spending one week in each district.

To ensure we were powered to calculate our key indicators, we used prevalence of male circumcision—a key DREAMS intervention—to calculate the sample size. Using a conservative estimate of 51\%, with a 5% margin of error, an estimated design effect of 2.0, and an estimated response rate of 80\%, we calculated a required study sample size of 930 men who had recently engaged in sex with an AGYW (we use this abbreviation in the singular to refer to any member of this demographic group). We aimed to recruit men from at least 10 venues in each of the 3 study locations.
Male Sex Partners’ Role in HIV Risk of Adolescent Girls and Young Women in Mozambique

To select venues, we elicited information during FGDs with young women on where we might find different types of AGYW sexual partners (e.g., husbands, boyfriends, casual partners, transactional partners). We created a list of venues, including bars, schools, markets, and beaches, in each district. Then, we reviewed this list with stakeholder reference groups (comprising members of the government and local implementing partners), which we formed in each district to advise on study implementation and to improve data use. Nearby venues were combined, closed venues were removed from the list, and several venues were added. We worked with establishment owners/staff and local government to gather permissions to recruit at the venues selected. During this process, we determined the best time of day to collect data from each venue and developed the field schedule.

At the venues, data collectors approached men to participate in a 15-minute interviewer-administered, tablet-based survey. We applied a “take all” approach at every venue, meaning that we approached all men in the venue to participate. Men who were 18 years or older and who appeared sober were eligible to participate.

Once eligibility and willingness to participate were determined, the data collector and potential participant moved to a private location near the venue (generally, just outside it) to document informed consent and, if granted, administer the survey. The survey instrument had 2 parts. Part 1 focused on respondent demographics with a final question about whether the respondent had recently had sex with an AGYW. Respondents who reported having had sex with an AGYW in the past 12 months proceeded to part 2, which included questions about sexual partnerships, demographics (theirs and their partners’), HIV testing and knowledge of HIV status, male circumcision, condom use, participation in HIV services, and preferences for and barriers to HIV services. Data collection continued until at least 310 men in each study site had completed part 2 of the questionnaire.

We analyzed the data in Stata 15 in several steps. First, we used frequency distributions to explore characteristics of the full sample of men who reported ever having sex. Next, we compared characteristics of men who reported having had sex with an AGYW in the past 12 months with those who had not. All subsequent analyses were restricted to men who reported having had sex with an AGYW in the past 12 months. A series of bivariate analyses were conducted to examine associations between characteristics and risk-taking behaviors of AGYW and their male partners. For each research question, we also conducted multivariable logistic regression to examine characteristics of male partners and AGYW that were associated with men’s use of condoms.

## RESULTS

A total of 102 AGYW participated in 15 FGDs across 3 study locations. Demographic characteristics aligned to recruitment criteria across the 5 subgroups of AGYW (see methods). Of the 1,520 men who were approached, 1,176 men (77.4%) consented to participate in the survey and were eligible. We recruited men from 38 venues (11 in Beira, 13 in Xai-Xai, and 14 in Quelimane).

### How AGYW Characterize Their Male Sexual Partners

Participants across all focus groups described sexual relationships with male partners diverse in age, educational attainment, marital status, and employment status.

Participants said it was “normal” to have a partner one’s own age, but also reported that AGYW of all ages had sexual relationships with older men. Generally, females ages 15–19 years said that girls their age dated men who were slightly older (in their early 20s or 30s). Young women ages 20–24 years described dating slightly older men (in their late 20s and early 30s), and some in both age groups described dating significantly older men (in their 40s, 50s, or 60s).

Participants in all groups expressed a strong preference for men who could offer material and economic security and who would take responsibility for pregnancy (with these concepts often being linked). Respondents typically associated these traits with older men. One respondent described a friend who was dating an older Mozambican businessman working in South Africa:

*He brings back 8,000, 9,000 [US $130–150]—I’ve seen the money . . . he is married . . . and I would say he is around 40 years old and she is 16.* —AGYW, 15–17 years, in-school, Beira

An adolescent said that she would rather be with an older man than someone her own age because of the monetary support an older man could provide her:

*I am with my boyfriend and I find an older man who can give me everything—he buys me hair pieces, clothes, you do not even know how much. So, I am with that*. 
Male Sex Partners’ Role in HIV Risk of Adolescent Girls and Young Women in Mozambique

Respondents explained that AGYW had sexual relationships both with married and single men. Younger and single AGYW participants noted that many AGYW their age may have preferred to date married men because these relationships provided them with material goods without leading to a long-term commitment. Participants noted that single women ages 20–24 years were more often looking for a serious relationship that could lead to marriage; therefore, they were less interested in married men.

FGD participants reported that AGYW had sexual partners who do both skilled and low-skilled work, but AGYW indicated they valued male sexual partners with high-skilled employment. An adolescent explained the high value she and her peers placed on men who work for the State. She recalled hearing a girl her age who worked for the State. I really want nothing to do with a man, because he is able to satisfy all of my wants, because I am with him for his money… He will always be buying me expensive phones. So, when you see that [that this man can provide], and the fact that your boyfriend cannot give you any money at all, pretty soon you are running to the older man. —AGYW, 15–17 years, in-school, Quelimane

AGYW across all subgroups reported that their sexual partners had different levels of education, ranging from none to primary, secondary, and university education. The only exception was in FGDs with young women ages 20–24 years who were pregnant, postpartum, and/or breastfeeding. Across the 3 regions, these AGYW noted that their sexual partners either had no education, minimal education, or no more than secondary education.

Respondents explained that AGYW had sexual relationships both with married and single men. Younger and single AGYW participants noted that many AGYW their age may have preferred to date married men because these relationships provided them with material goods without leading to a long-term commitment. Participants noted that single women ages 20–24 years were more often looking for a serious relationship that could lead to marriage; therefore, they were less interested in married men.

Younger FGD participants, both those in and out of school, said that sexual relationships between girls and schoolteachers were very common. These relationships were described as coercive because teachers typically promised good grades or other benefits in exchange for sex. One adolescent said:

Other girls here, even in this school, go out with teachers. They even say, “If you want to pass you have to go out with him.” So, why spend the whole school year working hard to get good grades, if he will fail you at the end of the year?… This school is full of teachers who hook up with their students. —AGYW, 15–17 years, in-school, Quelimane

How Men With AGYW as Sexual Partners Characterize Themselves

Eighty-six percent (n=981) of men surveyed reported recently (within the past 12 months) having had sex with an AGYW. Men who reported recent sex with AGYW were, on average, 27 years old (range 18–58 years). One-quarter (23.9%) of these men reported at least some primary education, one-quarter had some secondary education, one-quarter had completed secondary education, and one-quarter had at least some tertiary education. One-third (31.7%) were studying at the time of the survey. Eighty-four percent of men reporting an AGYW sexual partner had worked in the 7 days prior to the survey (90.5% during the 12 months prior). Respondents reported various occupations and a range of monthly incomes. Approximately half (50.9%) were married/cohabiting and a further 38.1% reported having a steady girlfriend (of any age) – 89% of all men reporting recent sex with an AGYW reported a steady partner (Table 1).

Compared to men who did not report recent sex with an AGYW, those who did were younger (on average: 27 years versus 43 years, P<.001), less likely to be married (50.9% versus 82.0%, P<.001), and less likely to be less educated (6.1% versus 13.0%, P<.001); more likely to have worked in the 12 months before the survey (90.5% versus 99.6%, P<.01); and more likely to be currently studying (31.7% versus 12.2%, P<.001). In a multivariable analysis, only age, having a steady partner (married or cohabitating), and education were significantly associated with recent sex with an AGYW. After controlling for all other demographics (except profession), younger men (adjusted odds ratio [AOR]: 0.84, P<.001) were more likely to report a recent AGYW sexual partner, and men with low educational attainment (less than primary) were less likely to report a recent AGYW sexual partner (AOR: 0.37, P<.05) (Table 1).

Men reporting recent sex with an AGYW reported extremely high rates of HIV testing compared to national and regional rates—82.8% reported ever being tested for HIV. About three-quarters of the sample (76.0%) reported being circumcised.
Sexual Risk Behavior

We examined numbers of sexual partners and condom use, as reported by men and AGYW.

Multiple Sexual Partners

Half (50.1%) of the men who had AGYW partners reported having had 3 or more sex partners in the previous 12 months (45.5% of those who were married). Married FGD participants noted that their husbands often had relationships with other women. One young woman described her husband’s extramarital relationships:

"My husband has lots of women. Each woman has her own home, and they are boyfriend and girlfriend." —AGYW, 20–24 years, pregnant, post-partum and/or breastfeeding, Quelimane

Although a few of the married AGYW described monogamous relationships, more married participants reported that they and their married AGYW friends had a boyfriend as well as a husband. One participant said,

"This happens a lot. I have a friend who has a husband, but she also has 3 boyfriends." —AGYW, 18–19 years, out-of-school, Beira

Focus group participants said that married women were motivated to have relationships with other men in part for economic reasons.

TABLE 1. Characteristics of Men Reporting Sex With AGYW in Mozambique, by AGYW Partner Status

<table>
<thead>
<tr>
<th></th>
<th>Has AGYW Partner (n=981)</th>
<th>Does Not Have AGYW Partner (n=159)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years, mean (standard error)***</td>
<td>27.33 (.22)</td>
<td>41.5 (.76)</td>
</tr>
<tr>
<td>Age, years, range (18, 58)</td>
<td>(18, 58)</td>
<td>(26, 64)</td>
</tr>
<tr>
<td>Currently studying, *** No. (%)</td>
<td>311 (31.70)</td>
<td>17 (12.23)</td>
</tr>
<tr>
<td>Highest level of completed education, No. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than primary***</td>
<td>60 (6.12)</td>
<td>18 (12.95)</td>
</tr>
<tr>
<td>Completed primary</td>
<td>174 (17.74)</td>
<td>24 (17.27)</td>
</tr>
<tr>
<td>Some secondary</td>
<td>251 (25.59)</td>
<td>29 (20.86)</td>
</tr>
<tr>
<td>Completed secondary*</td>
<td>256 (26.10)</td>
<td>24 (17.27)</td>
</tr>
<tr>
<td>Completed more than secondary</td>
<td>240 (24.46)</td>
<td>44 (31.65)</td>
</tr>
<tr>
<td>Employment, No. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worked in the past 7 days†</td>
<td>824 (84.00)</td>
<td>131 (94.24)</td>
</tr>
<tr>
<td>Worked in the past 12 months **</td>
<td>888 (90.52)</td>
<td>137 (99.56)</td>
</tr>
<tr>
<td>Income, No. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;$1,000</td>
<td>41 (4.18)</td>
<td>4 (2.88)</td>
</tr>
<tr>
<td>$1,000–4,999**</td>
<td>295 (30.07)</td>
<td>21 (15.11)</td>
</tr>
<tr>
<td>$5,000–9,999</td>
<td>257 (26.20)</td>
<td>36 (25.90)</td>
</tr>
<tr>
<td>$10,000–19,999</td>
<td>170 (17.33)</td>
<td>31 (22.30)</td>
</tr>
<tr>
<td>$20,000–39,999*</td>
<td>78 (7.95)</td>
<td>22 (15.83)</td>
</tr>
<tr>
<td>$40,000–49,999 &amp; ≥$50,000**</td>
<td>28 (2.85)</td>
<td>17 (12.23)</td>
</tr>
<tr>
<td>Missing data</td>
<td>112 (11.42)</td>
<td>8 (5.76)</td>
</tr>
<tr>
<td>Marital status, No. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single***</td>
<td>470 (47.91)</td>
<td>10 (7.19)</td>
</tr>
<tr>
<td>Married or living together***</td>
<td>499 (50.87)</td>
<td>114 (82.01)</td>
</tr>
<tr>
<td>Widowed/divorced***</td>
<td>12 (1.22)</td>
<td>15 (10.79)</td>
</tr>
</tbody>
</table>

Abbreviation: AGYW, adolescent girls and young women.
† P < .10; * P < .05; ** P < .01; *** P < .001.
particularly if their husbands were not providing for them. One adolescent said:

_They [other women] have to find a boyfriend to give them money._ —AGYW, 18–19 years, out-of-school, Quelimane

Focus group participants also noted that extra-marital relations were more common when husbands work far away from the home.

**Inconsistent Condom Use**

Sixty percent (60.3%) of men surveyed reported condom use at last sex, and 41% reported consistent (i.e., always) condom use in the last 12 months. Condom use was related to male partner characteristics, AGYW characteristics, the type of relationship, and gender norms.

**Male partner characteristics.** Men who reported condom use at last sex, compared to those who did not, were more likely to be single (55.1% versus 37%, $P<.001$), currently studying (38% versus 22.1%, $P<.001$), and have tertiary education (29.1% versus 17.5%, $P<.001$), and less likely to be working (81.4% versus 87.9%, $P<.01$) (Table 2). After controlling for all demographics except profession, men currently studying had higher odds of reporting condom use at last sex (AOR: 1.64, $P<.01$) and consistent condom use (AOR: 1.68, $P<.001$). Men with some primary education or no education had lower odds of reporting condom use at last sex (AOR: 0.61, $P<.05$) and consistent condom use (AOR: 0.53, $P<.01$), and, compared to single men, married men had lower odds of reporting condom use at last sex (AOR: 0.36, $P<.05$) and consistent condom use (AOR: 0.24, $P<.001$).

**AGYW characteristics.** Men reporting that their most recent AGYW sexual partner was younger than 20 years old, compared to those who reported AGYW sexual partners ages 20–24 years, were more likely to report condom use at last sex (64.8% versus 58.1%, $P<.05$) and consistent condom use (51.9% versus 35.6%, $P<.001$). Similarly, men reporting that their most recent AGYW sexual partner was employed, compared to those who reported an unemployed AGYW sexual partner, were more likely to report condom use at last sex (66.8% versus 58.2%, $P<.05$). However, we did not detect a difference in consistent condom use between these groups. Men reporting that their most recent AGYW sexual partner was a mother and/or pregnant were less likely to report condom use at last sex, compared

**TABLE 2. Male Partner Characteristics Associated With Men’s Reported Condom Use, Mozambique**

<table>
<thead>
<tr>
<th></th>
<th>Condom Use at Last Sex</th>
<th>Condom Use Frequency in Last 12 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (n=592)</td>
<td>No (n=389)</td>
</tr>
<tr>
<td>Age, years, mean (standard error)</td>
<td>27.16 (.29)</td>
<td>27.60 (.34)</td>
</tr>
<tr>
<td>Age, years, range</td>
<td>(18, 58)</td>
<td>(18, 52)</td>
</tr>
<tr>
<td>Currently studying, %</td>
<td>38.01</td>
<td>22.11</td>
</tr>
<tr>
<td>Education, %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than primary</td>
<td>4.73</td>
<td>8.23</td>
</tr>
<tr>
<td>Completed primary</td>
<td>13.68</td>
<td>23.91</td>
</tr>
<tr>
<td>Some secondary</td>
<td>25.34</td>
<td>25.96</td>
</tr>
<tr>
<td>Completed secondary</td>
<td>27.20</td>
<td>24.42</td>
</tr>
<tr>
<td>Completed more than secondary</td>
<td>29.05</td>
<td>17.48</td>
</tr>
<tr>
<td>Marital status, %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>55.07</td>
<td>37.02</td>
</tr>
<tr>
<td>Married or living together</td>
<td>43.07</td>
<td>62.72</td>
</tr>
<tr>
<td>Widowed/divorced</td>
<td>1.86</td>
<td>0.26</td>
</tr>
</tbody>
</table>

* $P<.05$; ** $P<.01$; *** $P<.001$; P values are based on chi-square statistics from bivariate analysis.
to those reporting sex with AGYW who were not mothers or pregnant at the time (45.8% versus 69.7%, \(P<.001\)), and less likely to report consistent condom use (24.7% versus 52.1%, \(P<.001\)). Men reporting that their most recent AGYW sexual partner was school-age but not attending school or attending primary school were less likely to report condom use at last sex and consistent condom use compared to men reporting that their most recent AGYW sexual partner was attending secondary or tertiary school (Table 3).

In some focus groups, women said that a single, pregnant woman left without any support would sometimes engage in riskier sexual behavior (e.g., not using condoms, sleeping with many men) in an effort to find a partner who could take care of her. An AGYW said:

_They [pregnant single women] go after truck drivers, those people with money, they go after them to get what their child needs, if the father doesn’t take on his role to take care of the child._ —AGYW, 15–19 years, married and pregnant/postpartum/breastfeeding, Quelimane

Another girl said:

_You have a child with him, but he denies it [that he is the father]. You don’t have a way to sustain your child. You’ll have to go find a man to get you some money, so you can buy Omo [detergent] for your child. Because children pee every day, and you have to always be cleaning [their clothes], and you need Omo to wash them._ —AGYW, in-school, 15-17 years, Quelimane

**Type of relationship.** In Table 4, we present data on men’s reported risk-taking behavior by the type of relationship they had with their most recent AGYW sexual partner. Men were more likely to report condom use at last sex with AGYW sexual partners that they just met (79.5%) and AGYW to whom they reported giving money for sex (67.5%) compared to their wives (24.2%, \(P<.01\)). Men whose AGYW partners were not their wives also had significantly higher odds of consistent condom use; for example, men whose AGYW partners were steady (but not live-in) partners had 5 times the odds of always using a condom (AOR: 5.13, \(P<.001\)). Men whose AGYW partners were sex workers had 15 times the odds (AOR:15.59, \(P<.05\)) of always using a condom compared to men who were married or living with their AGYW partners.

AGYW described differences in condom-use behavior by relationship type, but explained that the decision to use a condom was almost always driven by the male partner. AGYW said that they never use condoms with their husbands, but that they sometimes (albeit infrequently) used condoms with their boyfriends or casual partners. Married respondents said if a woman asked her

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**TABLE 3.** Men’s Risk-Taking Behaviors, by Men’s Reported AGYW Sex Partner Demographic Characteristics, Mozambique

<table>
<thead>
<tr>
<th>AGYW Demographic Characteristics</th>
<th>Current Age</th>
<th>Employment</th>
<th>Pregnant/Mother</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13–19 years (n=332)</td>
<td>20–25 years (n=646)</td>
<td>(P) Value</td>
<td>13–19 years (n=332)</td>
</tr>
<tr>
<td>Condom use at last sex</td>
<td>Yes (n=591)</td>
<td>64.8</td>
<td>58.1</td>
<td>(P&lt;.05)</td>
</tr>
<tr>
<td></td>
<td>No (n=388)</td>
<td>35.2</td>
<td>41.9</td>
<td>33.2</td>
</tr>
<tr>
<td>Condom use frequency in last 12 months</td>
<td>Consistent (n=389)</td>
<td>51.9</td>
<td>35.6</td>
<td>(P&lt;.001)</td>
</tr>
<tr>
<td></td>
<td>Inconsistent (n=557)</td>
<td>48.2</td>
<td>64.3</td>
<td>58.6</td>
</tr>
</tbody>
</table>

Abbreviation: AGYW, adolescent girls and young women.

