Evidence for the implementation of contraceptive services in humanitarian settings

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ABSTRACT

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More than 50 million people were forcibly displaced from their homes at the end of 2014, the highest number since World War II; 38 million of these were displaced within their own country rather than crossing an international border. Many have been displaced multiple times by chronic and recurring conflict. Complex humanitarian emergencies caused by armed conflict are characterized by social disruption, population displacement and the breakdown of national health systems. The negative impact of war and displacement on women has long been recognized, including by compromising their right to sexual and reproductive health (SRH) services. The ten countries with the highest maternal mortality ratios in the world are affected by, or emerging from, war; these countries are also characterized by low contraceptive prevalence. The provision of SRH services is a minimum standard of health care in humanitarian settings; however access to these services is still often compromised in war. A 2012-2014 global evaluation on the status of SRH in humanitarian settings showed that although access to SRH services has improved in humanitarian settings, gaps persist and the availability of contraceptive services and information is still weak relative to other SRH components. This dissertation addresses this gap by providing evidence that good quality contraceptive services can be implemented in humanitarian settings and that women and couples will choose to start and continue contraceptive use.

The first paper of this dissertation, a systematic review, explored the evidence regarding SRH services provided in humanitarian settings and determined if programs were being evaluated. In addition, the review explored which SRH services received more attention based on program evaluations and descriptive data. Peer-reviewed papers published between 2004 and 2013 were identified via the Ovid MEDLINE database, followed by a PubMed search. Papers on quantitative evaluations of SRH programs, including experimental and non-experimental designs that reported outcome data, implemented in conflict and natural disaster settings, were included. Of 5,669 papers identified in the initial search, 36 papers describing 30 programs met inclusion criteria. Some SRH technical areas were better represented than others: seven papers reported on maternal and newborn health (including two that also covered contraceptive services), six on contraceptive services, three on sexual violence, 20 on HIV and other

sexually transmitted infections and two on general SRH topics. In comparison to the program evaluation papers identified, three times as many papers were found that reported SRH descriptive or prevalence data in humanitarian settings. While data demonstrating the magnitude of the problem are crucial and were previously lacking, the need for SRH services and for evaluations to measure their effectiveness is clear. Contraceptive services were mostly limited to short-acting methods and received less attention overall than other SRH technical components.

In response to this lack of evidence for the implementation of contraceptive services in humanitarian settings, two contraceptive services programs implemented by CARE and Save the Children among conflict-affected populations in eastern Democratic Republic of the Congo (DRC) were evaluated. DRC has experienced chronic conflict for two decades, ranging from acute to post conflict phases. People have been displaced internally for many years while others have experienced repeated cycles of displacement and return.

First, cross-sectional surveys in 2008 (n=607) and 2010 (n=575) of women of reproductive age using a multi-stage cluster sampling design and facility assessments were conducted in Maniema province. Data on the numbers of clients who started a contraceptive method were also collected monthly from supported facilities. Current use of any modern contraceptive method doubled from 3.1% to 5.9% (adjusted OR 2.03 [95%CI 1.3-3.2]). Current use of long-acting and permanent methods (LAPM) increased from 0 to 1.7%, an increase that was no longer significant after adjustment. Program changes were made to improve service quality in 2010; provider skills and counseling improved and commodities became consistently available. Service statistics indicate that the percentage of clients who accepted a LAPM at supported facilities increased from 8% in 2008 to 83% in 2014. This study demonstrates that when good quality contraceptive services, including LAPM, are provided among conflict-affected populations, women will choose to use them.

Second, a retrospective cohort study measured 12-month contraceptive continuation in North Kivu province. A total of 548 women (304 short-acting and 244 long-acting method acceptors) were interviewed about their contraceptive use in the previous year. At 12 months, 81.6% women reported using their baseline method continuously, with more long-acting than short-acting method acceptors (86.1% versus 78.0%, p=.02) continuing method use. Use of a short-acting method (HR 1.74 [95%CI

1.13-2.67]) and desiring a child within two years (HR 2.32 [95%CI 1.33-4.02]) were associated with discontinuation at 12 months. Given the association between service quality and contraceptive continuation, the program's focus on service quality including improvements to provider skills and activities to address provider attitudes likely contributed to these results. The impressive continuation rates found here indicate that delivering high quality contraceptives services in these settings is possible, even in a difficult and unstable setting like eastern DRC.