\(\dagger P<.10; * P<.05; ** P<.01; *** P<.001 ; P\) values are based on chi-square statistics from bivariate analysis.
husband to use a condom, he would suspect her of infidelity or of having HIV or another sexually transmitted infection. A young woman said:

For me to use it [a condom], it has to be him who broaches the subject; the boss has to say, “Let’s use it.” I know that he will get suspicious [if I suggest using a condom] . . . “Why today are you talking about us using this?” . . . “She must be sick.” —AGYW< 20–24 years, Beira

Another young woman said of her husband:

He’ll leave me at home suffering and will go find another woman [if I insist on using a condom]. . . . I will offend him, because he’s in charge. —AGYW, 20–24 years, Quelimane

A few younger girls in each region said that condom use was more common with boyfriends their age and that they themselves use condoms. One adolescent said:

[Condoms also] prevent illness, unwanted pregnancy. . . . For us, this age, it is normal [to use them]. —AGYW, 18–19 years, out-of-school, Beira

Younger participants in Xai-Xai said that younger men (often their serious boyfriends) were much more open to the idea of using condoms, and much better informed. One AGYW said:

. . . at school there are always lectures [on condoms] . . . So, they [men their age] pay attention. —AGYW, 18–19 years, out-of-school, Xai-Xai

**Gender norms.** Most AGYW expressed feeling powerless in persuading boyfriends and casual partners to use condoms, fearing the partners might leave them. One adolescent said:

I arrive in the home of my boyfriend and he doesn’t have a condom, and I also don’t have one. So, I don’t know if it is fear or embarrassment . . . but always when my boyfriend says that there isn’t a condom, the girl always shuts up and has sex without a condom . . . It’s rare that my boyfriend actually says, “No, no, let’s do it without a condom.” He will always threaten me: “If you love me, we have to have sex without a condom.” We always give in . . . we have to prove we love him . . . we shut up. We have this fear, like, I will lose him, I have to accept to do it how he wants it. —AGYW, 18–19 years, out-of-school, Xai-Xai

Participants described coercion around not using condoms and specifically how older boyfriends with means offer gifts to encourage AGYW not to use condoms. One adolescent said:

[Men say] I’ll give you a phone, I’ll give you everything that you want today [if we can have sex without a condom]. —AGYW, 18–19 years, out-of-school, Quelimane

Similarly, another adolescent said:

Us girls . . . we have sex without prevention, we forget about condoms, we only have sex in the way the man wants it, a man who is the age of our fathers, or even with boys our age . . . [and] they could be infected with HIV. But we want the material goods he has, we don’t want love, and we hurry to date him. Afterwards, we have sex without a condom, we don’t use prevention methods. And then we get HIV without realizing it.
DISCUSSION

This study is the first to document the characteristics of male sexual partners of AGYW in Mozambique and factors that relate to HIV-risk-taking behavior. The mixed-methods approach employed in this study allows for 2 perspectives, providing complementary qualitative data from AGYW and quantitative data from men with AGYW as sexual partners.

Both qualitative and quantitative data described a diversity of male sexual partners in terms of educational attainment, employment status, income, and marital status. Whereas quantitative data from surveyed men suggested that male partners were more likely to be young and employed, qualitative data from women’s FGDs indicated that AGYW had male partners who were their age and older, as well as employed and unemployed partners. Qualitative data also suggested that while AGYW had male sexual partners across all categories of demographic characteristics, women strongly preferred men who could offer material and economic security, as well as take responsibility for pregnancy.

Qualitative data from women revealed that male school teachers were sexual partners of school-age AGYW, a finding that is consistent with studies in other sub-Saharan African contexts. This finding underscores the importance of providing male teachers, especially in secondary schools, with HIV prevention messages and interventions, such as safe-guarding mechanisms, awareness-raising campaigns, and reporting and punishment protocols and policies. Teachers must be appropriately trained and screened, and widespread information campaigns could be deployed to expose this issue nationally. We encourage the use of anonymous or protected reporting mechanisms, such as Linha Fala Criança-a helpline already in place in Mozambique for children experiencing abuse. Enforcement mechanisms could be created through school and government authorities to punish teachers for having sex with students, especially minors. We recommend that the Ministries of Health, Education, and Justice work closely together to develop a plan to address this issue at national and subnational levels. This is particularly crucial because of the substantial evidence that staying in school is a protective factor for HIV among AGYW.

Male partners reported higher than expected rates of circumcision and uptake of HIV testing services. According to national data, the proportion of men ages 15–49 who reported being circumcised varied between 20.1% and 47.6% in study provinces, and the proportion of men ages 15–49 who reported an HIV test in the past 12 months and who had received the results of that test varied between 15.9% and 31.8% in study provinces. This could be owing to our sampling strategy that focused on urban areas where services were near and readily available (perhaps mobile testing was offered at the recruitment venues we used), the effect of concentrated DREAMS programming in the study sites or social desirability bias: that is, men may have answered that they had tested, because they thought that was what interviewers wanted to hear.

Overall, we found that sexual relationships between AGYW and their male partners were characterized by high risk for HIV. Many AGYW and male sexual partners of AGYW reported multiple sexual relationships in the past 3 months, regardless of marital status, in line with general population data. In the current study, social norms, economic needs, and distance between marital couples were all cited as reasons contributing to the uptake of multiple partners. Another ethnographic study of young women in Maputo found that, in the context of high unemployment and limited economic opportunities for women, engaging in multiple and transactional sexual relationships created a pathway for women to gain financial and material resources.

Further, most men reported using condoms inconsistently, and men with less education had significantly lower odds of reporting consistent condom use. This was similarly reported in a study of miners in Mozambique. Men’s reported condom use also differed based on the demographic characteristics of AGYW. Men were less likely to use condoms with AGYW who were out of school or had low educational attainment. Out-of-school and primary-attending AGYW were likely to have less self-efficacy, and thus less power in sexual relationships, than their in-school and secondary-school attending counterparts. A study conducted by Patrão and McIntyre (2017) in Mozambique reported similar findings on the relationship between the education level of AGYW and their condom-use self-efficacy.

Surprisingly, condom use was more commonly reported in sexual partnerships with AGYW who were younger (ages 15–19 years) rather than older (ages 20–24 years). AGYW in our study...
noted that condom use was more common with boyfriends similar in age than with older—often married—boyfriends. This finding echoes a recent study in Mozambique on contraceptive use and may explain why condom use was more frequently reported by men with younger rather than older AGYW sexual partners. Finally, condom use at last sex was less likely to be reported in sexual relationships with mothers/pregnant women than it was in relationships with AGYW who were not pregnant/mothers. One explanation may be that AGYW were pregnant or mothers were married to their male partners, and condom use was low within marriage. Another explanation may be that condoms were used primarily to prevent pregnancy, not HIV, in these relationships, and once AGYW became pregnant or gave birth, they no longer used condoms. One 7-country study of HIV transmission among sero-discordant couples found that condoms were less likely to be used with pregnant than nonpregnant women, and this was the case whether the woman or the man in the couple was HIV-positive. This may be because pregnancy prevention was a higher priority than HIV prevention for men and women. The finding underscores the need to develop interventions promoting condom use with pregnant women and girls to reduce HIV transmission.

Condom use was particularly low in the context of marriage. Married AGYW said that condom use (and even the decision to have sex) was almost always determined by their male partners, and that their ability to negotiate safer sex was extremely limited. This narrative is not a new one in southern Africa or in Mozambique. AGYW described a context in which gender norms and power dynamics create barriers in their ability to negotiate condom use with sexual partners. Economic vulnerability further undermined AGYW’s ability to protect themselves. In our study, AGYW reported less willingness to negotiate condom use in relationships in which the male partner provided money or other benefits to them or their families. Pregnant AGYW and mothers who lacked a partner who financially provided for them and their baby may have been particularly at risk of engaging in HIV risk behavior because of increased financial needs. Capurchande and colleagues also found that parenthood amplified economic and social pressures that AGYW faced and may increase their risk-taking behaviors.

Adolescent girls and young women reported less willingness to negotiate condom use in relationships in which the male partner provided money or other benefits.

Limitations
This study has limited generalizability; samples of AGYW and male sexual partners were drawn from 3 urban/peri-urban areas with current DREAMS programming. Study districts have experienced, on average, a 45% decline in HIV prevalence among AGYW between 2015 and 2017. Furthermore, the quantitative portion of the study was not a representative sample of all male sexual partners of AGYW in study districts, owing to recruitment methods. Data were subject to self-reporting and recall biases. We did not collect biomarkers to validate the demographic and behavioral data. Survey respondents may have over-reported condom use, and gender norms may have influenced males to over-report whether they had sex with an AGYW in the past year. Also, men were asked only to report on their most recent sexual partner, limiting analyses.

CONCLUSIONS
The sexual partners of AGYW in Mozambique have diverse demographic profiles, from young students to older, married men and high schoolteachers. Although this study did not assess HIV prevalence, sexual partnerships may be characterized as high-risk—condom use was infrequently reported and inconsistent, and many men described concurrent sexual partnerships. Findings confirmed strong gender norms favoring the male as the decision maker in sexual relationships, as well as social norms that impeded condom use in marriage. AGYW who were less educated or who were pregnant/single mothers may have been at increased risk of practicing unsafe sexual behaviors, owing to lower negotiating power and social pressure. However, there are reasons for optimism. Condom use was more commonly reported by men with educated AGYW partners, and AGYW reported using condoms with their school-going boyfriends more routinely than with older partners. This indicated that school-based HIV and pregnancy prevention campaigns may be having a positive impact—a subject that requires further study. Nevertheless, the economic incentives to participate in unsafe sexual practices persist. Results confirmed the importance of reaching the male sexual partners of AGYW with HIV prevention, testing, and treatment programming and providing AGYW with prevention methods, such as pre-exposure prophylaxis, that do not require negotiating safer sex with their partners.

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REFERENCES


Three Waves of Data Use Among Health Workers: The Experience of the Better Immunization Data Initiative in Tanzania and Zambia

Laurie Werner,a Dawn Seymour,b Chilunga Puta,c Skye Gilberta

ABSTRACT

The governments of Tanzania and Zambia identified key data-related challenges affecting immunization service delivery including identifying children due for vaccines, time-consuming data entry processes, and inadequate resources. To address these challenges, since 2014, the countries have partnered with PATH’s Better Immunization Data Initiative to design and deploy a suite of data quality and use interventions. Two key aspects of the interventions were an electronic immunization registry and tools and practices to strengthen a culture of data use. As both countries deployed the interventions, 3 distinct changes in data use emerged organically. This article provides a detailed summary of these 3 phases or waves — from strengthening data collection, to improving data quality, to increasing data use for programmatic decision making cultivating a culture of data use.

INTRODUCTION

Over the past 2 decades, although global immunization coverage rates have increased with more children being protected by these lifesaving interventions, disparities at the subnational level are becoming more apparent.1,2 Global partners, such as the World Health Organization and United Nations Children’s Fund, are going to great lengths to understand these inequities at the global level. However, poor data availability and quality sometimes limits both global and national-level programs from understanding these inequities and how to address them. This article describes work undertaken through the Better Immunization Data (BID) Initiative, led by PATH, to work in partnership with the governments of Tanzania and Zambia to improve data collection, quality, and use, with the ultimate goal of enhancing immunization and overall health service delivery. This work has been grounded in the belief that better data plus better decisions will lead to better health outcomes.

Both Tanzania and Zambia have seen their national coverage rates increase, but continue to face challenges with regions having low coverage.3 In 2017, Tanzania and Zambia reported coverage rates for the third dose of the diphtheria, tetanus, and pertussis (DTP3) vaccine of 97% and 94%, respectively, yet the subnational data show areas with coverage as low as 60%–70%. When the BID Initiative work began in 2014, Tanzania and Zambia government stakeholders identified several challenges with data use in their health systems that contributed to these inequities4:

- **Unnecessarily vulnerable children.** In a paper-based system, health workers had difficulty identifying children due for vaccines as well as children who had missed vaccines (defaulters). It was also difficult to ensure that the necessary vaccine supplies would be available in adequate quantities at the appropriate time.
- **Time away from patients.** Recording the same or similar data sets across multiple forms during immunization services (as well as producing monthly
reports for the district level) consumes time, especially when 1 or 2 health workers vaccinate hundreds of children.

- **Wasted and/or inadequate resources.** Without high-quality and accessible data, health workers struggled to accurately plan outreach services and the distribution of stock and supplies, leading to vaccine stock-outs or, alternatively, vaccine wastage.

The BID Initiative, building on periodic literature reviews, a dynamically updated theory of change, and frequent consultations with user advisory groups in Tanzania and Zambia, developed a suite of data quality and use interventions to address these challenges and to begin to build a data use culture to “support and encourage the use of evidence, including facts, figures, and statistics, to inform their decision making” (Figure 1).¹⁻² The user advisory groups included immunization health workers from all levels of the health system. The suite included other interventions targeted at building a data use culture, such as using data to target supportive supervision, data use campaigns and peer-support networks to support data use, and a change management strategy used throughout implementation (described later in this article). The interventions were tested in facilities and districts and developed iteratively before a final suite of complementary

### FIGURE 1. Data Quality and Use Interventions Developed Under the Better Immunization Data Initiative Work

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electronic immunization registry, accessed via tablets in facilities</strong></td>
<td>1. Unique barcodes associated with each child: Home-based child health records on paper are barcoded and scanned at each visit for rapid, accurate identification of children, as well as matching the right dose(s) based on the child’s age or progression in the immunization schedule.</td>
</tr>
<tr>
<td>2. Facility-level, real-time clinic dashboards: Patient-centric dashboards help health workers quickly identify who needs lifesaving vaccines, how much stock will likely be needed at an upcoming session, and opportunities for follow-up with children who have failed to arrive.</td>
<td></td>
</tr>
<tr>
<td><strong>Electronic facility-level supply chain management system, accessed via tablets in facilities</strong></td>
<td>3. Electronic immunization record: The patient health record provides a holistic view of immunization, nutrition, and deworming status. It also automatically sends data to required reports, saving health workers time and reducing duplicate data entry.</td>
</tr>
<tr>
<td>4. Facility-level, real-time supply chain dashboards: Health workers know current stock levels and receive recommendations on when supply is low enough to require an order, minimizing service disruptions due to stock-outs and potentially reducing “buffer” stock requirements.</td>
<td></td>
</tr>
<tr>
<td>5. Automated deductions in stock based on vaccine consumption: When a health worker discards or orders a vaccine, they note the reason (e.g., broken fridge) to help district managers more quickly identify root cause issues of under- or over-stock.</td>
<td></td>
</tr>
<tr>
<td><strong>Real-time facility-to-district exchanges on discards and orders</strong></td>
<td>6. Real-time facility-to-district exchanges on discards and orders: A district-level government staff member receives in-depth training on the electronic system and data use opportunities, then advises health workers on system use and helps with frontline troubleshooting. Data use mentors can identify low-performing facilities to address performance gaps, encourage feedback loops, and strengthen the process of building a more permanent culture of data use.</td>
</tr>
<tr>
<td><strong>Data use capacity building, via on-the-job training</strong></td>
<td>7. Data use mentors: Health workers in the same area join a WhatsApp peer group in which they share experiences with one another about what worked well or share challenges about what could have been done better and get suggestions from peers. They additionally help each other with acute emergencies (e.g., unexpected stock-outs) and build social connections, which helps with motivation.</td>
</tr>
<tr>
<td><strong>WhatsApp peer groups</strong></td>
<td>8. WhatsApp peer groups: Guides developed for the facility and district level focus on indicators for immunization service delivery and questions about the data.</td>
</tr>
<tr>
<td><strong>Guides for data use</strong></td>
<td>9. Guides for data use: Guides developed for the facility and district level focus on indicators for immunization service delivery and questions about the data.</td>
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interventions were compiled for implementation and scale-up in each country. The interventions were intended to give the power of data to health workers, so they can do their jobs more effectively and efficiently.

As of March 2018, the Tanzania Electronic Immunization Registry and data use interventions are in use at all facilities that provide immunizations in 4 regions (Arusha, Dodoma, Kilimanjaro, and Tanga). The Government of Tanzania plans to deploy to another 10 regions in 2018 and scale nationally in 2019. In Zambia, the government deployed the Zambia Electronic Immunization Registry and data use interventions to all facilities providing immunizations in Southern Province, with the government planning scale-up and sustainability efforts. PATH continues to partner with both governments as they continue to scale the interventions.

This article focuses specifically on the data use culture and the 3 distinct data use “waves” (or phases) that emerged organically and were observed qualitatively during implementation as health workers became more empowered to use data. These waves bear some similarity to those observed in the electronic Vaccine Intelligence Network pilot in India. It is important to understand how individuals and cultures go through phases as they build and strengthen data use and to consider these phases when planning any implementation effort focused on building a culture of data use, even knowing that each individual will move through them at their own specific pace. In particular, the phases can help align expectations on what results to expect when and where an implementation is in its critical path toward achieving stable, routine data use.

## THREE WAVES OF PROGRESS TOWARD DATA USE

The implementations in both countries consisted of 4 visits to the facilities to train health workers on the interventions. In Tanzania, the visits in the initial region began in 2015, and in Zambia, they began in 2017. Over several months, as the implementation progressed beyond its initial stages and as expected, the BID Initiative team observed health workers progress through 3 data use waves (Figure 2):

1. Strengthening data collection
2. Improving data quality
3. Increasing use of data for programmatic decision making

Depending upon the capacity of the health workers, it took on average approximately 2–3 months to proceed through the all the waves, with the first wave taking 2-3 weeks, the second wave taking another 2–3 weeks, and the third wave occurring after the health workers were
familiar enough with the tool and the ways to use it to improve data quality.

First Wave: Strengthening Data Collection

In the initial wave, health workers focused on receiving and learning how to use the new data collection tools and processes. The BID Initiative provided tablets for health workers to enter data into the electronic immunization registry (EIR). Health workers mostly expressed excitement to use the new tools (with some initial reluctance from those with less experience using digital tools like mobile phones), especially tablets or any digital devices. The tablets represented a tangible change in workflow efficiency, data accessibility, and a transition from legacy paper systems to digital health solutions.

During this phase, the implementation team adapted the training based on the health workers’ proficiency with digital tools. Health workers who owned smartphones easily adopted the new digital tools, but for health workers who did not own smartphones or who preferred the legacy systems, the training was tailored to familiarize them with the device as well as address resistance to change. Health workers reported that it took 2–3 weeks to feel proficient with the new tools.

In both countries, the EIR systems were developed on open-source software platforms using a user-centered design approach: Open Immunize (Tanzania) and Open Smart Register Platform (Zambia). They were designed to be used on Android tablets with offline functionality, ability to work in low-resource settings, and ability to register and track children through their vaccine schedule. Each child was given a unique identification number and barcode (2D in Tanzania, QR in Zambia) to facilitate searching for and managing their record. The key data collected by the systems included demographic information for the child and their caregiver (including their contact information to allow for follow-up if a child missed a vaccine dose), information on each visit or encounter (such as which antigens were given to the child), information on the facility and provider, data on the stock used for immunization services (vaccines and associated supplies), as well as other key indicators normally tracked on the child health register such as Vitamin A, use of bed nets, and the child’s weight. Each EIR was developed with interoperability in mind to ensure the ability to share key data with the national health management information system and other systems present in each country, and effectively both systems can share data with the national health management information system and other information systems. The government information, communication, and technology and monitoring and evaluation departments were deeply involved throughout the process to ensure alignment with national policies and strategies as the systems were developed. These systems were essential to address the identified challenges and to ensure data were available in easily digestible means for use. When the BID Initiative work began in 2014, few systems met the stated system requirements of the countries, and therefore, significant investments were made in the platforms and the development process. Today, the options of these platforms and others would allow for a less intensive investment, both in time and resources.

During the first wave, the primary observations were that the health workers mainly focused on mastering the data collection process. The new tools facilitated improved data collection in the following ways:

- The health workers needed less time to record data. Rather than the duplicative data-entry process required by the legacy paper forms (where health workers had to enter the same data on multiple forms, such as an immunization registry, tally sheets, and stock ledgers), health workers recorded data once and used that data many times, whether to make decisions immediately or to prepare various reports. We conducted a time and motion study.
in Arusha Region, Tanzania, in 30 health facilities to observe and record the amount of time each health worker spent on activities associated with vaccination, starting from registering the child until administering the vaccine. The study data estimated that health workers spent 41\% less time registering and vaccinating each child after introducing the new tools.16

- Health workers also saved time preparing monthly reports because the system automatically generated reports and dashboards, saving 2 or more days’ worth of work per month from not having to complete monthly report forms. For facilities in Tanzania with automated reporting, health workers saved more than 70 hours or 8 full working days each year that they could allocate to patient care.

- The legacy systems had reinforced a static clinic environment, where health workers had to remain at a table to enter data into large registries and paper forms. The tablets allowed a dynamic and more efficient clinic workflow where the health workers could move with the patient while still entering data.

In general, across users, data completeness and timeliness began to stabilize after the first 3 months of implementation with more consistent level of entries into the systems and a small number of users facing ongoing challenges. Barriers that impeded data collection with the new tools included challenges faced by health workers who had never used a smartphone. Common issues were forgetting passwords or not turning the tablet off after service, which drained the battery. Solar chargers were provided to address challenges with electricity. In addition, maintaining use while health workers were required to continue using the legacy system was critical and challenging.

**Second Wave: Improving Data Quality**

During the second wave, health workers strengthened their understanding of data and the importance of data quality being collected, EIR functionality to check data validity, and the requirements to fill in specific data elements. Traditionally, health workers often viewed data collection as a duty for reporting to their superiors and not as something useful to their daily work. As health workers adopted and mastered the new digital systems, we saw them gain a greater understanding of the importance of the quality of the data because they easily saw where there were gaps and errors and the value of more accurate reporting.

In both countries, PATH used an “on-the-job” (OJT) training methodology17 in the health facilities with some mix of training of trainers to incorporate the district-level staff and to build their ability to provide support to the facilities over the long-term. The OJT methodology was built around a series of “touches” or facility visits (from 3–5 visits). The touches began with the introduction to the EIR and the new way of collecting data and progressed to focus on the data use interventions in the later touches as the health workers became comfortable with the tool and could begin to focus on the data now available to them. This training methodology design was based upon John Kotter’s Change Model18 to anticipate the change process the health workers would experience with the introduction of the new interventions and how they would be motivated or incentivized to use the system and the data produced. OJT training was chosen specifically to build their capacity to use the interventions in their clinical setting and to incorporate them directly into their existing workflows (or adjust workflows as appropriate), as well as to build their motivation by helping show the positive impact on the reduction in reporting time as well as having the data available to support them in their work. The primary observations during the second wave were that as health workers became more familiar with the digital tools (after 2–3 weeks), the data quality improved because the data validation components were integrated into the EIR. For example, before implementation, the availability of tally sheets in the Arusha and Tanga regions of Tanzania was only 52\% and 66\%, respectively, but after the introduction of the EIR, facilities automatically saw their aggregated counts of vaccinations.19 The value placed upon the data increased with the possibility of data access and visibility; as data became more meaningful to the health workers, they were able to focus on how it contributed to their daily work rather than viewing data entry as an isolated activity that they did in addition to delivering immunization services.

The new tools facilitated improvement of data quality in the following ways:

- **Accuracy.** Using the EIR reduced errors that could have occurred when multiple data sources differed without a way to verify the most accurate data point. Accuracy was improved by building data verification into the system itself.
Completeness. The EIR ensured that all critical aspects of the data had to be entered before the health worker could move to the next data point, minimizing information gaps.

Efficiency. With a single point of data entry, the EIR ensured a more efficient workflow and less complicated data collection (such as with multiple paper registries).

Timeliness. Regularly synchronizing the system to a national database improved timeliness. This provided visibility across the health system, as appropriate, and eliminated delays in reporting cycles.

In general, across users, known data quality issues reduced and eventually stabilized in the 3–6 months range after implementation. Initially, the primary barrier to improving data quality was that health workers had to use parallel systems as the new tools were introduced. This double data entry was a high burden on the health workers, affecting quality and completeness in both the legacy system and the new system, making it difficult for health workers to maintain motivation to use both systems as the country government determined their process to transition systems. In particular, according to baseline and midline survey results of health workers in 84 facilities in the Tanga region, perception of quality increased over time as well (Figure 3), potentially due to their increased ability to interact with the data and influence the data quality. Perception of data quality (accuracy, completeness, and timeliness) directly affected the health workers’ motivation to use the data as seen in our baseline data where 56% of surveyed facility staff in Zambia cited “poor accuracy” of data as a key barrier to data use.

During the third wave, health workers shifted from solely collecting and sharing data with the district to also demonstrating their use of the data.

Third Wave: Increasing Use of Data for Programmatic Decision Making

The third wave occurred after the new data collection tools had been used for at least 1 month and the health workers had become comfortable with them. At this point, the health workers shifted from solely collecting and sharing data with the district to also demonstrating their use of the data. Key decision areas that were reviewed and discussed with health workers included the ability to calculate coverage in their catchment area, monitor and manage stock levels, and track and trace defaulters. The legacy paper systems had impeded data accessibility and created barriers for significant use of the data in their daily tasks, as cited through health worker interviews at baseline. If health workers used the data, it had primarily been reactive, focusing on using the data to address issues that arose, such as
identifying children who did not come for their vaccinations, ordering stock after it ran low, or having a basic understanding of overall performance.

The data use interventions were designed with a user advisory group in each country comprised of health workers from across the health system, with the objective of building the capacity of the health workers to see value in the data and use it to take action to strengthen their work.21 These interventions included simple reports within the EIRs interface, such as the “to-do” list, which identifies the children who have missed a vaccine dose for easy follow-up by the health worker. Data use guides helped the facility and district staff by outlining easy-to-assess scenarios using their data to determine actions to take. Supervision coaching tools supported the district staff in using data to address challenges being faced in low-performing facilities. During the third wave, the primary observations were that, as the EIR provided data at their fingertips, health workers could now rapidly and accurately identify the right child and the right dose. Health workers started to use the data to make more proactive routine decisions around service delivery. They transitioned beyond focusing on data collection to using the reports and data visualizations to plan their daily activities, and they began to see trends that could inform ways to strengthen their work.

The EIR and other interventions facilitated data use for decision making in the following ways:

- Empowered health workers at all levels. The EIR encouraged a leadership model where facility in-charges encouraged health workers to make locally appropriate decisions, such as identifying and following up with defaulters or flagging orders for additional stock.
- Enabled ongoing supportive supervision by ensuring that district staff had access to the data needed to evaluate facilities’ performance against district expectations, as well as equipping them with appropriate questions to scrutinize the data and address performance gaps.
- Supported peer networking using digital applications so that health workers shared challenges and experiences and received feedback from peers.
- Established a common understanding across each level of the health system through provision of simple electronic data use guides, targeted at both data producers and users.

Users reported increased data use for specific actions, such as identifying defaulters, stock levels, and low DPT3 coverage areas. In Zambia, health workers in Southern Province reported increases in their data use to take action in these 3 areas (Figure 4): a 36% increase in identifying and

**FIGURE 4.** Ability to Identify Low DPT3 Coverage Areas, Defaulters, and Vaccine Stock Levels Among Facility Health Care Workers, Baseline Versus Midline, Southern Province, Zambia

Abbreviations: DPT3, third dose of diphtheria, pertussis, and tetanus vaccine.

[Diagram showing data use improvements]
taking action to address low coverage areas (from 47% to 83%), a 24% increase in taking action on defaulters (from 54% to 78%), and a 10% increase in managing stock levels (from 54% to 64%). These are self-reported results from a survey of health workers at 89 facilities in the first 6 districts of implementation in Zambia; a baseline survey was administered immediately before the implementation of BID interventions and a midline survey was administered approximately 4 months after implementation. The full details of the survey results are reported elsewhere.19,20

Barriers to improving data use for decision making included lack of knowledge transfer during staff rotation and turnover, lack of empowerment for some health workers to make decisions based on the data, and lack of appropriate resources available and the authority to use those resources. If there are no resources to support evidence-based decision making, service delivery can be compromised.

— LESSONS LEARNED

Observing and learning how health workers adopted the new tools and worked through the waves of data use and taking appropriate steps in real time helped ensure successful implementation and results. The following were some key learnings:

- In the early stages, implementers should tailor the trainings to health workers’ level of proficiency or lack thereof with digital tools. This aligns with findings from other studies.13
- A common misconception was that a new digital tool alone would “solve all problems.”
- Data quality and careful use must be emphasized throughout the process, monitored through supportive supervision, and celebrated when done correctly.9
- Consistent use of the tools should be reinforced to have high-quality data accessible for action, such as identifying children who have missed vaccines, reviewing available stock, and summarizing services provided during a specific time frame.
- Implementers should work with the district to identify low-performing facilities and determine which questions to ask about the facilities’ data to address performance gaps, encourage feedback loops, and build a more permanent culture of data use.11
- All health workers and district staff should be trained in the tools to allow the presence of multiple staff to support any new staff to use the tools consistently. Having all staff trained also mitigates loss of knowledge when health workers leave or transfer among facilities.
- Resistance to change among health workers can affect facility-wide adoption. Understanding how health workers effectively created or embraced change previously in their work can be useful in helping them adopt to new processes and tools. A clear change-management plan to usher health workers through the new systems is also important.
- Supportive supervision (from implementers and supervisors) is needed to follow-up on areas of poor-quality data and discrepancies in the data. Sustainability of the third wave, institutionalized data use for decision making—requires an empowering leadership model and adequate resources to carry out decisions and actions determined from data use.
- Having a digitally proficient workforce, a policy that allows legacy systems to be retired quickly, strong supportive supervision throughout, and motivated individuals or communities allows the health workers to progress through these waves more quickly.

— CONCLUSION

When tools for health service delivery are redesigned or new, it is important to consider how the tools can impact data quality and use and how the impact unfolds over time or, as seen with BID, progresses across multiple waves. Through the observations conducted under the BID Initiative work, we saw that familiarity with and consistent use of a tool took time, especially when a legacy system was being used in parallel (first wave). However, as more data and complete data sets were entered into the tool, health workers began to appreciate the availability and completeness of the data (second wave). Finally, health workers began to focus on using the data to identify gaps and make decisions in reaction to those gaps, and the district used the data to make decisions around the support they provided to facilities and the allocation of stock (third wave).

As Tanzania and Zambia continue to use these tools to strengthen a culture of data use, we anticipate movement to a fourth wave. In a fourth wave, health workers and immunization managers can shift from a reactive to a proactive
approach, using the data to anticipate and plan for challenges before they occur. For example, rather than planning stock for the following month based on the number of children vaccinated in the prior month (third wave), in a fourth wave, we would see health workers noticing trends such as surges of children during certain seasons or times of the year. The health workers would then order vaccines and resources ahead of those seasons or times to ensure the facility could manage and vaccinate the increased number of patients they would expect to see.

In future research, we recommend exploring the sustainability of the first 3 waves and testing the following questions on data use in this fourth wave:

- **How do limitations in time, capacity, and sufficient data affect the ability to progress to the fourth wave?**
- **Do health workers use the data dashboards to look beyond 1 month of service delivery and identify longer-term trends or plan for the impact of large events, such as elections?**
- **How will facilities maintain knowledge despite staff turnover?**

As anticipated and observed by the BID Initiative, a natural progression exists in relation to strengthening data quality and use. Improved data collection tools and building data use capacity are vital for this evolution. Allowing time for health workers to proceed through the waves will ideally allow for creation of a stronger culture of data use—a foundation to be established, maintained, and built upon over time.

**Acknowledgments:** We would like to acknowledge the governments of Tanzania and Zambia, and, in particular, the staff of the immunization programs and the health workers of the Arusha, Tanga, and Kilimanjaro regions in Tanzania and Southern Province in Zambia for their deep commitment in Côte d’Ivoire. The authors also acknowledge the reviewers and administrative staff within PATH who supported the production of this article, as well as the BID Initiative teams in Tanzania and Zambia who supported the work described in this article.

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**Competing Interests:** The authors report receiving grants from the Bill & Melinda Gates Foundation during the conduct of the study. Additionally, Ms. Gilbert is an advisor for Logisim and worked there on seconad from January to May 2016. A resulting publication from her seconad (cited in this article) influenced her contributions to this article.

**REFERENCES**


Experience of the Better Immunization Data Initiative


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Management of Preeclampsia, Severe Preeclampsia, and Eclampsia at Primary Care Facilities in Bangladesh

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Program introduction, including cascade training, to screen for severe preeclampsia and eclampsia and initiate treatment with magnesium sulfate was somewhat successful. Challenges included inconsistent adherence to the national protocol, data quality, and some issues with supplies and equipment.

ABSTRACT

Introduction: Eclampsia-related conditions are the second leading direct cause of obstetric deaths in Bangladesh. Efforts to prevent such deaths in low- and middle-income countries are increasingly focused on task shifting at the primary care level to enable frontline providers to screen and initiate treatment for women with preeclampsia, severe preeclampsia, and eclampsia (PE/SPE/E). The MaMoni Health Systems Strengthening project (funded by the United States Agency for International Development) implemented a magnesium sulfate intervention at primary care facilities in 4 Bangladesh districts in 2016 and 2017.

Methods: The project trained frontline providers through a cascade approach from the national to the union level. A PE/SPE/E patient algorithm, digital blood pressure machines, and eclampsia kits with magnesium sulfate were supplied to service providers at each facility. We conducted a retrospective record review of facility-level data to assess the degree to which newly trained frontline providers adhered to a protocol that incorporated the use of magnesium sulfate for SPE/E in primary care settings.

Results: In total, 283 women were found to have PE/SPE/E. Fifty-four percent were managed according to the protocol. The required supplies were present at each facility, but some issues existed with regard to availability and functionality of blood pressure apparatuses.

Discussion: Challenges related to recordkeeping and service quality limited the analysis. Frontline providers need refresher trainings, ongoing supervision, properly calibrated blood pressure devices, and performance monitoring support in order to improve screening and management of PE/SPE/E in primary care facilities.

INTRODUCTION

Preeclampsia, severe preeclampsia, and eclampsia (PE/SPE/E) are hypertensive disorders of pregnancy that contribute significantly to global maternal and perinatal mortality.1 Marked by high blood pressure (BP) and the presence of albumin in urine, preeclampsia is a risk factor for the potential development of severe pre-eclampsia or full-blown eclampsia and should be monitored. Management of SPE/E poses a challenge in low- and middle-income countries due to a lack of basic supplies, health worker shortages, limited competencies of frontline providers, and systems challenges that lead to delays in women receiving necessary treatment.2–4 In Bangladesh, eclampsia-related conditions are the second leading direct cause of obstetric deaths and lead to 24% of all maternal deaths.5 Over 1,000 women die each year in Bangladesh due to PE/SPE/E. As in many low- and middle-income countries, most pregnant women who develop PE/SPE/E in Bangladesh do not get diagnosed or treated. They either do not access the health system at all, are not screened properly, or do not receive timely treatment due to delays in (1) making the decision to seek care, (2) being transported to receive care, and (3) actually receiving the required treatment at the care site where it is available.6,7

PE/SPE/E Detection and Management at the Primary Care Level: A Global Priority

In recent years, global efforts to reduce eclampsia-related deaths have focused on task shifting, or enabling...
Evidence is lacking on the effectiveness of program interventions for the diagnosis, management, and referral of women with eclampsia-related conditions.

Management of Preeclampsia and Eclampsia in Bangladesh

frontline health workers to identify women with PE/SPE/E and initiate management of the disorder. Calcium supplementation is recommended for preventing preeclampsia when dietary intake of calcium is low, while antihypertensive drugs may be necessary for women with PE. Magnesium sulfate (MgSO4) is recommended by the World Health Organization (WHO) to manage SPE/E among pregnant women. In settings where administering a full MgSO4 regimen (which includes a “loading dose” followed by scheduled maintenance doses) is not possible, WHO recommendations include providing the initial MgSO4 loading dose (via intramuscular injection and/or intravenous drip) and immediately transferring the individual to a higher level of care. To implement this strategy, frontline health workers in low- and middle-income countries need to have access to BP gauges, urine dipsticks, and MgSO4, and need to be trained to screen all pregnant women >20 weeks of gestation for elevated BP, urine albumin, and the presence of any danger signs. If SPE/E is identified, the workers need to administer a MgSO4 loading dose and facilitate a timely referral of the woman to a higher-level health facility.

Although the inputs are standard, numerous obstacles may be encountered when rolling this service out in low- and middle-income countries. Weak health systems may have inadequate service delivery protocols, provider skills, systems for supportive supervision, availability of essential supplies (such as BP gauges, urine dipsticks, and injectable MgSO4), and collection and use of monitoring data. Barriers to ensuring women with PE/SPE/E are identified and optimally managed likely vary from setting to setting, yet they are expected and must be addressed to further reduce global maternal mortality.

The research group that developed the Preeclampsia Integrated Estimate of Risk (fullPIERS) model for high-income, tertiary care settings also developed the miniPIERS model for providers to use in primary care settings. The miniPIERS is a validated model for identifying women at increased risk of adverse maternal outcomes associated with hypertensive disorders of pregnancy. It relies on a simple assessment of maternal demographics (maternal age, parity, and gestational age), signs (BP and proteinuria), and symptoms (headache, visual disturbance, chest pain, difficulty breathing, upper abdominal pain, nausea, vomiting, and vaginal bleeding with abdominal pain). The miniPIERS study found that using the model in resource-limited settings has the potential to significantly improve care where minimal or no monitoring of hypertensive disorders of pregnancy currently exists. It has been further tested in community settings through the Community Level Interventions for Preeclampsia clinical trials in India, Pakistan, Mozambique, and Nigeria (https://clinicaltrials.gov/ct2/show/NCT01911494). The results are forthcoming and are expected to make a valuable contribution to the evidence base on effective intervention strategies for identifying and managing PE/SPE/E at the community level in low-resource settings.

Currently, though, evidence is lacking on the effectiveness of program interventions focused on diagnosis, management, and referral of women with eclampsia-related conditions at primary-level health facilities and in communities. This topic is of particular interest in Bangladesh following changes within the past few years in the national PE/SPE/E protocol and recent program efforts. This article examines service delivery data from 35 primary care facilities that received support for providing screening and pre-referral treatment with MgSO4 as part of their standard maternal health services. The facilities were supported by the MaMoni Health Systems Strengthening project (MaMoni HSS) to improve the quality and reach of their maternal and newborn health services by using a range of evidence-based interventions, including the introduction of PE/SPE/E screening and management following national guidelines.