This dissertation represents a major contribution to the field of SRH in humanitarian settings, and has implications for research and programs. First, these results strengthen the evidence base for the implementation of contraceptive services in humanitarian settings, and demonstrate to implementers and donors of humanitarian aid that effective programs resulting in adoption and continuation of contraceptive methods can be successfully implemented in these challenging settings. Second, these programs were implemented in full collaboration with the Ministry of Health (MOH), supporting MOH facilities and health workers, thus strengthening the health system. Third, the programs achieved these impressive results in rural DRC where they attracted early adopters, most of them first time contraceptive acceptors. In addition, these programs were implemented by multi-sectoral, as opposed to SRH-specific, non-governmental organizations that made good quality contraceptive services a priority, further reinforcing the inclusion of contraceptive services as a routine component of humanitarian health response. Finally, both programs evaluated in this dissertation focused strongly on improving the quality of contraceptive services with specific attention to training, supervision, provider attitudes, data use and commodities management. This program focus on quality contributed to the positive findings.

Making good quality contraceptive services available is challenging and requires sustained commitment, funding and program adjustments, but, in the programs studied here, was ultimately successful. Given true choice, when a range of methods was routinely available, women, many of whom had no prior experience with contraceptive use, were able to choose the method that best served their needs and continued to use their preferred method. These results add to the limited evidence on contraception in humanitarian settings, and demonstrate that even in remote and unstable settings, when good quality contraceptive services, with a choice of short-acting, long-acting and permanent methods,

are in place, women will not only choose to start, but also continue, to use contraception to exercise their right to reproductive choice

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Introduction

More than 222 million women in developing countries have an unmet need for contraception [1]. A strong negative correlation between maternal mortality and contraceptive use exists [2], suggesting contraceptive services are critical to reducing maternal mortality [3]. As the world recognized the slow progress towards achievement of Millennium Development Goal 5 (to reduce the maternal mortality ratio by three quarters), renewed attention has been given to contraceptive services as an important contributor to maternal mortality reduction. The Sustainable Development Goals include as a target to 'ensure universal access to sexual and reproductive health-care services' by 2030, including access to contraceptive services [4]. According to the Countdown to 2015 for Maternal, Newborn and Child Survival, a reduction in maternal mortality and morbidity requires, among other changes, increased coverage of contraceptive services including short-acting, long-acting and permanent methods, which has improved little since 2000 in the countries that represent more than 95% of maternal and child deaths globally [5, 6]. Promotion of contraception could potentially prevent 30% of maternal deaths as well as contribute to improvements in child survival and reductions in poverty and hunger [7, 8]. The evidence for the benefits of contraceptive use is clear, especially with respect to maternal and child mortality. In addition to the health benefits, women and couples, including those in unstable humanitarian settings, have the right to choose the number and timing of their children and should have access to services to exercise this right [9, 10].

More than 50 million people were forcibly displaced from their homes at the end of 2014, the highest number since World War II; 38 million of these were displaced within their own countries [11, 12]. Although acute crises dominate headlines, people have been displaced for 10 years or longer in nearly 90% of the 60 countries monitored by the Internal Displacement Monitoring Centre [11]. Many have been displaced multiple times by chronic and recurring conflict. The complex humanitarian emergencies caused by armed conflict are characterized by social disruption, population displacement and the breakdown of national health systems [13, 14]. In addition to their need for shelter, food, water and primary health care, women living in humanitarian settings face may sexual and reproductive health (SRH) concerns including high risk of mortality or morbidity due to pregnancy-related causes, unintended or unwanted pregnancy due to lack of information or access to contraceptive services, complications of

unsafe abortions, gender-based violence and sexually transmitted infections including HIV [15]. Few of these women, however, have access to comprehensive SRH services.

The negative impact of war and displacement on women has long been recognized, including by compromising their right to SRH services [13, 15]. The ten countries with the highest maternal mortality ratios in the world are affected by, or emerging from, war; these countries are also characterized by low contraceptive prevalence (Table 1) [16, 17].

Table 1: Countries with the highest maternal mortality ratios (MMR) and modern contraceptive prevalence, 2013 [16, 17]

		MMR	**Contraceptive prevalence (modern methods)**
1.	Sierra Leone	1100	6.7%
2.	Chad	980	3.3%
3.	Central African Republic	880	11.5%
4.	Somalia	850	2.9%
5.	Burundi	740	17.4%
6.	Democratic Republic of the Congo	730	5.7%
7.	South Sudan	730	1.6%
8.	Cote d'Ivoire	720	11.3%
9.	Guinea	650	6.4%
10.	Liberia	640	12.2%

Prior to the 1990s, little attention was paid to the SRH needs of people affected by armed conflict. The 1994 International Conference on Population and Development in Cairo specifically recognized the SRH needs of refugees and their right to SRH [9]; the Fourth World Conference on Women in Beijing in 1995 reiterated these statements [10]. In 1999, the Inter-Agency Working Group on Reproductive Health in Crises (IAWG), a broad coalition of NGOs, UN and government agencies, academic institutions and donors committed to expanding and strengthening access to quality SRH services for persons affected by conflict and natural disaster, published the *Inter-Agency field manual on reproductive health in humanitarian settings* to provide technical and program guidance to field staff [18]. In 2004, the Minimum Initial Service Package (MISP), a minimum set of SRH services to be introduced in an emergency, was integrated into humanitarian assistance standards [19], which helped to legitimize SRH in humanitarian response. An important component of the MISP is preparation to introduce comprehensive SRH services, including contraception, as the emergency situation stabilizes [18].

Despite such progress for SRH in humanitarian settings on the international policy agenda, the extent to which this trickled down to the field was less evident. Some humanitarian actors worried that by

offering contraception they would be participating (or would be perceived as participating) in population control, or they assumed the beneficiaries would not want contraceptive services [20]. A global evaluation on the status of SRH in humanitarian settings in 2004 showed that major gaps persisted; some SRH technical components were better covered than others with contraception one of the weakest components. Further, when contraceptive services were available, they were often limited to, at most, pills, condoms and injectables; long-acting and permanent methods were rarely provided [21]. A study of official development assistance (ODA) from 2003-2006 to 18 conflict-affected countries revealed that SRH represented 2.4% of the average annual disbursement for all ODA, and that contraceptive services made up the smallest share of the SRH ODA at 1.7% (compared to HIV at 46.7%) [22].

Evidence on the effect of conflict or displacement on fertility desires is equivocal with no common fertility pattern arising among conflict-affected populations [23]. Available data demonstrate both rising fertility due to pressures to replace dead fighters or children and decreasing fertility because the stress and uncertainties of life during displacement are not conducive to childbearing. Essentially, fertility desires among conflict-affected populations are more affected by social and demographic factors that have been long associated with fertility change than by displacement status [23-25]. While pre-existing awareness and use of contraception is also influential, demand for spacing or limiting births is present, as in any population. For example, studies in six conflict-affected areas of Sudan, Uganda and the Democratic Republic of the Congo (DRC) found that 43% to 71% of women wanted to delay their next pregnancy or did not want any more children, but fewer than 20% of women were using a modern contraceptive method (and fewer than 3% in four of the six settings) [26]. This discrepancy between women's fertility desires and contraceptive use is likely due to the lack of services: zero to just over one-third of assessed health facilities in the six settings had the necessary staff and supplies to provide mandated contraceptive services [26]. In a study of the availability of SRH services in nine general referral hospitals in five provinces of the DRC, contraceptive services were lacking in most of the hospitals: implants were not available in any, IUDs were available in one, and pills and injectables in two hospitals [27].

Limited attention to long-acting and permanent methods is a persistent problem. Of nine papers describing contraceptive programs in humanitarian settings, only three discussed access to long-acting

and permanent methods while the others were mainly limited to short-acting methods [28-36]. All three articles focusing on long-acting and permanent methods were published in the last two years. A program in northern Uganda provided the full range of contraceptive methods, including long-acting and permanent methods, via mobile clinics and strengthening public health centers' provision of short- and long-acting methods [28]. Two articles presenting service data and describing program implementation on contraceptive use in humanitarian settings in DRC, Chad, Pakistan, Mali and Djibouti found that 60% of clients starting a contraceptive method chose a long-acting method [35, 36]. An additional qualitative study along the Thailand-Burma border found that, although the availability of IUDs was limited, the experiences of Burmese women who used IUDs were overwhelmingly positive [37].