PROJECT DESCRIPTION

MaMoni HSS was a large maternal, newborn, and child health (MNCH) project in Bangladesh that was funded by the United States Agency for International Development (USAID) between 2013 and 2018. Its maternal health interventions focused on strengthening public-sector services from the community level to secondary-level referral facilities to provide quality antenatal care (ANC) during labor and delivery, newborn care, and postnatal care (PNC) including postpartum family planning (Figure 1). The project also worked at the national level to support the Ministry of Health and Family Welfare (MOHFW) to develop a maternal health strategy and standard operating procedures (SOPs). The SOPs incorporated a complete package of evidence-based practices and interventions adopted by MOHFW for implementation through the public sector service delivery system at various levels of care. The project’s other work at the national level included the development of various guidelines, protocols, training materials, and job aids for the roll-out of the interventions across the country.
Bangladesh Health System

Although used in Bangladesh since 1998, MgSO4 was not available for treating SPE/E at the primary care level via antenatal services prior to 2016 because of a lack of a standard protocol and uncertainties about the skill level and competence of primary care providers. A basic overview of the health system in Bangladesh is necessary background to understand the intervention we discuss here. The secondary and tertiary levels of the health system comprise subdistrict (locally referred to as Upazila) health complexes, maternal and child welfare centers, district hospitals, and various teaching and specialist hospitals. At the primary care level are union health and family welfare centers (UH&FWCs), union sub-centers, and community clinics. UH&FWCs (which are the focus of this article) are typically staffed by 1 subassistant community medical officer (SACMO), 1 to 2 family welfare visitors (FWVs), and 1 or more support staff. SACMOs have participated in a 3-year medical training course following secondary school and provide basic primary health care services. FWVs receive 18 months of training after completing secondary school and provide MNCH care services, including family planning, delivery, and immunization. They are the lead providers of ANC services at UH&FWCs. A medical officer, who is a doctor with at least 5 years of professional medical education, serves at some, but not all UH&FWCs (Figure 1). Across the public health system, the health care workforce has been described as being in crisis due to a shortage of trained providers, including FWVs; an inappropriate skill mix; and inequitable distribution. FWVs are critical frontline providers staffing nearly 5,000 UH&FWCs around the country. While they are recognized and counted within national health surveys as medically trained providers, serious gaps in their provision of maternal health services have also been documented.

PE/SPE/E Case Detection and Management by Frontline Providers in Bangladesh

Following a pilot test conducted in 2013 and 2014, the National Technical Committee of the

\[\text{FIGURE 1. MaMoni HSS Project’s Maternal Health Interventions in Bangladesh}\]
Directorate General of Family Planning (under MOHFW) endorsed a protocol for the identification and pre-referral management of severe preeclampsia and eclampsia at union-level facilities by the FWVs and SACMOs. The protocol recommended that all pregnant women receive at least 4 quality antenatal check-ups and that measurement of BP, urinalysis for proteinuria, and screening for the presence of SPE/E danger signs should be done at every antenatal, intrapartum, and postnatal service visit. All women identified with severe preeclampsia or eclampsia (see case definitions in Figure 2) were to be given a loading dose intramuscular injection of MgSO4 and then referred to the nearest comprehensive emergency obstetric and neonatal care (CEmONC) facility. For women with preeclampsia, the protocol specified that they should be referred to a nearby CEmONC facility for treatment with antihypertensive drugs and monitoring. Primary care providers in Bangladesh are not authorized to prescribe or administer antihypertensive drugs to pregnant women. A pictorial algorithm (Figure 3) was developed by MOHFW together with development partners as a job aid for frontline providers at UH&FWCs to guide them through triage and management of women with PE/SPE/E in line with the national protocol. Subsequently, MaMoni HSS selected 45 UH&FWCs for early implementation of this protocol as part of the larger set of maternal health interventions under the project.

This article presents findings from a record review of facility-level data on PE/SPE/E services at 35 of the 45 UH&FWCs, and it additionally provides recommendations for future efforts to address eclampsia at the community level within Bangladesh and in other low-resource settings.

## METHODS

### Facility Selection

The 45 UH&FWCs initially selected to receive the PE/SPE/E intervention were chosen with consideration for having relatively high ANC coverage, having a resident FWV around the clock, having a referral facility at an accessible distance, and having outreach services with comparatively strong performance. All facilities were located in 4 districts (Figure 4) where the project focused on strengthening primary- and secondary-level public services to provide a complete package of evidence-based MNCH interventions, including family planning and nutrition.

### Initiation of the Intervention

To initiate the PE/SPE/E intervention, sensitization meetings were held with relevant district- and subdistrict-level health officials from the 4 districts together with representatives from MOHFW, members of the Obstetrical and Gynaecological Society of Bangladesh (OGSB), and MaMoni HSS program managers. A baseline survey carried out across all 45 facilities consisted of a retrospective record review of 6 months of facility-level data (covering the period October 2015 to March 2016) to identify documented cases of preeclampsia and eclampsia and how they were managed. The data source for the baseline was a new MNCH patient register that the project had earlier worked with MOHFW to distribute and train providers on how to use, as a replacement to using 4 separate registers to capture the same information. In addition, a routine service delivery point survey conducted quarterly by the project was used to check whether MgSO4 and BP apparatuses were present at each UH&FWC.

A memorandum of understanding was developed between MaMoni HSS and OGSB in order to roll out training for FWVs and SACMOs in the targeted facilities. OGSB developed the training materials and carried out a cascade training approach in which national-level expert trainers established a group of district-level master trainers who then replicated the training at the community level for FWVs and SACMOs as new facilities adopted the intervention. Service providers at secondary-level referral facilities also received an orientation from OGSB on the intervention to

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**FIGURE 2.** Case Definitions of Preeclampsia, Severe Preeclampsia, and Eclampsia According to National Protocol, Bangladesh

<table>
<thead>
<tr>
<th>Condition</th>
<th>Definition</th>
<th>Danger Signs</th>
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<tr>
<td>Preeclampsia</td>
<td>dBP≥90–109 + proteinuria</td>
<td>Headache, Blurred vision, Upper abdominal pain</td>
</tr>
<tr>
<td>Severe preeclampsia</td>
<td>dBP ≥110 or PE + 1 danger sign</td>
<td></td>
</tr>
<tr>
<td>Eclampsia</td>
<td>dBP≥90 + convulsions or unconscious</td>
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</table>

Abbreviation: dBP, diastolic blood pressure.
FIGURE 3. Pictorial Algorithm for the Management of Women With PE/SPE/E Developed by the Ministry of Health and Family Welfare, Bangladesh

Abbreviations: BP, blood pressure; MgSO₄, magnesium sulfate; PE/SPE/E, preeclampsia, severe preeclampsia, or eclampsia.

The development of this algorithm was led by the Ministry of Health and Family Welfare with input from development partners. Various international algorithms were reviewed to inform its development, including one developed by Helping Mothers Survive as well as an earlier version used in-country.
prepare them to receive and manage the referred cases (Figure 5).

**Provider Training**

Two-day competency-based trainings for frontline providers at the 45 facilities were carried out between March and May of 2016. In the trainings, providers were taught how to check BP using both digital (Microlife brand) and manual BP cuffs, conduct a urine protein analysis, and screen all women for danger signs. Training participants learned to identify PE/SPE/E based on the case identification criteria in Figure 2. They were taught how to administer a loading dose of MgSO₄ via intramuscular injection and refer identified SPE/E cases to the nearest CEmONC facility. Each participant was provided with a digital BP machine and a laminated copy of the patient algorithm (that included both the pictorial version and a 1-page text description of the algorithm). Eclampsia kits that consisted of 4 preloaded vials of injectable MgSO₄ were purchased by the project and allocated to UH&FWCs based on a rough
estimate of possible eclampsia incidence. Incidence estimates were produced following a 2-step process. First, an initial calculation was made of the crude birth rate in each UH&FWC catchment area using data from the 2011 Bangladesh census. Then, calculations of PE and E incidence for each catchment area were made based on estimates of PE and E incidence (PE 2.8% of live births and eclampsia 2.3% of PE) in developing countries published by EngenderHealth in a 2007 report.17 Based on these projections, FWVs were provided with a monthly supply of MgSO₄, which they restocked periodically from subdistrict drug storage facilities when conducting general inventory restocking as part of their regular work. Urine test tubes and strips for measuring albumin were already available at all primary care facilities through the existing supply chain.

Upon completion of the training, providers began screening for PE/SPE/E at their facilities and managing SPE/E with a pre-referral loading dose of MgSO₄. Services were documented in the facility’s MNCH register by FWVs in fields designed to capture key details of ANC, intrapartum, and PNC services. A single initial record was supposed to be created in the MNCH register for all women when they received ANC, intrapartum, and/or PNC services. At each new visit (e.g., second or third ANC visit, intrapartum care following ANC, or PNC following intrapartum care) information about that visit was to be added to women’s initial record. A second record was to be created in the supplemental reporting form (hereafter referred to as a “patient linelist”) only for women diagnosed with SPE/E. The purpose of the patient linelist was to provide condensed essential SPE/E reporting information to MaMoni HSS. This form did not include variables related to ANC, intrapartum, or PNC services, nor did it record information about referrals for women with PE. However, it captured outcome information not recorded in the MNCH registers, such as whether referrals were completed and maternal and newborn outcomes.

**Complementary Program Inputs**

The project’s other maternal health interventions—to increase ANC coverage and quality, raise awareness at the community level about PE/SPE/E danger signs and the newly available services, improve the quality of CEmONC services at referral facilities, and monitor and improve the availability of essential drugs and supplies—complemented the efforts to improve PE/SPE/E identification and management at UH&FWCs. As part of its overall scope, the project also carried out monthly monitoring and supervision visits at selected facilities with district- and subdistrict-level managers. Facilities at different levels of the health system that were supported by the project’s various MNCH interventions
Management of Preeclampsia and Eclampsia in Bangladesh

(Figure 1) received these supervision visits, including some of the 35 UH&FWCs included in this article. During these visits, a standard monitoring checklist was completed to facilitate review of a broad range of service quality issues, including around PE/SPE/E. Additional monitoring and supervision was carried out between January and July 2017 by OGSB together with MaMoni HSS managers and local-level health officials to specifically assess PE/SPE/E service provision at 8 UH&FWCs—1 high-performing and 1 low-performing UH&FWC in each focus district.

Data Analysis

A secondary analysis of data from MNCH registers and patient line lists covering the period from September 2016 to August 2017 was carried out to develop a point estimate of correct initial management of PE/SPE/E identified during ANC, intrapartum, and PNC visits at 35 of the 45 intervention facilities. The 10 facilities not included in the analysis were no longer adequately staffed or had structural problems that prevented them from providing consistent ANC services during this time. Photocopies of MNCH registers were made by FWVs, transported to Dhaka in sealed boxes, and entered into an Excel spreadsheet for analysis. Patient line lists were already kept in password-protected electronic files in the MaMoni HSS Dhaka office. The analysis was designed to generate descriptive statistics summarizing key variables that reflect compliance with the PE/SPE/E screening and management protocol.

The variables analyzed included the proportion of women screened for PE/SPE/E, the proportion with indications of PE/SPE/E, and the percentage of those identified who received a loading dose of MgSO4 and referral to a higher level of care. Screening was determined by looking at relevant variables across ANC, intrapartum, and PNC visit records. Key variables in ANC records included diastolic blood pressure (dBP) and proteinuria, as well as open text fields for capturing pregnancy danger signs, patient “complaints and disease,” and provider “treatment and advice.” Intrapartum records included check boxes for blurred vision, severe headache, and convulsions, as well as a general “delivery complications” field and write-in fields for treatment and referral information. BP and urinalysis are required during intrapartum care, but these variables were not available in the intrapartum records. PNC records captured dBP and general write-in fields for complaints and disease and for treatment and advice, but not urinalysis. Write-in fields across all 3 of these services were closely examined and cleaned to establish uniformity of the presentation of key information. This clean-up primarily consisted of ensuring that all instances of treatment with magnesium sulfate were written as “MgSO4” and creating coded columns for PE/SPE/E cases and for referred cases. In addition to the generation of the point estimate, cases with a documented PE/SPE/E diagnosis were also compared with cases with only the indications of PE/SPE/E documented but not the actual diagnosis. The final point estimate merged the findings from the analysis of both the MNCH registers and the patient line lists.

Ethical approval for this analysis was granted from the Johns Hopkins School of Public Health Institutional Review Board as well as the Bangladesh Medical Review Council’s National Research Ethics Committee.

Other analyses were also carried out to assess facility readiness and provider competency. Results from a quarterly service delivery point survey managed by MaMoni HSS were reviewed to verify the presence of MgSO4 and BP machines at each of the 35 UH&FWCs covering the periods January–March 2016 and July–September 2017, as well as just prior to and at the end of the period of analysis. A short questionnaire was completed by field-level MaMoni HSS staff in April 2018 to check for the presence of the laminated algorithm, test tubes, and urinalysis strips at each UH&FWC. This questionnaire also double-checked for the presence of MgSO4 and BP machines. Both of these datasets were used to ascertain facility readiness. Provider knowledge was assessed by analyzing results from pre- and post-training questionnaires with 32 items that checked providers’ knowledge of the PE/SPE/E competencies covered in the training. Qualitative analysis consisted of reviewing the reports from the OGSB-led supervision visits, as well as reports from the project’s joint supervision visits and quarterly reports that had been submitted to USAID to gather contextual information to inform the program description and discussion.

RESULTS

Results from the baseline revealed that providers had documented 3 cases of PE and 2 cases of eclampsia between October 2015 and March 2016. None of the women with documented eclampsia were treated with MgSO4. Analysis of the service delivery point dataset revealed that prior to the intervention, MgSO4 was not present at any of the UH&FWCs. All but 4 had BP machines. These machines were assumed to be manual BP
gauges, which are provided to facilities through the national supply chain, although the type of machine was not indicated in this dataset. In the second service delivery point survey covering July–September 2017, all 35 facilities had MgSO4 and BP machines. The questionnaire completed in April 2018 showed that all 35 facilities had the laminated PE/SPE/E algorithm and urinalysis test tubes and strips. At that time, 33 of the 35 facilities reported having a BP machine. The 2 that did not have a BP machine noted that the FWVs were using their own personal BP machines in the facilities. An additional 3 facilities (which reported having BP machines) noted that they were using manual machines that were not giving correct readings. Two facilities reported stock-outs of MgSO4 at the time they completed the questionnaire (Table 1). On average, providers correctly answered 18 out of 32 questions (or 57%) on the pretest and 26.25 out of 32 (82%) on the posttest.

The following summary of the facility-level data comprises analyses of both the MNHC register data with ANC, intrapartum, and PNC service records and the patient linelists with only women who had an SPE/E diagnosis. Missing records appeared to be common in both datasets. For example, 25 women who had SPE/E documented by an FWV in the MNCH register did not appear in the patient linelist. Likewise, 88 women with SPE/E were reported to MaMoni HSS via the patient linelist, but their records did not appear in the MNCH register.

Across both datasets, 13,346 women were seen for ANC, intrapartum, and/or PNC services at the 35 UH&FWCs between September 2016 and August 2017. The MNCH registers contained records of 13,031 ANC visits, 3,641 intrapartum visits, and 5,833 PNC visits. The patient linelists contained records of 139 women with SPE/E whose diagnoses were reported to MaMoni HSS. Records from only 51 of these women also appeared in the MNCH register.

Analysis of the MNCH registers revealed that most pregnant women (9,898, 74%) were between 20 and 29 years of age (Table 2). A total of 8,462 (65%) pregnant women received just 1 ANC consultation during pregnancy, while 2,358 (18%) received 3 or more (Table 3).

Both a dBP and a proteinuria reading were recorded at over 90% of ANC visits. Among the 5,833 PNC visits documented in the MNCH register, dBP was recorded 98% of the time. Across both datasets, 283 women were identified as having PE/SPE/E—52 preeclampsia, 214 severe preeclampsia, and 17 eclampsia (Figure 6). An additional 250 women without PE/SPE/E had documented hypertension (dBP ≥ 90). In the MNCH register, 53% of PE/SPE/E cases had been identified by a provider, meaning that a written diagnosis of PE/SPE/E or treatment with MgSO4 was recorded. The rates at which the clinical management of identified cases followed the national protocol are depicted in Figure 6. Overall, the records indicated that providers adhered to the protocol for 54% of women with PE/SPE/E (153 women). Adherence to the protocol was lowest for PE—only 15% of women with PE were referred. Adherence was highest for eclampsia, with a loading dose of MgSO4 being administered and a referral being made to a CEmONC facility for 94% of women with eclampsia.

Among the PE/SPE/E cases that were not referred, 74 women (62%) were admitted to a UH&FWC for delivery. Among women with SPE/E who were referred, referral compliance was only documented for about half (79, 52%). Of this group, 59 (75%) complied with their referral, while 20 (25%) did not.

<table>
<thead>
<tr>
<th>TABLE 1. Facility Readiness Survey Results, July–September 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Readiness Indicators</strong></td>
</tr>
<tr>
<td>PE/SPE/E pictorial algorithm</td>
</tr>
<tr>
<td>Test tube for albumin test</td>
</tr>
<tr>
<td>Urine strip for albumin test</td>
</tr>
<tr>
<td>BP machine</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>MgSO4</td>
</tr>
</tbody>
</table>

Abbreviations: BP, blood pressure; FWV, family welfare visitor; MgSO4, magnesium sulfate. PE/SPE/E, preeclampsia, severe pre-eclampsia, or eclampsia.
Among the women who were referred, type of delivery was recorded for 147. Of these, 118 (80%) had a vaginal birth, while 29 (20%) had a cesarean delivery. Newborn outcomes were recorded for 154 (54%) of all PE/SPE/E cases. Among those with recorded newborn outcome information, 150 (97%) of deliveries resulted in a live birth. There were 3 stillbirths and 1 newborn death. In all 4 of these cases, the mother had been referred to a higher level of care.

**DISCUSSION**

We aimed to generate a point estimate of correct diagnosis and initial management of PE/SPE/E by frontline providers at primary care facilities in Bangladesh. We found that frontline providers managed slightly over half of women with PE/SPE/E in line with their training. Significant challenges were noted with regard to the quality of the data. This issue stood out in the analysis because large numbers of women with SPE/E were present in the MNCH register but missing from the patient linelists, and vice versa. The range of missing information in the MNCH register, as well as the disparity between women whose diagnosis was documented by a provider versus identified in the analysis based only on dBP, proteinuria, and/or a danger sign, further highlighted the data quality challenges.

Two possible explanations could account for the lack of record duplication expected between the MNCH register and the patient linelists. First, frontline providers may have sometimes established a record for a woman in the MNCH register but not the linelist (and vice versa). Second, some of the relevant MNCH registers may not have been shared from all 35 facilities. Both of these scenarios could potentially explain why 88 women with SPE/E were reported to MaMoni HSS in the patient linelists but not found in the MNCH register.

Another quandary was that the prevalence of PE was much lower than that of both hypertension and SPE. Typically, a declining pattern would be present, with the highest numbers of women having hypertension, fewer women having PE, and many fewer women having SPE/E. This pattern not being apparent in our dataset is likely explained by inaccurate measuring or recording of BP and/or proteinuria (in addition to the issues with missing data already described). BP measurement and/or urinalysis may not have been done at all (despite a reading having been recorded) or may have been done incorrectly. Further, BP measurements may have been rounded up or down when recorded. Rounding up could have skewed the results toward higher numbers of SPE cases than there actually were. For women with a dBP measurement of ≥90, if a negative proteinuria measurement was recorded but the test was not actually done, records may have fallen into the category of hypertension, rather than PE. Anecdotal evidence from both project staff and local researchers studying FWV skills in detecting and managing PE/SPE/E supports that any of these may be realistic scenarios. While not documented thoroughly enough to be fully substantiated, these scenarios are also supported by some published literature.3,18

The data quality challenges highlighted the need for ongoing mentoring, support, and refresher training for frontline workers. This need is also apparent in the low rate of adherence to the PE/SPE/E protocol and is emphasized in the broader literature on this topic as well.3,5,8,10 Furthermore, while FWVs’ adherence to the standard protocol requires more intensive monitoring and guidance, improvements in record-keeping are also essential for accurate tracking of service quality and case management. In an ideal scenario, a rapid feedback loop would exist in which service data would be regularly consolidated and summarized, and trends and issues discussed and addressed directly with FWVs and SACMOs.