A second global evaluation of SRH in humanitarian settings conducted by IAWG in 2012-2014, comprising several studies, demonstrated limited progress for contraceptive services relative to other SRH components since the previous 2004 evaluation. Only 14.9% of the SRH elements in humanitarian health appeals[1] from 2009-2013 requested funding for contraceptive services, the smallest share of any of the SRH components; contraceptive services subsequently received the lowest dollar amount among SRH components (US$76.3 million out of US$1.5 billion) [38]. Further, long-acting and permanent methods were rarely mentioned in the appeals. While some of the 63 health facilities assessed in Burkina Faso, DRC and South Sudan provided pills and injectables, fewer met the minimum quality criteria to provide long-acting or permanent methods [39]. A study of the implementation of minimum SRH standards in Jordan found availability of IUDs in addition to short-acting methods, suggesting these methods are more likely to be found in countries where they are already commonly used [40]. Overall, the findings of the 2012-2014 global evaluation reflect the limited attention still given to contraceptive services in humanitarian settings.

Due to personal preference and clinical needs over the life course, a broad range of methods is an essential component of good contraceptive programming [7, 41-43]. Increasing contraceptive method choice is associated with increases in contraceptive prevalence [44]. Therefore, provision of a broad range of contraceptive methods is important. In addition to method choice, essential elements of good

[1] Appeals for funding are launched when needs exceed the ability of a government or a single agency to respond to a crisis. The study reviewed project and funding data from these appeals that were reported to the UN Office for the Coordination of Humanitarian Affairs' Financial Tracking Service, which records international humanitarian aid to crises where appeals have been launched.

quality contraceptive services include clinical competence of providers, counselling skills including the information given to clients, interpersonal skills, support for continuation of method use and integration with other health services [43]. Despite the skewed method mix found in many countries, improving access to neglected methods is feasible [45, 46]. Evidence shows that a variety of approaches, including demand-side and supply-side contraceptive services interventions, have been successful at improving knowledge, attitudes and intentions to use contraception [47].

Hypotheses

Contraceptive services are included in humanitarian standards to meet existing demand in the acute emergency phase expanding to provision of the range of modern methods as the situation stabilizes [18, 19], but these standards are not being met, except in rare (and recent) cases. Excuses that women do not want contraceptive services or that they are too difficult to implement are still given by humanitarian actors. As illustrated above, evidence demonstrating successful implementation of contraceptive services in humanitarian settings was limited. Even when programs were implemented, their quality was mostly unknown. The first hypothesis of this proposal, therefore, was that programs providing SRH services in humanitarian settings were not being evaluated, and that contraceptive services received less attention than other SRH technical components.

Assuming the first hypothesis was true and the evidence was, in fact, quite limited, the second hypothesis was that successful implementation of good quality comprehensive contraceptive services among populations in humanitarian settings could be demonstrated and result in increased utilization of contraception. This hypothesis was tested in the Democratic Republic of the Congo (DRC) which has experienced chronic conflict over the last 20 years, ranging from periods of acute conflict to stability. Large numbers of people have been displaced internally, mostly living outside of camps, or have experienced cycles of displacement and return. In rural eastern DRC, where these studies were implemented, most people use Ministry of Health facilities as private sector options are not present. In this dissertation, one study evaluated the effectiveness of a contraceptive services program in Kasongo health zone, Maniema province. The other evaluated a contraceptive services program in Masisi and Mweso health zones, North Kivu province by measuring 12-month contraceptive continuation.

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Paper 1: Evaluations of reproductive health programs in humanitarian settings: a systematic review[2]

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Abstract

Provision of reproductive health (RH) services is a minimum standard of health care in humanitarian settings; however access to these services is often limited. This systematic review, one component of a global evaluation of RH in humanitarian settings, sought to explore the evidence regarding RH services provided in humanitarian settings and to determine if programs are being evaluated. In addition, the review explored which RH services receive more attention based on program evaluations and descriptive data. Peer-reviewed papers published between 2004 and 2013 were identified via the Ovid MEDLINE database, followed by a PubMed search. Papers on quantitative evaluations of RH programs, including experimental and non-experimental designs that reported outcome data, implemented in conflict and natural disaster settings, were included. Of 5,669 papers identified in the initial search, 36 papers describing 30 programs met inclusion criteria. Twenty-five papers described programs in sub-Saharan Africa, six in Asia, two in Haiti and three reported data from multiple countries. Some RH technical areas were better represented than others: seven papers reported on maternal and newborn health (including two that also covered family planning), six on family planning, three on sexual violence, 20 on HIV and other sexually transmitted infections and two on general RH topics. In comparison to the program evaluation papers identified, three times as many papers were found that reported RH descriptive or prevalence data in humanitarian settings. While data demonstrating the magnitude of the problem are crucial and were previously lacking, the need for RH services and for evaluations to measure their effectiveness is clear. Program evaluation and implementation science should be incorporated into more programs to determine the best ways to serve the RH needs of people affected by conflict or natural disaster. Standard program design should include rigorous program evaluation, and the results must be shared. The papers demonstrated both that RH programs can be implemented in these challenging settings, and that women and men will use RH services when they are of reasonable quality.

Introduction

Increased attention to the reproductive health (RH) needs of people affected by armed conflict or natural disaster began in the mid-1990s with a few key events. The *Lancet* published an editorial identifying family planning as a complete gap in services for refugees [1]. The groundbreaking report *Refugee Women and Reproductive Health Care: Reassessing Priorities* highlighted how the health of refugee women fleeing war was further threatened by near absence of reproductive health services [2]. The 1994 International Conference on Population and Development in Cairo specifically recognized the rights of displaced populations to RH [3]. This led to the formation in 1995 of the Inter-Agency Working Group on RH in Crisis (IAWG), a consortium of non-governmental organizations (NGO), donors and United Nations (UN) agencies, to advance RH services in humanitarian settings. In 1999, the IAWG developed the *Inter-Agency field manual on reproductive health in humanitarian settings* to provide technical and program guidance to field staff [4].

In 2004, the IAWG completed a global evaluation of RH in humanitarian settings at field, agency and global levels. The evaluation found that more RH services were available than a decade earlier, although major gaps remained in most of the technical areas, with gender-based violence as the least developed technical area. Although RH services were somewhat more available for refugees living in camps, they were largely absent for internally displaced (IDP) and non-camp populations [5]. Adolescents were underserved, and safe abortion was not even assessed. The global evaluation identified a need to improve RH data collection to ensure that useful data were collected and properly interpreted, as well as for more rigorous program evaluations.

From 2012-2014, another ten years on, the IAWG conducted a second global evaluation of RH in humanitarian settings. This systematic review, one component of the 2014 global review, sought to explore the evidence regarding RH services provided in humanitarian settings. Are RH programs in these settings being evaluated? Do the programs work? What is the quality of the evaluations? Which RH services receive more programmatic and financial attention based on program evaluations and descriptive data?

Methods

Search strategy

This literature review summarized peer-reviewed papers published since the last global evaluation (between 2004 and 2013) that were identified via the Ovid MEDLINE database, followed by a PubMed search to pick up more recent papers not currently indexed. In addition, references for included papers were cross-checked to ensure that all relevant literature was identified and included. A combination of terms describing conflict and natural disasters were used with terms describing RH under the broad categories from the *Inter-agency field manual on reproductive health in humanitarian settings* of maternal and newborn health, family planning (FP), gender-based violence (GBV), HIV/AIDS and other sexually transmitted infections (STIs), safe abortion and adolescent reproductive health. Searches were limited to papers published in English. This initial search was broad and intended to capture all papers on RH in humanitarian settings. Papers on quantitative evaluations of RH programs, including experimental and non-experimental designs that reported outcome data were included. Descriptive quantitative studies with no specific health intervention identified and no outcomes or outputs reported (e.g., studies that reported only descriptive or baseline data) as well as purely qualitative papers were excluded. Studies were not excluded on the basis of their quality. Other inclusion and exclusion criteria are detailed in Table 1. Papers excluded under these criteria but that reported descriptive or prevalence data were logged to permit comparison of the sectoral spread of evaluation papers (the focus here) and broader prevalence or descriptive papers.