---

**TABLE 2. Age Distribution of Women Who Received ANC, Delivery Services, and/or PNC (N=13,346)**

<table>
<thead>
<tr>
<th>Mother’s Age</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>1,728 (13)</td>
</tr>
<tr>
<td>20–24</td>
<td>5,802 (43)</td>
</tr>
<tr>
<td>25–29</td>
<td>4,096 (31)</td>
</tr>
<tr>
<td>≥30</td>
<td>1,564 (12)</td>
</tr>
<tr>
<td>Not recorded</td>
<td>156 (1)</td>
</tr>
</tbody>
</table>

**TABLE 3. Distribution of Pregnant Women by Total Number of ANC Consultations Received (N=13,031)**

<table>
<thead>
<tr>
<th>ANC Visits</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8,462 (65)</td>
</tr>
<tr>
<td>2</td>
<td>2,211 (17)</td>
</tr>
<tr>
<td>3</td>
<td>1,787 (14)</td>
</tr>
<tr>
<td>≥4</td>
<td>571 (4)</td>
</tr>
</tbody>
</table>

---

We found that frontline providers managed slightly over half of women with PE/SPE/E in line with their training.
Other challenges are the availability of MgSO4 and functioning BP machines. MgSO4 being on the government’s essential drug list is an advantage, but if MOHFW cannot fund its availability at the primary care level, then its supply is dependent on donor funds and is not sustainable. Finally, more attention should be paid to ensuring that frontline providers have access to functioning BP apparatuses and use them correctly. The project’s scope was limited to providing replacement devices to facilities where providers reported problems with the functionality of the digital BP machine they had been provided with. However, maintaining proper calibration of aneroid devices and ensuring correct measurement techniques are fundamental challenges, particularly in low-resource settings.

**CONCLUSION**

Community-based management of PE/SPE/E is an important maternal health intervention that is being tested in a variety of community-level and primary care settings in low- and middle-income countries. Findings from program experience in Bangladesh indicate that intensive inputs are required to introduce and maintain quality of PE/SPE/E service delivery in primary care facilities. The findings also demonstrate that delivering competency-based training together with the provision of essential supplies (i.e., BP machines, a visual job aid, and injectable MgSO4), supportive supervision, and complementary program inputs at the national, community, and secondary care levels are effective interventions to begin to enable frontline providers to comply with PE/SPE/E screening and management protocols. In addition to these inputs, well-functioning BP apparatuses, routine monitoring of facility-level data, and ongoing performance management are also critical for providing and monitoring quality services. These findings can contribute to strengthening community-level PE/SPE/E interventions in Bangladesh and in other low-resource primary care settings.
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REFERENCES

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Getting to the First 90: Incentivized Peer Mobilizers Promote HIV Testing Services to Men Who Have Sex With Men Using Social Media in Mumbai, India

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This peer mobilization pilot for HIV and syphilis testing used messaging on gay dating sites, clinic referrals, and peer recruitment to reach men who have sex with men in Mumbai. In 6 months, the pilot reached a relatively modest 247 individuals, 244 of whom had never tested for HIV. Challenges included low recruitment and loss to follow-up for posttest counseling and treatment initiation for individuals with HIV.

ABSTRACT

Recent studies of Indian men who have sex with men (MSM) have shown widespread use of social media for seeking sex partners. We piloted a peer mobilization approach to explore the feasibility of engaging previously unreached MSM online to link them to HIV testing services (HTS). MSM were encouraged to seek HTS through messages posted on a popular dating website. Those who visited the designated HTS site and tested for HIV were recruited as peer mobilizers and given coupons with unique identifying codes to distribute to other men in their virtual networks. If a network member presented at the site with a coupon and tested for HIV, the peer mobilizer was given a small monetary incentive. Network members presenting at the testing site were also recruited as peer mobilizers and given coupons. In a 6-month period, 247 MSM were recruited and tested for HIV and syphilis, of whom 244 (99%) were first-time testers. Two-thirds were less than 25 years old and about half reported inconsistent or no condom use during the last 10 anal sex acts. Eight individuals (3.2%) tested positive for HIV, and 22 (8.9%) had a high titer for syphilis; all were referred to tertiary hospitals for treatment. Our approach was modestly successful in reaching and providing HTS to previously unreached MSM, but challenges included lower-than-expected recruitment, individuals not returning for posttest counseling, and loss to follow-up of individuals with HIV. The next phase of peer mobilization will aim to scale up these services through government-supported targeted interventions for this subpopulation of primarily young, unreached MSM at high risk. The challenges will be addressed by targeting more dating sites, increasing access to testing using rapid HIV tests at several community-based facilities, and offering peer navigation support for people living with HIV.

INTRODUCTION

The Joint United Nations Programme on HIV/AIDS (UNAIDS) has set ambitious 90-90-90 targets to accelerate the end of the HIV epidemic—that is, by 2020, 90% of people living with HIV (PLHIV) will know their HIV status, 90% of people diagnosed with HIV infection will receive sustained antiretroviral therapy (ART), and 90% of people receiving ART will have viral suppression. Despite significantly increased access to ART among PLHIV, reduction in the rates of new HIV infections has been less substantial (16%) between 2010 and 2016. Various factors explain this lack of progress, including the possibility that an estimated 30% of PLHIV remain undiagnosed and untreated and thus continue to transmit the virus to uninfected sexual or injecting partners. Better testing approaches are needed to reach populations for which HIV risk is highest and HIV prevention, testing, and treatment coverage is lowest in order to achieve the first 90 target.

India has an estimated 2.1 million PLHIV and a concentrated epidemic. The National Integrated Biological and Behavioral Surveillance (IBBS) conducted in 2014–2015 among men who have sex with men (MSM) using cluster sampling showed a national HIV prevalence of 4.3% and 4.9% in the state of Maharashtra. The 2016–2017 round of HIV Sentinel Surveillance conducted among a random sample of MSM registered with
targeted interventions showed an all-India prevalence of 2.69% and a prevalence of 4.69% in Maharashtra. Analysis of national-level surveys of Indian MSM showed that significant factors associated with HIV positivity were being the receptive partner or both receptive and penetrative as compared to exclusive penetrative partners; being more than 25 years old as compared to younger counterparts; being illiterate rather than literate; and being employed versus unemployed. An HIV cascade study in MSM from 12 cities using respondent-driven sampling showed an HIV prevalence of 9.5%, but 70% of PLHIV were not aware of their status because they had tested more than a year earlier or had never tested. The national program supports targeted interventions for key populations including MSM; these interventions are implemented by NGOs and provide prevention services and commodities, referrals to integrated counseling and testing centers (ICTC) for HIV and syphilis testing, and referrals to ART centers for PLHIV. Targeted interventions provide services to MSM who are physically present at “hot spots”—sites where soliciting and/or sexual activities take place, such as public toilets. However, several studies in India show that many MSM use social media and other web-based platforms to seek sex partners. The movement from conventional physical locations to virtual spaces poses a challenge in reaching this “hidden” subpopulation of MSM.

The Linkages across the Continuum of HIV Services for Key Populations Affected by HIV (LINKAGES) Project in India works with government-supported targeted interventions to promote the HIV continuum of care for key populations in 6 districts with high HIV prevalence in 2 states, including the large metropolitan city Mumbai in the state of Maharashtra. A LINKAGES baseline survey (October 2015 to March 2016) in Mumbai showed that 8,684 MSM were registered and receiving regular services from targeted interventions, and 209 of these men were PLHIV (2.4% prevalence). Community discussions revealed a hidden population that remain unreached through the traditional hot spot–based outreach program of targeted interventions. The reasons included an increasing trend of seeking sex partners on social media/mobile phones instead of hot spots and a reluctance to avail targeted interventions for fear of disclosure of status and/or identity leading to social stigma and criminalization. We piloted a peer mobilization approach to explore the feasibility of connecting with unreached virtual networks of MSM in Mumbai who may not visit hot spots and promoting HTS within these networks. This article describes the implementation of the approach and lessons learned during a 6-month period from January to July 2017.

METHODS

The network-based peer mobilization approach is inspired by the successful use of respondent-driven sampling, a method used to reach a community-based sample of hidden or hard-to-reach populations for HIV surveillance. During implementation of the peer mobilization approach, MSM were contacted through messages posted on social media; respondents who made use of HTS at the designated site were, if willing, recruited as “primary seeds” or first-wave peer mobilizers. Peer mobilizers were oriented on motivating peers for HTS and provided 4 coupons each with unique identifying codes. During physical interactions, peer mobilizers gave the coupons to peers who used social media for soliciting partners and were interested in taking up the HIV services on offer. If a peer visited the designated site with the coupon, consented to HIV testing, and underwent testing, the peer mobilizer was given a small monetary incentive of 300 Indian Rupees (INR) (US$5) for his effort. Participants who attended the HTS site were given a travel reimbursement of 150 INR (US$2.50). Referred peers, if willing, were also enrolled as peer mobilizers and provided a similar number of coupons. In this fashion, several waves of peer mobilizers were recruited in each network generated by a primary seed.

Preparatory Phase

We named the peer mobilization project Mulakat, a Hindustani word that means “meeting.” The designated testing site for the project was Humsafar Trust (HST), an MSM community-based organization office/drop-in center, clinic, and ICTC located in suburban Mumbai. HST’s prior experience with online surveys had shown that the most commonly used websites of Mumbai MSM were PlanetRomeo, Facebook, and Grindr. We decided to target PlanetRomeo because HST had an ongoing agreement with the website managers for posting messages free of cost. A community consultation was organized to develop messages about Project Mulakat to be posted on the site. The messages pertained to community members’ roles in maintaining a safe MSM community and the benefits of availing HTS at HST.
The LINKAGES team designed and printed coupons with unique code numbers, validity periods, and contact details of HST, as well as a bespoke tool to record participants’ sociodemographic profile and risk behaviors. A coupon manager based at HST was the point of contact for MSM attending the clinic. He ensured MSM fulfilling eligibility criteria received all services (pre- and posttest counseling, blood tests, clinical check-up, referrals for treatment of individuals with positive results for HIV/syphilis), enrolled peer mobilizers, tracked coupons, and maintained individual records, which were summarized and reported monthly. In addition, 3 Internet outreach workers from the MSM community created their own profiles and posted messages on PlanetRomeo in defined geographical areas and directed respondents to the coupon manager. Internet outreach workers were hired for a period of 3 months; each was given a target of recruiting 7 primary seeds and, in coordination with the coupon manager, followed up with peer mobilizers for coupon disbursals to peers. The HST and LINKAGES management teams monitored activities and results at frequent intervals.

Inclusion Criteria and Client Flow

The client flow is shown in Figure 1. MSM attending the HST clinic who did not meet eligibility criteria were provided services as per their requirements but not enrolled in the project (Box 1). Eligible MSM were asked for information pertaining to sociodemographic profile and risk behaviors and offered pretest counseling. Those who gave written informed consent (as per norms followed by the HST ICTC) were tested for HIV and syphilis and asked to return the next day for posttest counseling. Individuals with positive test results for HIV, syphilis, or both were referred to tertiary hospitals. All participants received prevention education during pre- and posttest counseling, were offered assistance for registering with targeted interventions for ongoing services, and received prevention messages from the coupon manager at regular intervals via WhatsApp in which group members could not view others’ contact details. At the posttest visit, MSM willing to be enrolled as peer mobilizers were oriented to the project by the coupon manager and given tips on how to motivate other MSM to avail HTS. Coupons given to peer mobilizers had a validity period of 30 days. If none or only some of the coupons had been used within the time period, peer mobilizers were contacted and requested to encourage their peers to attend the clinic.

Laboratory Tests

Syphilis testing was done using the rapid plasma reagin kit manufactured by Span Diagnostics. A titer of 1:8 or more was considered as high-titer syphilis, and individuals with such results were referred to a tertiary hospital for further evaluation and treatment as per national guidelines. For HIV testing, the ICTC at HST followed the national guidelines of 3 tests for asymptomatic individuals using different kits in a particular order, with the subsequent test being performed only if the previous test result was positive. The first test kit used was COMBAIDS, followed by MERISCREEN and thereafter AIDSCAN.

FIGURE 1. Client Flow

Abbreviations: C, coupons given to PM; CM, coupon manager; MSM, men who have sex with men; PM, peer mobilizer.
The national program approved and issued guidelines for HIV screening at targeted intervention sites using rapid tests in December 2016.\textsuperscript{14} Rapid testing was operationalized after Project \textit{Mulakat} was completed.

\section*{Data}

The results were derived from secondary analysis of routine service statistics. The protocol for analysis was reviewed by FHI 360’s Protection of Human Subjects Committee and given a non-research determination.

\section*{RESULTS}

Process data and outputs of the peer mobilization intervention are shown in Figure 2. In the period January to July 2017, messages on social media were sent to 5,530 MSM and 1,030 MSM made online inquiries. Through social media and coupon referrals, a total of 274 individuals attended the clinic, of whom 27 were ineligible because they either had received targeted intervention services ($n=23$) or were less than 18 years old ($n=4$). Thus, 247 MSM were enrolled, which included 22 primary seeds (first-wave peer mobilizers), subsequent waves of peer mobilizers, and others unwilling to be peer mobilizers. The numbers of MSM recruited from each network generated from the 22 primary seeds (not shown) varied greatly. The mean size of the 5 largest networks was 39.8 (range 13–81), while the mean size of 11 networks was 3.8 (range 1–7); 6 primary seeds did not refer others.

A profile of the participants is shown in the Table. Two-thirds (69\%) were less than 25 years old and their preferred social media platforms were Facebook, Grindr, IMO, Instagram, PlanetRomeo, Tinder, and WhatsApp. Nearly half (44\%) reported inconsistent or no condom use during the last 10 acts of anal sex, and some reported other high-risk behaviors such as transactional sex, group sex, and substance use during sex. Among the 247 participants, 244 (99\%) were first-time testers. The prevalence of HIV and high-titer syphilis was 3.2\% and 8.9\%, respectively. Half of those with HIV diagnosed were successfully linked to treatment, and all but one of those with a positive test result for syphilis attended the referral hospital for treatment.

\section*{Achievements}

\textit{Reached Previously Unreached MSM at Risk of HIV}

The peer mobilization approach was able to reach and provide HTS to MSM who had never tested for HIV.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure2.png}
\caption{Peer Mobilization: Process and Output Indicators}
\end{figure}

Abbreviations: HTS: HIV testing services; MSM, men who have sex with men; PM, peer mobilizer.

\textbf{BOX 1.} Eligibility Criteria for Enrollment of MSM in Project \textit{Mulakat}

- At least 18 years of age
- Accessed social media to seek male sex partners in the last 3 months
- Had sex with a male in the previous month
- Not availing services from or registered with existing government-supported targeted intervention programs for MSM

The peer mobilization approach was able to reach and provide HTS to MSM who had never tested for HIV.
IBBS, which had recruited people from physical hotspots. Our subpopulation of MSM had a lower HIV prevalence (3.2%) as compared to that in IBBS Maharashtra (4.9%), which could be due to the MSM in our study being younger—69% were under 25 years as compared to 34.5% in the Maharashtra IBBS—and thus having fewer years of risk behavior. Also, as mentioned earlier, Indian MSM studies showed that being more than 25 years of age is a significant factor associated with an HIV-positive status. However, the HIV prevalence in our MSM sample was higher than among those registered with targeted interventions (2.4%) despite the latter being an older group (only 22.2% were less than 25 years old). MSM reached through the peer mobilization approach appeared to be at high risk of HIV because of unprotected anal sex (44%) and had a high prevalence of syphilis (8.9%). The program was well received by the community; some peer mobilizers donated their incentives to the HST PLHIV support group, saying their only motive in getting enrolled as peer mobilizers was to help other community members.

**Provided Referrals for MSM With HIV or Syphilis**

Project *Mulakat* used the existing HST referral systems to tertiary care hospitals. All high-titer syphilis cases were referred to a particular government hospital where an HST staff member was posted; he ensured that these individuals received further management. Of a total of 22 persons with high-titer syphilis, 21 attended the referral hospital while 1 did not attend, citing inconvenient timings. Individuals with HIV were referred to different ART centers closest to their residence as per government norms, and they were also offered support through the HST PLHIV network. Of the 8 MSM receiving an HIV-positive diagnosis, 4 were initiated on treatment.

**Kept Costs Low by Using Existing Target Intervention Services**

The direct cost of the intervention for the 6-month period was 260,000 INR (US$4,333), which included personnel, material, and incentive costs. Indirect costs such as clinic and laboratory staff time and supplies were borne by HST through the targeted intervention and ICTC budget.

**Challenges**

**Lower-Than-Expected Recruitment**

Project *Mulakat* was based on the LINKAGES Thailand program in which incentivized peer mobilizers recruited 424 network members over a

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age group, years</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>70 (28)</td>
</tr>
<tr>
<td>20–24</td>
<td>101 (41)</td>
</tr>
<tr>
<td>&gt;25</td>
<td>76 (31)</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>111 (45)</td>
</tr>
<tr>
<td>Service</td>
<td>63 (26)</td>
</tr>
<tr>
<td>Others</td>
<td>73 (29)</td>
</tr>
<tr>
<td><strong>Faced violence during/after sex with male partners</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>25 (10)</td>
</tr>
<tr>
<td>No</td>
<td>222 (90)</td>
</tr>
<tr>
<td><strong>Preferred social media platforms</strong></td>
<td></td>
</tr>
<tr>
<td>Grindr</td>
<td>161 (22)</td>
</tr>
<tr>
<td>WhatsApp</td>
<td>143 (20)</td>
</tr>
<tr>
<td>Facebook</td>
<td>139 (19)</td>
</tr>
<tr>
<td>PlanetRomeo</td>
<td>65 (9)</td>
</tr>
<tr>
<td>Others</td>
<td>218 (30)</td>
</tr>
<tr>
<td><strong>Received cash or kind for sex with a man in previous year</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>59 (24)</td>
</tr>
<tr>
<td>No</td>
<td>188 (76)</td>
</tr>
<tr>
<td><strong>Paid cash or kind for sex with a man in previous year</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>22 (9)</td>
</tr>
<tr>
<td>No</td>
<td>225 (91)</td>
</tr>
<tr>
<td><strong>Participated in group sex</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>27 (11)</td>
</tr>
<tr>
<td>No</td>
<td>220 (89)</td>
</tr>
<tr>
<td><strong>Uses alcohol and/or drugs during sex</strong></td>
<td></td>
</tr>
<tr>
<td>Sometimes/often</td>
<td>73 (30)</td>
</tr>
<tr>
<td>Never</td>
<td>174 (70)</td>
</tr>
<tr>
<td><strong>Condom use during anal sex (last 10 acts)</strong></td>
<td></td>
</tr>
<tr>
<td>Consistent</td>
<td>139 (56)</td>
</tr>
<tr>
<td>Inconsistent</td>
<td>87 (35)</td>
</tr>
<tr>
<td>Never</td>
<td>21 (9)</td>
</tr>
<tr>
<td><strong>Never tested for HIV previously</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>244 (99)</td>
</tr>
<tr>
<td>Positive HIV test result</td>
<td>8 (3.2)</td>
</tr>
</tbody>
</table>

**High-titer syphilis (RPR titer ≥ 1:8)**

22 (8.9)

Abbreviation: RPR, rapid plasma reagin.
Fear of law, stigma, and discrimination may have prevented some individuals from participating in the project.