Quality assessment of the papers

The quality of each included study was assessed using criteria from the STROBE checklist for observational studies or the CONSORT checklist for clinical trials [6, 7]. Papers were assigned a rating of high, medium or low quality based on the number of met criteria in a list adapted from these checklists.

Results

The search strategy yielded 5,669 papers after duplicates were removed; 5,310 were excluded based on a review of the title. Of the 359 papers for which abstract or full-text review was conducted, 323 papers were excluded, leaving 36 papers describing 30 programs (Figure 1). Of the 36 papers, 25

described programs in sub-Saharan Africa, six in Asia, two in Haiti and three reported data from multiple countries and continents. Some RH technical areas were better represented than others: seven papers reported on maternal and newborn health (including two that also covered FP), six on FP, three on GBV, 20 on HIV and other STIs and two on general RH topics (Table 2). None of the papers described safe abortion or post-abortion care programs, and five of the papers described HIV prevention programs targeting adolescents. Only six papers were classified as high quality while the majority was classified as medium quality or low quality. Fewer than half (16) of the papers reported comparison data, either in the form of pre- and post-intervention measures or intervention and comparison groups. Table 3 provides a summary of the included papers.

Of the 323 papers reviewed and excluded, 93 papers reported descriptive or prevalence data on RH in crisis settings. Again, some RH technical areas were better represented than others: 20 papers on maternal and newborn health (including one that also reported on FP and one that also looked at GBV), four on FP, 32 on GBV, 27 on HIV or other STIs (only six of which mentioned other STIs), seven papers on general RH and five on adolescent RH (specifically HIV, GBV or FP) (Table 2).

Maternal and newborn health

Seven of the 36 papers described evaluations of maternal and newborn health programs, including two programs that also addressed family planning. The papers covered a range of topics including emergency obstetric and newborn care (EmONC), antenatal care (ANC) and the training of traditional birth attendants or community health workers (CHWs) to improve maternal health outcomes.

Two papers described the outcomes of programs to improve EmONC services, the first for Afghan refugees in Pakistan [8] and the second in humanitarian settings in nine countries [9]. Although not all supported facilities met the WHO criteria of fully functional EmONC facilities [10], the papers reported greater availability post-intervention of EmONC services 24 hours a day and subsequent increased use of those services in most facilities. The authors of both papers described challenges in calculating the UN process indicators for EmONC[a] at baseline [10], primarily due to the absence of key data from delivery registers; however, both reported these indicators at endline.

Other program approaches to improve maternal and newborn health involved training mobile health workers to provide elements of basic EmONC plus blood transfusion and ANC in eastern Burma [11]; seconding refugee health workers to health facilities serving the refugee population and training refugee women to promote RH in the community in Guinea [12]; and training CHWs in Afghanistan to strengthen the link between the community and formal health services [13]. All three papers reported increased use of skilled birth attendants post-intervention. The Afghanistan study, however, found that only the presence of a female CHW was associated with increased skilled birth attendance; the association was absent with male CHWs. One paper assessing the effectiveness of baby tents (clean spaces to support mothers to practice healthy infant feeding) established in Haiti found that 70% of babies less than six months old were exclusively breastfed and 10% of non-exclusively breastfed infants moved to exclusive breastfeeding while enrolled [14]. Finally, an evaluation of a home-based lifesaving skills training for traditional midwives in Liberia found that midwives' knowledge improved from pre to post training and remained stable one year later [15].

Family planning (FP)

Six papers described FP programs, including two that also described maternal and newborn health outcomes. Programs used different strategies to improve FP use: providing the full range of FP methods, including long-acting and permanent methods, via mobile clinics and strengthening health centers' provision of short- and long-acting FP in northern Uganda [16]; training mobile health workers to provide short-acting methods in eastern Burma [11]; seconding refugee providers to health facilities serving refugees to provide FP and training female CHWs to promote FP use in Guinea [17]; and training CHWs to conduct FP education and provide short acting methods in Afghanistan [18]. All four papers reported that contraceptive prevalence increased from baseline or was higher than national levels. Additional papers found that the presence of a female CHW was associated with higher FP use in Afghanistan [13], and that contraceptive use was higher among Afghan refugee women in Pakistan who received subsidized health services than among those with access to un-subsidized services [19].