Limited websites: We initially posted messages on PlanetRomeo due to an existing service agreement between HST and PlanetRomeo and added Facebook at a later stage. However, participants stated a preference for other social media platforms, such as Grindr and WhatsApp.

Low utilization of coupons: Many coupons issued to peer mobilizers did not convert into clinic visits by peers; either the peer mobilizer did not distribute the coupons or the persons given the coupons did not go to the facility. A factor that may have affected coupon utilization was the use of a single testing site. Mumbai is a large city, and traveling to the HST site may not have been convenient for those living far away. Figure 3 is an administrative zone map of government-supported Mumbai ICTCs, with HST in zone 3. In addition, Mumbai has 4 mobile ICTC vans and 24 targeted intervention sites capable of providing community-based HIV screening that could also be utilized during the scale-up phase.

Small networks: Another likely factor in the low recruitment was that most peer mobilizers were members of small networks. Of a total of 22 networks, only 5 had more than 10 members (range 13–81) who attended the HST clinic. Several MSM were unwilling to be recruited as peer mobilizers, and one of their main reasons was that they did not have enough contacts in the community. The Thailand program also reported that only 20% of participants agreed to take on peer mobilizer roles, but a single super-recruiter successfully reached 149 new clients in 6 months, of whom 93% received an HIV test. The next phase of peer mobilization in India should, through community consultations, attempt to identify peers with large networks prior to implementation.

Stigma and discrimination: Homosexuality was decriminalized in India in September 2018, which was after the project ended. Participants were offered facilitated registration at targeted interventions for ongoing services, but very few accepted the offer. Fear of law, stigma, and discrimination may have prevented some individuals from participating in the project.

Individuals Not Returning for HIV Test Results
During the project period, 50 MSM did not return to the clinic for posttest counseling despite repeated reminders; among them, 1 had tested positive for HIV. Of the 50 men, 40 collected their test results after the project period. The most common reason given for the delayed visit was that they were students in Mumbai and had gone to their hometown for holidays. The challenge can be addressed by using rapid tests for HIV screening with same-day test results, which are now available at targeted interventions.

PLHIV Lost to Follow-Up
Among the 8 MSM who tested positive, 4 were registered with ART centers and treatment was initiated. Of the remaining PLHIV, 1 did not return to collect test results, 2 refused to accept their positive status in spite of several counseling sessions, and 1 relocated to his hometown. A review of social media strategies for promoting HIV service uptake along the continuum of care within key populations showed that interventions around linkages to and retention in care and initiation of ART need further development. Peer navigation for facilitating referrals to government-run ART centers and social support by MSM PLHIV networks could help promote treatment linkages and adherence support for PLHIV.

LESSONS LEARNED
Several factors contributed to the achievements of the peer mobilization pilot in Mumbai:

- Detailed planning with community involvement: The planning exercise for Project Mulakat took about 2 months and was led by LINKAGES staff with support from HST staff from other projects and community leaders. Operational guidelines were developed for the entire process with timelines, client flow, clinic and monitoring formats, and an indicative budget.

- Message development: Involvement of the community in message development ensured that messages posted on websites were innovative and caught the attention of the virtual
MSM community. Some of the online messages are shown in Box 2.

- **Data-driven activity modifications**: Regular monitoring of project outputs by the LINKAGES and HST management teams resulted in some modifications to activities during the course of the project. For example, when recruitment of primary seeds took longer than anticipated, we decided to post messages on Facebook in addition to PlanetRomeo. To address the challenge of coupons not being utilized, 2 community events were organized at the HST drop-in center. Peer mobilizers were informed and asked to encourage their peers to attend the events and present coupons for availing services. Through this initiative, 21 people were reached and tested. In addition, at a later stage, peer mobilizers

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**BOX 2. Messages Posted Online**

- HIV tests make me feel sexy and safe. When was the last time you tested for HIV? To know how to get a test for you and your friends, talk to us.
- Don’t lose this opportunity to be a star among your friends. To educate your friends about HIV, join us today!
- Let our confidential services build your trust toward taking a step to being safe from HIV! To be a part of our mission, please call...
who said they had a large network were given more than 4 coupons on request.

Specific measures that can be taken during scale-up to address the challenges encountered in Project Mulakat are provided in Box 3.

CONCLUSIONS AND NEXT STEPS

Project Mulakat demonstrated the feasibility of connecting with unreached virtual networks of urban Indian MSM to promote HTS and generated practical recommendations for improving the effectiveness of the intervention. To provide follow-up services, global experiences of innovative programs using communication technology can be used to develop a combination package of online-to-offline interventions for MSM. These interventions may include online sessions on risk assessment and reduction and clinic visits for HTS and tests for sexually transmitted infections.

The strategic approach for MSM interventions under the National AIDS Control Organization (NACO) provides guidelines to targeted interventions for additional technology-based outreach including use of MSM dating websites. The peer mobilization approach can be integrated into targeted intervention programs for reaching MSM not found at hot spots but active on social media. In the next phase, LINKAGES, in collaboration with NACO, will develop an intervention package for virtual subpopulations of MSM that can be implemented at a greater scale by targeted interventions. The lessons learned from Project Mulakat, as well as other experiences with MSM networks using social media in different regions of India and peri-urban/rural settings, will inform the intervention package and help refine national guidelines to reach and provide services to this hard-to-reach subset of the MSM population.

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REFERENCES


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Increasing Family Planning Access in Kenya Through Engagement of Faith-Based Health Facilities, Religious Leaders, and Community Health Volunteers

Allison Ruark,a Jane Kishoyian,b Mona Bormet,c Douglas Huber

The Christian Health Association of Kenya (CHAK) partnered with health facilities managed by faith-based organizations (FBOs), religious leaders, and community health volunteers to increase access to family planning in western Kenya. FBO-managed health facilities saw large increases in family planning uptake over the 5-year project, particularly for implants.

ABSTRACT

Health facilities managed by faith-based organizations (FBOs) are important providers of health care in Kenya but provide only a small proportion of family planning services in the country. From 2013 to 2017, the Christian Health Association of Kenya (CHAK) implemented a project with 6 FBO-managed health facilities to increase voluntary family planning services in western Kenya, in partnership with religious leaders and community health volunteers (CHVs). The project aimed to build capacity of FBO-managed health facilities, increase religious leaders’ knowledge of family planning, mobilize communities, improve family planning access and referrals for services, and advocate for improved family planning commodity security from the public sector. Project impact was evaluated using facility-level service statistics, project records and reports, and feedback from religious leaders and CHVs who implemented the project. Facility service statistics showed large increases in family planning visits. Phase 1 (2013–2014) was implemented at 2 health facilities, where client visits for family planning increased sixfold (from 705 to 4,286 visits) with tenfold increases seen in client visits for pills, intrauterine devices, and implants. In Phase 2 (2015–2017), the project was expanded to an additional 4 health facilities and total client visits for family planning nearly doubled (from 7,925 to 14,832 visits). During Phase 2, new client visits for implants increased threefold, making implants the most popular family planning method. Religious leaders who implemented the project reported reaching nearly 700,000 people with family planning messages and referring more than 87,000 clients to health facilities for family planning services. The religious leaders expressed confidence in the effectiveness of the project and in their role in enhancing access to voluntary family planning. Health facilities, religious leaders, and CHVs also reported multiple challenges to implementation, including inconsistent supply of family planning commodities from county health departments. This project demonstrates the potential of FBO-managed facilities and faith leaders to increase family planning demand and service provision, as well as the importance of coordination with the public sector to ensure supply of commodities and support for FBO-managed facilities.

BACKGROUND

Faith-based organizations (FBOs) are important providers of health care in many sub-Saharan African countries, yet available evidence suggests that FBO-managed facilities lag behind other health facilities in providing voluntary family planning services. In Kenya, FBOs own 16.5% of hospitals and 12.5% of all health facilities, but in 2014 only 2% of women reported obtaining contraception from FBO-managed facilities, and these facilities were less likely than public facilities and other privately managed facilities to offer family planning services. Catholic facilities offer only fertility awareness methods, and many Protestant facilities provide minimal family planning services. In 2010, only 69% of Kenyan FBO facilities offered family planning, compared with 97% of public facilities and 83% of private facilities, and only 29% of FBO facilities offered long-acting or permanent methods of family planning such as intrauterine devices (IUDs), implants, and male and female sterilization.

FBOs in Africa are trusted by communities and thus well-placed to promote and provide family planning services, and religious leaders can similarly be influential advocates for family planning due to the respect and access they have within communities. Previous research has found that African religious leaders (both Christian...
and Muslim) understand the importance of family planning and are open to promoting family planning if provided with training and support. The power of religious leaders’ pulpit can be seen in the fact that women who regularly attend religious services are more likely to use family planning, especially if their religious leaders have positive attitudes toward family planning and frequently speak about sexuality from the pulpit. Initiatives to expand family planning access through training staff of FBO-managed facilities and mobilizing religious leaders to raise awareness in their communities have succeeded in increasing family planning usage in Ghana, Ethiopia, Liberia, Rwanda, Uganda, and other African countries.

This article presents an initiative of the Christian Health Association of Kenya (CHAK) to partner with FBO-managed health facilities and religious leaders to increase family planning awareness in their communities. CHAK is a national FBO, founded in 1946, which comprises 24 hospitals, 57 health centers, 387 dispensaries, and 27 community-based health care programs owned by Protestant churches. These facilities and programs work in partnership with the Kenya Ministry of Health (MOH), county health departments, NGOs, development partners, the private health sector, and communities. CHAK has a central mandate of engaging religious leaders to improve health and a long-standing focus on family planning, including implementation of a World Bank-funded project in 2010 that trained pastors to educate parishioners about the value of family planning from the pulpit.

### PROJECT CONTEXT
Nationally, Kenya’s total fertility rate has declined from 4.9 births per woman in 2003 to 3.9 in 2014. Over the same period, contraceptive use has risen from 39% of married women in 2003 to 58% in 2014, with the largest gains seen in injectables and implants. Nationally, half of women of reproductive age do not want to have another child, and in Nyanza and Western regions this proportion is even higher (58% and 56%, respectively). Unmet need for family planning is also higher in these regions, at 23% in Nyanza and 21% in Western region, compared with 18% nationally (among married women of reproductive age).

The project was implemented in Kakamega, Siaya, and Vihiga counties, which are contiguous counties in the Nyanza and Western regions of Kenya near Lake Victoria and the border with Uganda. These counties have a higher total fertility rate than the national average (Table 1). Four of 6 project sites were in Siaya County, which is notable for being among the 3 counties in Kenya with the lowest median age at first birth and for having one of the lowest levels of contraception use. CHAK chose to target these counties based on their high total fertility rate and unmet family planning need.

### Project Description
The ongoing project has a mandate to (1) build capacity of FBO-managed health facilities and community-based providers of family planning services, (2) sensitize Protestant, Catholic, and Muslim religious leaders, (3) mobilize communities, (4) improve family planning access and referrals from communities to health facilities, and (5) advocate for improved commodity security from MOH and county health departments. A particular goal of the project is to train and engage religious leaders to provide family planning information and referrals as part of their commitment.

<table>
<thead>
<tr>
<th>TABLE 1. Family Planning and Reproductive Health in Kakamega, Siaya, and Vihiga Counties, Kenya</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kakamega County</strong></td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Estimated population (2009 census)</td>
</tr>
<tr>
<td>Total fertility rate</td>
</tr>
<tr>
<td>Age at first birth, years, median</td>
</tr>
<tr>
<td>Knowledge of contraceptive methods, %</td>
</tr>
<tr>
<td>Use of modern contraceptive methods, %</td>
</tr>
<tr>
<td>Use of any contraceptive method, %</td>
</tr>
</tbody>
</table>

Source: Kenya Demographic and Health Survey 2015, except for estimated population data taken from the 2009 Kenya Population and Housing Census.
to the health and well-being of families in their communities. Key project activities are highlighted in Table 2, in relationship to these project objectives.

Phase 1 of the project was initiated in 2013 in 2 CHAK health facilities and their surrounding communities: Dophil Maternity and Nursing Home and Namasoli Health Center (see further details about facilities in Table 3). The objective was to enhance voluntary family planning performance at FBO-managed health facilities by mobilizing community health volunteers (CHVs) and religious leaders and ensuring adequate supplies of family planning commodities. In 2015, the project was expanded to 4 additional facilities and their surrounding communities (Phase 2): Kendu Adventist Mission Hospital, Kima Mission Hospital, Ng’iya Health Center, and Sagam Community Hospital (Table 3). All facilities equitably serve people of all faiths and religious traditions and offer on-site a range of modern family planning methods, including pills, injectables, IUDs, implants, male and female condoms, standard days method (using CycleBeads), Lactational Amenorrhea Method (LAM), and female sterilization. All facilities were chosen because they were located in areas with high need for family planning services and did not already have programs partnering with CHVs or religious leaders to increase family planning access.

At the beginning of Phase 1, CHAK held meetings with the health facility management teams to share the project goals and objectives with them and ensure their engagement and support. Similar meetings were held with the management

The objective of the project was to enhance voluntary family planning performance at FBO-managed health facilities.

**TABLE 2. CHAK Family Planning Project Objectives and Activities in Kenya**

<table>
<thead>
<tr>
<th>Project Objective</th>
<th>Project Activities</th>
</tr>
</thead>
</table>
| 1. Build capacity of FBO-managed health facilities and community-based providers of voluntary family planning services | • CHAK built capacity through consultative meetings with participating health facilities and community stakeholder groups and developed capacity-building action plans.  
• Health care workers and CHVs from each health facility were trained on provision of family planning services.  
• CHAK provided technical assistance to family planning focal point persons through regular consultations and site visits, and CCIH provided long-distance technical assistance. |
| 2. Sensitize religious leaders | • Religious leaders were trained and given tools in support of referring clients and educating parishioners about family planning in churches, women’s groups, and men’s group, using materials developed by CHAK.  
• Religious leaders participated in monthly meetings to support their family planning work. |
| 3. Mobilize communities | • Religious leaders and CHVs engaged in monthly dialogue days aimed at educating communities about family planning, dispelling myths, presenting family planning as consistent with Biblical principles, and explaining the benefits of family planning.  
• CHVs distributed information, education, and communication materials to health facilities.  
• CHVs and religious leaders engaged in ongoing community education and information sharing (often presenting together at the same event), including sensitization meetings in churches and communities. |
| 4. Improve family planning access and referrals from communities to health facilities | • Health facilities carried out quarterly outreach events to offer voluntary family planning services.  
• CHVs carried out monthly community-based distribution of pills, condoms, and Cycle Beads.  
• Religious leaders and CHVs referred clients to health facilities for family planning services. |
| 5. Advocate for improved commodity security from MOH and county health departments | • CHAK participated in family planning policy and planning meetings at county and national levels.  
• CHAK supported health facility staff to attend quarterly county meetings to discuss family planning distribution to their facilities.  
• Access to family planning commodities was ensured through strong collaboration with the county and national health management. |

Abbreviations: CCIH, Christian Connections for International Health; CHAK, Christian Health Association of Kenya; CHV, community health volunteer; FBO, faith-based organization; MOH, Ministry of Health.
teams of the 4 facilities added during Phase 2. CHAK worked with health facility staff to carry out a situational analysis of past and current status of family planning services at the facilities and in the county. The situational analysis involved systematic review of data from the health facilities and from county Ministries of Health, and CHAK also interviewed hospital administrators and conducted focus groups with health care providers (nurses, clinical officers, and laboratory technicians), religious leaders, and CHVs. CHAK was able to identify challenges and bottlenecks to family planning access and develop a roadmap and implementation plan that defined desired outcomes and steps to achieving those outcomes.

Religious leaders and CHVs were tasked with implementing the project at the community level. They received project-branded hats and t-shirts to help identify them in their role as community educators, but they were unpaid. Religious leaders received a 3-day training focused on information about family planning, communication skills, and counseling skills. CHVs had already been trained by MOH but were not engaged in community-based distribution of family planning commodities prior to the project. They received a further 5-day training to equip them to counsel family planning clients and assist them in making informed family planning choices, distribute certain family planning commodities according to MOH guidelines (pills, condoms, and CycleBeads), and refer clients desiring other family planning methods to health facilities. Each CHV received a branded bag stocked with family planning commodities (pills, condoms, and CycleBeads) and a penis model to use in demonstrating male condom use. CHVs were also given funds for transport to allow them to fulfill their responsibilities.

Religious leaders and CHVs worked together to lead community dialogues about family planning. Before each dialogue, the leaders met to talk about family planning methods and address any questions or concerns about family planning (particularly among religious leaders). Religious leaders also invited CHVs to talk about family planning in forums such as church women’s groups and youth groups. This approach has been so successful that CHAK has initiated additional projects to train religious leaders to educate their communities about hypertension and diabetes and to enlist their help in tuberculosis case finding.

Throughout Phases 1 and 2, CHAK held biannual stakeholder meetings with faith leaders, community gate keepers such as chiefs and community administrators, health workers, facility managers, CHAK managers, county officials, and county Ministry of Health staff. This engagement with stakeholders was crucial to garner support, avoid duplication of efforts, and ensure successful project outcomes. County health departments provided training materials, reporting tools and registers, and family planning commodities. Throughout project implementation, CHAK worked with county governments to ensure that the facilities received adequate supplies of family planning commodities. CHAK also supported facilities through offering on-the-job training for health workers (particularly training on long-acting family planning methods), supportive supervision, and mentoring.

CHAK received approval for the project from health facility administrators, health providers, community religious leaders, and religious leaders governing the health facilities. Health facilities approved use of facility-level data (which contained no personal identifiers) in evaluating the project. MOH and county health departments also approved and supported the project because it served to improve county family planning performance.

### TABLE 3. CHAK Project Health Facilities, Kenya

<table>
<thead>
<tr>
<th>Name</th>
<th>Phases</th>
<th>Facility Level</th>
<th>County</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dophil Maternity and Nursing Home</td>
<td>1 and 2</td>
<td>3</td>
<td>Siaya</td>
<td>Nomiya Church</td>
</tr>
<tr>
<td>Kendu Adventist Mission Hospital</td>
<td>2</td>
<td>4</td>
<td>Siaya</td>
<td>Seventh Day Adventist</td>
</tr>
<tr>
<td>Kima Mission Hospital</td>
<td>2</td>
<td>2</td>
<td>Vihiga</td>
<td>Church of God</td>
</tr>
<tr>
<td>Namasoli Health Center</td>
<td>1 and 2</td>
<td>2</td>
<td>Kakamega</td>
<td>Anglican Church of Kenya</td>
</tr>
<tr>
<td>Ng’iya Health Center</td>
<td>2</td>
<td>3</td>
<td>Siaya</td>
<td>Anglican Church of Kenya</td>
</tr>
<tr>
<td>Sagam Community Hospital</td>
<td>2</td>
<td>4</td>
<td>Siaya</td>
<td>CHAK</td>
</tr>
</tbody>
</table>

Abbreviation: CHAK, Christian Health Association of Kenya.
Funding for the project was provided by the David and Lucile Packard Foundation under the Africa Christian Health Associations Platform Family Planning Project in 2 separate grants, which accounts for the 2 phases of the project. Christian Connections for International Health (CCIH) collaborated closely with CHAK in the conceptualization, proposal development, and early implementation of the project, including baseline assessments at the health facilities. CCIH is an association of FBOs and individuals working in international health that has been a leader in advocating for family planning funding and promoting FBO involvement in family planning.5

### METHODS

In order to evaluate the impact of this project, we assessed multiple sources of data, including facility service statistics, project records and reports, and feedback from religious leaders and CHVs who implemented the project.

For Phase 1 (2013–2014), 2 of the authors (JK and DH) collected service statistics on new and repeat visits according to family planning method from the registers of Dophil Maternity and Nursing Home and Namasoli Health Center for 2012 (baseline prior to project implementation), 2013 (after project implementation), and 2014. All data collected from these health facilities were part of the standard MOH reporting system for counties, contained no identifying patient information, and provided a comparable and consistent data source before and during the project. In Phase 2 (2015–2017), the project added 4 additional health facilities (Table 2). Baseline data from the year prior to project implementation were not available for these 4 facilities. As for Phase 1, we collected data from facility registers on new and repeat visits according to family planning method, for all 6 facilities, for the period 2015–2017.

Throughout Phases 1 and 2, CHVs submitted monthly reports of how many clients they had provided with pills, condoms, and CycleBeads in households and communities. These clients were included in health facility data. In 2014, an unexpected innovation led to another source of data with which to evaluate the pilot project. As well as providing family planning messages to their congregations and communities, religious leaders began making family planning referrals directly to CHVs and health facilities, an activity that had not been part of the original project design. The project thus asked religious leaders to begin reporting monthly, using a standardized form, the number of community members they had reached with family planning messages and the number of clients they had referred to health facilities and CHVs. Religious leaders and CHVs were provided with mobile phone-based reporting tools, but not all of them had phones or Internet access to support the technology; consequently, some chose to instead submit reports in hard copy. CHVs and religious leaders also submitted written feedback on the project as part of their monthly reports. The CHAK program coordinator (JK) made regular supervisory visits to the facilities to monitor the project and maintain an ongoing dialogue with religious leaders, CHVs, clinical staff, and the communities.

### FINDINGS

#### Project Implementation and Perspectives From Religious Leaders and CHVs

In Phase 1 (2013–2014), 30 religious leaders and 60 CHVs were trained with updated family planning information, counseling, and referral skills. According to monthly reports submitted by religious leaders during Phase 1, they reached 5,154 clients in the Dophil catchment area and 7,198 clients in the Namasoli catchment area with family planning messages, and referred 450 and 988 clients to the 2 facilities, respectively. In Phase 2 (2015–2017), an additional 32 religious leaders and 52 CHVs were trained. By 2017, religious leaders had reached a total of 675,000 men and women with family planning information and had referred 85,810 clients to health facilities for family planning services.

Religious leaders and CHVs reported satisfaction with the project and confidence that it was benefiting the health and well-being of families in their communities. Religious leaders reported that they were comfortable in and enthusiastic about their role in providing education about family planning and referrals for family planning services. CHVs reported that community-based distribution reduced barriers to women accessing family planning services, and that working with religious leaders facilitated acceptance of their work by communities. Table 4 illustrates these perspectives with comments that religious leaders and CHVs submitted as part of their monthly reports.

#### Evidence of Project Impact From Health Facility Data

During Phase 1, Dophil and Namasoli saw large increases in family planning visits compared with
the 2012 baseline (Figure 1). Total client visits for family planning increased threefold by 2013 (from 705 to 2,416) and sixfold by 2014 (to 4,286 visits). Rapid increases were seen for long-acting and reversible methods as well as user-dependent methods. Between 2012 and 2014, client visits increased approximately tenfold for pills (111 to 1,377 visits), IUDs (66 to 589 visits), and implants (61 to 835 visits). Dophil and Namasoli also saw large increases in visits for condoms (106 to 830 visits) and more modest increases for injectables (361 to 539 visits), while the number of sterilizations increased from 0 to 46. Voluntary sterilization for women generally required referral to a district hospital. Although male sterilization (vasectomy) was also available, it was not requested at either facility. In phase 2, these 2 facilities sustained high performance in project years 3–5, with Dophil seeing a continued increase in total family planning visits.

In Phase 2, total client visits to the 6 health facilities for family planning nearly doubled. From 7,925 visits (2015) to 11,183 visits (2016) to 14,832 visits (2017). Data from Phase 2 also distinguished between new visits (which represent unique clients) and revisits (Figure 2). New client visits for implants more than tripled (997 to 3,588 visits), and implants were the most popular method in absolute terms (29% of all client visits). New client visits for IUDs more than doubled (1,018 to 2,142), new client visits for injectables nearly doubled (699 to 1,191), and new visits for pills increased by 66% (691 to 1,146 visits). Revisits for commodities such as pills and injectables stayed steady or increased over the period 2015 to 2017, suggesting that many women were continuing with the same family planning method. In contrast, the number of clients seeking condoms decreased by nearly half, which may indicate that these women were shifting to other family planning methods. The remaining methods were sought by only a small number of women.

### TABLE 4. Perspectives From Religious Leaders and CHVs on the CHAK Family Planning Project, Kenya

<table>
<thead>
<tr>
<th>Religious leaders</th>
<th>Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female religious leader</td>
<td>The whole concept of family planning has always been viewed as a woman issue, that’s the reason I decided to focus my messages towards men so that they can also get involved in family planning activities...[education] has changed the perception of many men about family planning. —Female religious leader</td>
</tr>
<tr>
<td>Male religious leader</td>
<td>I am happy that my community regards me as a family planning pastor. I am not ashamed to talk about family planning to the congregation wherever I get a chance. Many couples that I have encouraged to use family planning methods are now using the methods because as a teacher of the word of God they believe in my words. I have been able to refer more than 100 clients to the health facilities for family planning methods...I have become a daktari meaning a doctor of family planning. —Male religious leader</td>
</tr>
<tr>
<td>I referred one of my clients who had 7 children to the health center for an implant and her husband no longer quarrels her and insults her for “having many children like a rat.” I am happy when my clients are happy. —Male religious leader</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHVs</th>
<th>Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female CHV</td>
<td>Before I started distributing pills to clients at my house, some of my clients used to have difficulty accessing the pills from the health facility since they had no approval from their husbands. Currently my clients can tell their husbands that they are coming to borrow something like salt or a pair of scissors from me and they get a chance to collect pills from me...I have been able to refer more than 100 clients to the health facility for family planning methods...I have become a daktari meaning a doctor of family planning. —Male religious leader</td>
</tr>
<tr>
<td>Female CHV</td>
<td>I give my clients family planning pills during our monthly merry-go-round women’s meeting [voluntary savings and loan association]. They don’t have to travel to the health facility. —Female CHV</td>
</tr>
</tbody>
</table>

Abbreviations: CHAK, Christian Health Association of Kenya; CHV, community health volunteer.

In Phase 2, total client visits to the 6 health facilities for family planning nearly doubled.

### FIGURE 1. Total Client Visits\(^a\) by Family Planning Method at Dophil and Namasoli Health Facilities, Kenya, Phase 1

- **2012 (baseline)**
- **2013**
- **2014**

Abbreviation: IUD, intrauterine device.

\(^{a}\)Includes new and returning client visits.
(fewer than 200 per year for CycleBeads and LAM in 2017 and fewer than 100 per year for female sterilization); therefore, changes in demand for these methods should be interpreted with caution. According to feedback from health facilities, low uptake of fertility awareness methods (LAM and Standard Days Method using CycleBeads) may be attributable in part to health care workers placing greater emphasis on other methods.

According to health center staff, some returning visits were scheduled follow-up visits and others were initiated by clients who had experienced side effects, had questions, or had other needs for ongoing care. Injectable contraceptives are effective for 3 months, meaning women using injectables should have returned 4 times per year. However, the number of revisits for injectables in 2016 and 2017 (the second and third years of Phase 2) suggests that not all new users of injectables were returning to the same facilities 4 times the following year. Revisits for injectables in 2016 and 2017 were only 2 to 3 times the number of new visits for injectables the previous year, consistent with typical discontinuation rates for injectables. This finding suggests that some women discontinued injectable contraceptives, while others may have obtained injections at facilities not included in this study. Similarly, data for pill revisits suggest that some women discontinued pill usage. Clients were typically given a 3-cycle supply of pills at each visit, but sometimes only 1 or 2 cycles of pills were provided if supplies were short, which may have contributed to some women discontinuing usage.

The number of revisits for IUDs was smaller than for pills and injectables, as expected. Women receiving IUDs were scheduled for 1-month and 3-month follow-up visits. The copper-bearing CuT 380A, which is effective for up to 12 years, was the most common IUD provided. Implants were primarily 3-year devices (Implanon or Nexplanon) and less commonly 5-year devices (Jadelle), and women receiving implants were scheduled for a 1-month follow-up visit after insertion. The number of revisits among women using implants was relatively high, compared with revisits among women using IUDs. Condoms were distributed in variable numbers, depending on available stock and client request, but the fact that a majority of visits for condoms were new visits (rather than revisits) suggests that women were not regularly obtaining condoms from these facilities as a primary means of contraception.

As shown in Figure 3 and Figure 4, considerable variation existed between facilities in total client visits for family planning and in the popularity of various methods. For example, more than half of new client visits for implants in 2017 were at Sagam Community Hospital, which was likely attributable to this facility conducting community outreach events twice per month, which was more than other facilities. In addition,
the high numbers of implants distributed at Sagam may have been due to the high quality of counseling available at this facility (which is a teaching hospital) because good counseling can be a key factor in women deciding to use long-acting reversible methods such as implants. Clear increases in family planning visits were seen at all facilities between 2015 and 2017, with two exceptions. While Namasoli Health Center did not see a large increase in client visits for family planning during Phase 2, this facility had already seen visits increase substantially during Phase 1, from 384 in 2012 to 2641 in 2014. Kendu Adventist Mission Hospital saw little or no increases for most family planning methods over Phase 2, which may be due to several unique features of this facility. Kendu is a level-4 hospital located near other lower-level health facilities, and members of the community may have chosen to obtain family planning at those lower-level facilities rather than at a hospital. In addition, Kendu also restricted the family planning commodities it gave to

Abbreviation: IUD, intrauterine device.

Note: “Other” includes CycleBeads, Lactational Amenorrhea Method (LAM), and female sterilization.
CHVs with the justification that these commodities were in short supply at the facility. Other facilities saw new client visits approximately double (Dophil Maternity and Nursing Home), triple (Kima Mission Hospital and Ng’iya Health Center), or quadruple (Sagam Community Hospital) between 2015 and 2017.

**Challenges Faced in Project Implementation**

Whereas health facility data indicate that the project was highly successful in increasing family planning access, CHAK also noted a number of challenges to implementation faced by religious leaders, CHVs, and health facilities. These challenges are described in Table 5, along with solutions that were identified and/or implemented. The various challenges faced at multiple levels of the project illustrate the complexities of implementing such a project, even one that was highly successful according to multiple sources of data.

**DISCUSSION**

The rapid and sustained increase in family planning uptake by the 6 participating health facilities over the course of project implementation indicates that FBOs can substantially expand services to help address unmet need for family planning in Kenya. Data on facility visits, as assessed in this study, have been found to be a fairly accurate proxy for trends in contraceptive prevalence. Thus, we see strong evidence for concluding that contraceptive prevalence rose in populations served by this program. We also note that religious leaders reported referring many more clients for family planning services than visited the project facilities for family planning services. Religious leaders referred 85,810 clients for family planning services in Phase 2, but the 6 facilities reported only 33,940 client visits for family planning over the same period. While some clients may not have followed through with the referral, others may have sought family planning at non-project facilities.

Implants were the most frequently requested family planning method and had the largest increase in demand. This high demand for implants is consistent with analysis showing that large increases in implant use across sub-Saharan Africa since the early 2000s are driving increased modern contraceptive use in the region. By the mid-2010s, Kenya had the highest prevalence of implant use among 17 sub-Saharan African countries for which such data were available, with the percentage of married women using implants increasing from 2% to 18% between 2008 and 2016.

This project demonstrates that religious leaders can effectively reach large numbers of people with family planning messages. CHAK’s collaboration with religious leaders began by identifying common ground and building trust through continuous dialogue and sensitivity to faith.
leaders’ perspectives and needs. Also crucial was empowering religious leaders through capacity building, training, family planning updates, and information, education, and communication materials to support their mission to preach the word of God. Monthly meetings between CHVs and health facility staff provided an opportunity for updates, problem solving, and commodity supply. At times CHVs also participated in church services to provide health and family planning messages.

County officials were also an integral part of the project, participating in launch and training workshops as well as providing commodities. In some cases, county officials also allowed staff who were paid by the MOH to be seconded to FBO facilities. Project results were included in county reporting, and county officials thus viewed the performance of FBO projects and facilities.

### Table 5. Challenges Faced and Solutions Implemented by the CHAK Family Planning Project, Kenya

<table>
<thead>
<tr>
<th>Challenges Faced</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>By religious leaders</td>
<td></td>
</tr>
<tr>
<td>Criticism from community members that it was inappropriate for religious leaders to talk about family planning and that they were straying from their mission to preach the word of God</td>
<td>Religious leaders received training to equip them as family planning educators and used relevant verses from the Bible and Quran to support their calling to educate people on health issues and promote family health through family planning.</td>
</tr>
<tr>
<td>Contraceptive myths and misconceptions, opposition to family planning based on religious beliefs</td>
<td>Religious leaders discussed facts of family planning in order to dispel myths and misconceptions, and used WHO materials as well as verses from the Bible and Quran to address opposition to family planning.</td>
</tr>
<tr>
<td>Technical questions from family planning clients or potential clients that religious leaders could not answer</td>
<td>Religious leaders referred such clients or potential clients to CHVs or health facilities, invited health facility staff or CHVs to speak about family planning during religious services and other community events.</td>
</tr>
<tr>
<td>Male Muslim leaders not able to reach women with family planning messages</td>
<td>Female Muslim religious leaders were recruited to conduct outreach to women.</td>
</tr>
<tr>
<td>By CHVs</td>
<td></td>
</tr>
<tr>
<td>Stock-outs of family planning commodities (pills, condoms, and CycleBeads)</td>
<td>CHVs referred clients to health facilities for these commodities.</td>
</tr>
<tr>
<td>Hostility towards family planning, particularly the idea of not having more children (sometimes reinforced by religious leaders)</td>
<td>CHVs emphasized that the goal for family planning is to space births and limit family size to what the family wants and can care for, but not necessarily to stop having children.</td>
</tr>
<tr>
<td>Skepticism towards particular family planning methods, including beliefs that they are ineffective, harmful, or cause negative side effects</td>
<td>CHVs tried to combat myths and misconceptions, such as sterilization can cause cancer, family planning leads to weakness that makes women unable to work, and various methods are ineffective.</td>
</tr>
<tr>
<td>Referred clients not visiting the health facility due to lack of time and money or lack of support from husbands</td>
<td>CHVs conducted community outreach, including counseling couples about the benefits of family planning.</td>
</tr>
<tr>
<td>By health facilities</td>
<td></td>
</tr>
<tr>
<td>Staff turnover, particularly of nurses trained on LARCs, such as implants and IUDs</td>
<td>Actions included on-the-job training and mentorship of new staff, improving work environment (such as through ensuring that commodities and supplies are available), and recognition of staff who perform well.</td>
</tr>
<tr>
<td>Commodity shortages and stock-outs, particularly during strikes at government facilities (3-month doctors’ strike in 2016–2017 and 5-month nurses’ strike in 2017), which led to increased demand for family planning services at FBO-managed facilities</td>
<td>Grant funds were used to purchase “buffer stock” (200 IUDs and 300 implants were purchased during Phase 2), and coordination with county health departments was undertaken to maintain adequate stock without need for project-purchased commodities (as achieved by Dophil and Namasoli).</td>
</tr>
</tbody>
</table>

Abbreviations: FBO, faith-based organization; CHAK, Christian Health Association of Kenya; CHV, community health volunteer; IUD, intrauterine device; LARC, long-acting reversible contraceptive; WHO, World Health Organization.
as part of county efforts to strengthen services. CHAK is now expanding this model of collaboration between FBO-managed health facilities and counties to other regions of the country. The challenges faced by health facilities in procuring family planning commodities from county health departments demonstrate the need for continuing coordination with the public sector, especially given the reality of constrained government resources for family planning and inconsistent supply of commodities. Continued advocacy, engagement, and good relationships with county officials are necessary to support staffing of health facilities and training of staff, as well as procurement of materials and commodities.

Procuring family planning commodities was a recurring challenge for this project and is a common problem across Africa, especially for FBO-managed facilities. A study of FBO-managed facilities in 13 African countries found that more than half had faced stock-outs of one or more reproductive health products (including contraceptives) in the past 3 months, requiring staff to implement creative solutions such as finding other sources of commodities and purchasing and storing buffer stock. The CHAK project adopted such strategies, procuring buffer stocks of contraceptives (particularly IUDs and implants) in both Phase 1 and Phase 2 of the project to ensure that lack of commodities would not limit performance.

Besides the challenges described, we also note several limitations in the available data and interpretation of those data. Because the project had no control group, we cannot know to what degree factors external to the project and project facilities affected family planning uptake at those facilities. Stock-outs of family planning commodities at other facilities may have increased demand for family planning at the project facilities, and the health worker strikes during Phase 2 of the project may have had the same effect. Furthermore, no baseline data are available for the 4 facilities added in Phase 2, meaning that while data from 2015 to 2017 show an increase in family planning visits beginning in the first year of Phase 2, they cannot answer how family planning uptake changed from pre-implementation to the first year of Phase 2 implementation. The increase in family planning uptake for 2015–2017 likely underestimates the impact of the project in Phase 2.

**Recommendations**

We offer the following recommendations for similar programs attempting to engage religious leaders and FBO-managed facilities for rapid and sustainable increases in voluntary family planning.

In addition, CHAK is willing to share expertise and any tools developed for the project, including training materials and reporting forms, and would welcome visits to the health facilities that implemented the project.

**Sensitively Engage Religious Leaders**

The project should ensure that religious leaders are appropriately invited and adequately trained to participate in the project, and it should include religious leaders of all faith traditions if possible. Adequate training includes up-to-date information on methods of family planning and addressing common misconceptions held by the community and religious leaders themselves. In this project, health facility staff issued invitations to Christian and Muslim leaders, which were well received. Also critical was giving religious leaders time to understand the training they received on family planning, ask questions, and discuss their new knowledge as well as their role in the project with their congregations. This collaborative process of “internal advocacy” was crucial to religious leaders (who are mostly men) having the support of their faith communities in taking on the role of family planning advocate.

**Ensure Ownership of the Project by Various Stakeholders**

As noted, stakeholder engagement meetings were critical to ensure that government officials, faith leaders, health facilities, and other key stakeholders concurred with the project’s goals and put their support behind the project in practical ways. The project also found other ways to increase stakeholder investment in the project. Providing CHVs and religious leaders with branded bags, t-shirts, and hats built morale and gave them a sense of ownership and commitment to the project. Communicating with CHVs, religious leaders, and health facilities about the project’s progress at regular meetings, and sharing data from all health facilities with them, helped them to see the “big picture” of project impact and increased their investment in the project’s success. These meetings also gave stakeholders an opportunity to discuss how the project might improve.

**Design a Realistic Monitoring and Evaluation Strategy and Data Management Plan**

A carefully designed monitoring and evaluation strategy is crucial for documenting progress
Conclusion

We believe this project provides an effective, scalable, and sustainable model for engaging with FBO-managed facilities, CHVs, and religious leaders to increase family planning demand and services in sub-Saharan Africa. These 3 partners formed a vital triangle of effective service provision, and the linkages between them enhanced performance and results. This study makes a particular contribution in identifying lessons learned for mobilizing religious leaders as effective promoters of voluntary family planning and facilitating access to services through referrals. Even given recent increases in family planning usage within sub-Saharan Africa, considerable unmet need remains. Greater support for the extensive service delivery infrastructure provided by FBOs, and effective engagement of religious leaders, can make a significant impact on addressing the unmet need for family planning in Africa.

Acknowledgments: We thank the staff of the Secretariat of the Christian Health Association of Kenya, Dophil Maternity and Nursing Home, Kendu Adventist Mission Hospital, Kimu Mission Hospital, Namensi Health Center, Ng’iya Health Center, and Sagam Community Hospital, and all the religious leaders and community health volunteers who made the project a success. Thanks also to the Packard Foundation for funding the project, and Christian Connections for International Health for supporting the project.

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References


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Indicators for Monitoring and Evaluation of Community-Based Injectable Contraception: Multisourced Process and New Global Guidance

Jill M. Peterson, a Kirsten Krueger, b John Stanback b

We based our guidance on a literature review, technical consultation, and case studies of 3 countries. We identified 4 essential indicators: enough community health workers (CHWs) certified to provide injectables to meet project goals, CHWs are appropriately supervised, stock of injectables is reliable, and clients are receiving injections.

ABSTRACT
For many women, convenient access to family planning in their communities provides the impetus they need to start and maintain use of a family planning method. The benefits of family planning task shifting, which allows community health workers (CHWs) to provide methods such as oral contraceptive pills and injectables within communities, were publicly recognized by the World Health Organization (WHO) in 2009. WHO’s 2012 global guidelines on task sharing recommended CHW provision of injectable contraception, accompanied by targeted monitoring and evaluation (M&E); however, the term “targeted” was not defined. To fill this gap, we undertook a literature review, technical consultation, and case studies in Malawi, Senegal, and Uganda to inform our development of a list of M&E indicators, supporting guidance, and job aids to help strengthen community-based access to injectable contraception programs and their ability to follow WHO recommendations. We identified 4 essential indicators: there are enough CHWs certified to provide injectables to meet project goals, CHWs are being appropriately supervised to ensure client safety, the stock of injectables is reliable and can meet project goals, and clients are receiving injections.

BACKGROUND
Increasing the use of family planning in developing countries is linked to reducing poverty, hunger, and maternal and childhood deaths. Consequently, it has been an important component of world development goals.1–3 For many women, convenient access to family planning in their communities provides the impetus they need to start and maintain use of a method. Numerous countries have thus implemented programs in which community health workers (CHWs), also known as lay health workers, counsel women in their communities on family planning and provide them with methods, allowing them to avoid the need to visit distant health facilities. In sub-Saharan Africa, this practice was initially most common for distribution of oral contraceptive pills and condoms, but in the mid-2000s, it began to include injectable contraception in several countries.4,5 Having recognized and promoted community-based access to injectable contraception (CBA2I) since 2009, the World Health Organization (WHO) included it in their written guidance in 2012.8,9 The document on optimizing health workers’ roles focused on task sharing for maternal and newborn health and recommended that CHW provision of injectable contraception be accompanied by “targeted” monitoring and evaluation (M&E).9 However, the guidelines did not define what this particular type of M&E should entail. Today, more than a dozen countries have implemented CBA2I programs, including some of those with the poorest access to contraception, and approximately 10 others are exploring the possibility or have discussions or pilot programs underway.

To assist countries in following this WHO recommendation, we developed written guidance on M&E of CBA2I, including recommended M&E indicators. This article outlines the process we used to develop the guidance and indicators.

METHODS
We developed the M&E guidance and indicators, using a systematic, 3-stage process that included a literature review, a technical consultation, and case studies.
We use a systematic, 3-stage process to develop the M&E guidance and indicators.

**Literature Review**

Our literature review pertained to the status of CBA2I around the world, focusing on the M&E of CBA2I programs, including any currently used indicators. We searched the Global Health (produced by CABI), POPLINE, and PubMed databases for publications from the mid-1990s to April 2016, using search terms including “community + family planning,” “community + family planning + inject,” and “injectable contraception.” In addition to searching online databases, we included documents and tools from our own in-country CBA2I activities. We also asked colleagues from various partner organizations for relevant information. We compiled what we had learned by country and then did more intensive data gathering for the 13 countries for which we had relevant literature.

**Technical Consultation**

We subsequently convened a group of 12 experts in the fields of family planning program implementation and M&E of family planning for a 2-day workshop. These technical experts were purposively selected to represent various organizations and regions of the world, as well as diverse country experiences in implementing CBA2I, in part based on findings from our literature review. The group included representation from government, international NGOs (INGOs), and WHO. At the workshop, we used a facilitated, consensus-building process to draft indicators.

The process began with participants sharing experiences with CBA2I and M&E of programs in the countries represented. Information gathered through the literature review was also shared. The group then discussed and documented how to reach key audiences, recognizing the importance not only of developing guidance and indicators, but also disseminating them.

Next, the group conceptualized a logic model for a hypothetical CBA2I program. The group agreed on typical CBA2I program outcomes and activities—key aspects of a logic model—which were then used to develop relevant indicators. The participants discussed indicators, created categories, and grouped indicators by category. They then divided into small groups and discussed indicators for the first category and later returned as a large group to revise the indicators until all suggestions and phrasing from the small groups were incorporated. This process was repeated for all indicator categories. The final result was 5 categories: training, supervision, readiness, service delivery, and data quality.

The discussion also included differentiating between “nice-to-have” indicators and indicators considered essential for a well-managed program. After the meeting, the authors led the effort to refine the indicators and invited the technical experts from the consultation to provide feedback on the revisions.

**Case Studies**

To further explore the feasibility of the proposed indicators, we conducted case studies in Malawi, Senegal, and Uganda. We used data collected during the literature review to select these countries, which represented various regions of anglophone and francophone sub-Saharan Africa, a range of implementation models (national programs versus smaller-scale programs implemented by INGOs), varying education levels and training programs for the CHWs, and longstanding programs, as well as newer ones.

We developed standard interview questions, and in each country, we sought to interview the following:

- **Parties responsible for administering the CBA2I program, including higher-level government officials in the family planning division**
- **District staff responsible for family planning**
- **Facility-based staff responsible for providing and/or overseeing family planning**
- **CHWs who were providing CBA2I**
- **Personnel at NGOs who played a role in establishing CBA2I projects and specifically the M&E of those projects**

Through these interviews, we gained a better understanding of how CBA2I was managed, including the skills and training of CHWs and their other service responsibilities. We asked what indicators countries were currently using, and we consulted client registers and other tools and job aids as available. We probed to understand how the data contributed to decision making at a programmatic or national level. Lastly, we documented other data the countries wished they had to help them better manage and improve their programs.

To anticipate the utility and effectiveness of our indicators, we sought to understand how data were collected and compiled, which included asking ministry of health officials, M&E officers, and others with a role in analysis for estimates of the amount of time that typically elapsed between data collection and analysis. Lastly, we asked the interview respondents to identify best practices for M&E of CBA2I that they wanted to share.
with others who were initiating or expanding programs.

**RESULTS**

By triangulating data from the literature review, technical consultation, and case studies, we produced an M&E guidelines document, an executive summary, and 3 case study summaries. The guidelines include a full list of 18 M&E indicators and indicator definitions. In addition, the guidelines propose programmatic recommendations and sample job aids to facilitate implementation of CBA2I. Programmatic recommendations include conducting regular supervision, providing training on data collection and use, ensuring timely and accurate reporting, analyzing data for use at multiple levels, conducting regular data quality assessments, and recognizing and supporting CHWs. The job aids provide sample forms for tracking service provision and commodities and are intended to be adopted by existing programs, as well as incorporated into new programs. Editable versions are available for customization by individual programs.

**Program Differences**

The literature review provided useful information for understanding how CBA2I programs operate in various countries. For example, we learned about differences in the educational level and training requirements for the CHWs (some countries had literacy requirements for CHWs, others did not), restrictions on provision of injectables (some programs could only provide reinjections, not the initial dose), and implementation models (some were implemented nationwide by governments, others in programmatically supported districts). This background information helped us identify technical experts for the workshop and select countries for our case studies, and it allowed us to develop a deeper understanding of the current status of CBA2I in countries to ensure broad usability of the guidance.

**Essential Indicators**

The guidelines contain the list of the 18 M&E indicators initially developed during the technical consultation process, 4 of which we have designated “essential.” Cognizant that collecting data on 18 indicators would be difficult for many programs, we agreed that by using the 4 essential indicators, CBA2I programs could get adequate feedback for good management. These indicators were deemed essential because they measure the process from beginning to end—whether there are enough CHWs certified to provide injectables to meet project goals, that CHWs are being appropriately supervised to ensure client safety, that the stock of injectables is reliable and can meet project goals, and that clients are receiving injections. The 4 essential indicators are as follows:

- **Number and percentage of CHWs certified to inject contraception:** Program managers should use this indicator to determine that the number of CHWs certified to inject contraception is sufficient to meet project goals. In addition, most of those trained should be officially certified within the program’s regular certification time frame and process.

- **Number and percentage of CHWs certified during the previous reporting period who received at least 1 in-person supportive supervision visit for providing injectable contraception within [x] months after successful completion of practicum:** As we learned through our case studies, supervisory visits play an extremely important role in monitoring the safety and effectiveness of CBA2I programs. Although programs may vary in the intervals of supervisory visits, we recommend at least 1 visit per month in the first few months immediately following certification. After a CHW has proven to provide high-quality injectable services, the visits may be reduced to every quarter, which can be incorporated into existing processes.

- **Number and percentage of CHWs reporting a stock-out of injectables:** Just as programs need to ensure that enough CHWs are available, the workers must also have sufficient stocks of injectables to meet demand. Ideally, stock-outs should be rare or nonexistent, and any reports of regular stock-outs should be investigated immediately.

- **Number of injections provided by CHWs:** At a bare minimum, knowing the number of injections provided by CHWs can help program managers understand whether they have created enough demand for CBA2I services. Tracking the number of injections provided compared with program targets and past trends helps program managers identify concerns early.

The 18 indicators (Table 1) also include measures of trainings held; providers demonstrating adequate skills during supervisory visits; geographic coverage; and whether data are timely,
Case studies helped refine the indicators and highlighted the information that an M&E program could reasonably collect.

Variations in Program Implementation
We conducted 5 interviews in Malawi, 5 in Senegal, and 7 in Uganda. Through these interviews we noted variations in program implementation (Table 2). For example, Malawi’s CBA2I program is implemented nationwide by a cadre of CHWs called health surveillance assistants who receive a regular salary. In Uganda, the program is implemented in certain INGO-supported districts—approximately one-third of all districts—and the CHWs are unpaid volunteers. In Senegal, the Department of Reproductive Health and Child Survival approved a policy to scale up CBA2I by trained traditional midwives, matrones, in 2014, but the supply of commodities has been inconsistent. The matrones are paid at the discretion of the local health sector management.

Case-study countries were already collecting CBA2I-specific data, including CBA2I data disaggregated by method initiated, new or continuing users, and the number of commodities used. For example, the countries monitored CBA2I data on the number of new family planning users by method, the number of continuing family planning users by method, and the number of injections and oral contraceptive pills distributed during that reporting period. In Senegal and Uganda, the data are available by community-based provision, but in Malawi, injectables provided by CHWs are simply included in total tallies for the facility to which the CHW reports. As a result, analysis of injections given by CHWs, as opposed to facility-based cadres, is not possible in Malawi.

None of the people we interviewed could recall cases of infection or accidental needle sticks associated with CBA2I. Thus, it is not something for which data are regularly recorded. The officials we interviewed agreed that clinical problems should first be managed through the supervisory chain of command and then through supervisor visits as needed. This response influenced how we developed the indicator and guidance related to reportable incidents, such that health workers should be instructed on the proper clinical channel but also be given a place to record such incidents so that occurrences can be quantified.

Based on the case studies, we refined the indicators developed during the technical consultation and gained a stronger sense of what was reasonable for an M&E program to collect. We considered which indicators were already being collected, what information was available through registers or could be collected through registers, and what might be better collected through special studies or research evaluations. We also saw where programs commonly had gaps and ensured that our indicators would help programs fill them. Lastly, we considered responses from interviewees describing data they wished they had to better inform their management of CBA2I.

Discussion
The goal of our process was to develop a consensus list of CBA2I indicators and related guidance documents to strengthen CBA2I programs, resulting in increased access to and quality of family planning services. Data from the literature, global experts, and country practices provided a strong foundation for the resultant guidance and indicators. The guidance is intended for use by governments and programs or projects aiming to implement or improve CBA2I programs, and specifically, the M&E of those programs.

We recognize that 18 indicators for a subset of a family planning program might seem excessive. Within those 18 indicators, however, we have

accurate, and reliable. In addition, because some countries have expressed concerns that this lay cadre of health workers lacks the skills to provide injections without harming clients, we included indicators covering problems of infection or accidental needle sticks. We termed these “reportable incidents,” recognizing that M&E should not be the first nor the only place these events should be reported. Rather, they should be reported immediately through clinical channels, specifically to a facility-based supervisor in most cases. After any immediate reports, M&E can be used to monitor the number and patterns of these incidents. For example, M&E would be effective in detecting if clusters of reportable incidents are occurring in certain geographic areas or if the number of incidents exceeds acceptable levels.

In the indicators table, we have provided definitions and additional information, such as how calculations can be made, suggestions for disaggregation, and variation that can be expected by program or country. We do not propose data sources, because they will vary by country. Some countries have national programs and may be able to use data from the health management information system, but others may be subnational programs with data collected only by special forms at a programmatic level. Each country or program should establish the most accurate, reliable, and timely data source in its context.
<table>
<thead>
<tr>
<th>Number</th>
<th>Indicator Definition</th>
<th>Numerator/Denominator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Number of CHWs trained in providing injectable contraception</td>
<td>NA</td>
</tr>
<tr>
<td>1.2</td>
<td>Number of CHWs who passed a post-training test on injectable contraception</td>
<td>NA</td>
</tr>
<tr>
<td>1.3 (n)</td>
<td>Number and percentage of CHWs certified to inject contraception&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Numerator: 1.3 Denominator: 1.1</td>
</tr>
<tr>
<td>1.4 (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5 (n)</td>
<td>Number and percentage of CHWs certified to provide injectable contraception who express confidence in their skills and abilities</td>
<td>Numerator: 1.5 Denominator: 1.3</td>
</tr>
<tr>
<td>1.6 (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7</td>
<td>Number of training courses held on community-based provision of injectable contraception</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td><strong>Supervision</strong></td>
<td></td>
</tr>
<tr>
<td>2.1 (n)</td>
<td>Number and percentage of CHWs certified during the previous reporting period who received at least 1 in-person supportive supervision visit for providing injectable contraception within [x] months after successful completion of practicum&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Numerator: 2.1 Denominator: 1.3</td>
</tr>
<tr>
<td>2.2 (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3 (n)</td>
<td>Number and percentage of CHWs supervised in-person at least once within [x] months after successful completion of practicum who demonstrated adequate skills at the time of first supervision</td>
<td>Numerator: 2.3 Denominator: 2.1</td>
</tr>
<tr>
<td>2.4 (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1 (n)</td>
<td>Number and percentage of CHWs certified in providing injectable contraception who have given an injection in the last quarter</td>
<td>Numerator: 3.1 Denominator: 1.3</td>
</tr>
<tr>
<td>3.2 (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3 (n)</td>
<td>Number and percentage of villages/catchment areas with a CHW certified to provide injectable contraception</td>
<td>Numerator: 3.1 Denominator: Total number of villages/catchment areas</td>
</tr>
<tr>
<td>3.4 (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5</td>
<td>Number of households served per CHW</td>
<td>Numerator: Number of households in a catchment area in the reporting period Denominator: Total number of active CHWs in the catchment area in the reporting period</td>
</tr>
<tr>
<td>3.6 (n)</td>
<td>Number and percentage of CHWs reporting a stock-out of injectable&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Numerator: 3.6 Denominator: 3.1</td>
</tr>
<tr>
<td>3.7 (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>Number of CHW-led mobilization events</td>
<td>NA</td>
</tr>
<tr>
<td>4.2</td>
<td>Number of one-on-one family planning counseling sessions held by CHWs</td>
<td>NA</td>
</tr>
<tr>
<td>4.3</td>
<td>Number of injections provided&lt;sup&gt;a&lt;/sup&gt;</td>
<td>NA</td>
</tr>
<tr>
<td>4.4</td>
<td>Number of reportable incidents including accidental needle sticks, or infections or abscesses at the site of the injection</td>
<td>NA</td>
</tr>
<tr>
<td>4.5 (n)</td>
<td>Number and percentage of CHWs submitting data reports on time</td>
<td>Numerator: 5.1 Denominator: 3.1</td>
</tr>
<tr>
<td>4.6 (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1 (n)</td>
<td>Number and percentage of CHWs submitting complete client data reports</td>
<td>Numerator: 5.3 Denominator: 3.1</td>
</tr>
<tr>
<td>5.2 (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.3 (n)</td>
<td>Number and percentage of CHWs submitting reports with reasonable accurateness</td>
<td>Numerator: 5.5 Denominator: 3.1</td>
</tr>
<tr>
<td>5.4 (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5 (n)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
listed separately the data points needed as numerators and denominators in calculating percentages. For example, rather than listing just 1 indicator for “the proportion of CHWs certified to inject contraception,” in the full list we have included the data needed to calculate this proportion as a separate indicator (e.g., Indicator 1.1: number of CHWs trained in providing injectable contraception). In addition, many of the indicators can be used beyond CBA2I responsibilities to monitor CHW programs more generally. For example, the number of mobilization events or counseling sessions would provide general programmatic information in addition to data on CBA2I. Collectively, the 18 indicators provide a comprehensive view of a community-based family planning program with specificity for CBA2I.

For additional refinement, programs are encouraged to further disaggregate the indicators. For example, if more than 1 cadre of CHWs in a given country is providing CBA2I, the program may wish to disaggregate by cadre. In our case-study countries, CHWs were already collecting data on the number of new versus continuing users of all methods; these numbers could also be considered in the management of a CBA2I program. If programs have the resources for more in-depth measurement, they may also want to consider reasons for discontinuation, although given already heavy reporting burdens for CHWs, this topic may also be examined through a subject-specific research study.

Since our release of the guidance in March 2018, the Punjab government in Pakistan has begun providing targeted M&E using this guidance.
The indicators, and the related job aids. In addition, the guidance and indicators were used in Malawi as its self-injection program was scaled up. In Malawi, we were able to see firsthand how the indicators were adapted for the local context and to the self-injection program. In some cases, the technical working group tasked with drafting M&E indicators adopted the indicators verbatim; in others, they adapted them to conform to available data sources and programmatic characteristics. By understanding the rationale behind the various indicators, program managers can get a comprehensive view of effective M&E of CBA2I and then adapt the indicators to conform to their specific contexts. The guidance, indicators, and job aids were also included in the 2018 Community Health Worker Provision of Injectable Contraception: An Implementation Handbook.\(^\text{10}\)

**CONCLUSIONS**

The 3-stage process we used to develop indicators and guidance for M&E of CBA2I allowed us to incorporate findings from published literature, the knowledge of experts in the field, and real-world, on-the-ground experience. By triangulating these 3 sources, we have developed a consensus list of M&E indicators as well as supporting guidance, including job aids, that will strengthen CBA2I programs and their ability to follow WHO recommendations. The guidance, an executive summary, and case study summaries can be found at https://www.k4health.org/toolkits/cba2i/step-8-document-processes-and-outcomes and at https://www.fhi360.org/resource/community-based-access-injectable-contraceptives-cba2i-select-resources.

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**REFERENCES**


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