Gender-based violence (GBV)

Although the literature search included broader terms related to GBV, all three included papers focused specifically on care for survivors of rape. Two papers reviewed the effectiveness of psychosocial interventions for survivors. A randomized controlled trial in the Democratic Republic of the Congo (DRC) on the effectiveness of group cognitive processing therapy versus individual support to female survivors of rape found that those who received group psychotherapy showed greater improvement in depression, anxiety and post-traumatic stress disorder (PTSD) symptoms six months after treatment compared to those in the control group [20]. The second paper found that the global functioning of survivors in the Republic of Congo improved following post-rape psychological care, and improvement was maintained one to two years later although high loss to follow up weakened these results [21]. The third paper reviewed the effects of a multi-media training tool for clinical care for rape survivors on the knowledge, attitudes and practices of health providers in four conflict settings [22]. The authors found that although negative attitudes towards survivors did not significantly change, respect for patient rights increased and provider practice improved from pre-training to three months post-training.

HIV and other sexually transmitted infections (STIs)

More papers (20) focused on HIV and other STIs than any other RH component; however only three of these reported on STIs other than HIV. Three papers reported results of retrospective record reviews to evaluate programs to prevent mother to child transmission of HIV (PMTCT), two in northern Uganda and one in a refugee camp in Tanzania. One program found that higher proportions of HIV-positive pregnant women identified in ANC used anti-retroviral prophylaxis in northern Uganda compared with the national average [23]. The other two programs reported high numbers lost to follow-up before completing infant HIV testing at 18 months. In one study, this was primarily due to a lack of understanding of its importance and infant death; incomplete or no ARV prophylaxis, early weaning and prolonged breastfeeding were associated with increased risk of loss to follow-up and infant death [24]. In the final study, more than two-thirds of the HIV-infected women were repatriated to their home country before delivery; among those who delivered in the camp, nevirapine uptake was 98% [25].

Eight papers reported the outcomes of anti-retroviral therapy (ART) programs for HIV-positive adults or children in East Africa, Haiti and globally. Three papers found that ART patients in northern Uganda had mortality rates and adherence comparable to or better than ART patients in stable settings or who were not displaced [26-28]. Similarly, a review of the data from 24 ART programs in conflict or post-conflict settings found that patient outcomes were comparable to those in stable settings [29]. Five papers examined the effect of a crisis on ART programs: the post-election violence in Kenya in early 2008 [30-32], acute conflict in DRC in 2004 [33] and the earthquake in Haiti in 2010 [34]. Notably, although the papers found higher rates of treatment interruption immediately post-disaster, generally services were quickly re-established and patient attendance and adherence rebounded soon after.

Eight papers reported HIV and/or STI knowledge, attitudes and behavior results following HIV prevention programs. Two papers reported on a group randomized controlled trial to evaluate the impact of an evidence-based HIV prevention intervention on sexual risk behaviors of in-school 6th graders in Liberia [35, 36], and six used post-intervention surveys to assess program effectiveness in four African countries [37-42]. All of the papers reported mixed results of their prevention programs regarding some elements of knowledge and behavior change; however, the four that follow reported more positive results. A comparison of pre- and post-intervention survey data in Sierra Leone found that HIV-related knowledge and condom use increased among adolescents [37], commercial sex workers and military personnel [38] following an HIV prevention program including intensive IEC activities and distribution of free condoms. Two papers on refugee camps in Guinea reported that exposure to program peer educators was associated with improved HIV and STI knowledge and changed behavior to prevent HIV [39, 40].

General RH

Two papers reported on unique efforts related to reproductive health. A program to improve and measure the quality of RH services at a clinic serving Burmese refugees and migrant workers on the Thailand-Burma border improved the quality of care, and also increased staff skills and motivation to collect and use data to make program decisions [43]. An evaluation of a literacy program that used RH content in Guinea found that refugee women who completed the program reported high knowledge on

maternal and newborn health, HIV and STIs; increased use of FP; and a marked increase in feelings of empowerment [44].

Discussion

This review found that some RH programs in crisis settings have been evaluated although most evaluations were medium in quality, suggesting limitations in study design and analysis. Most of the papers reported generally positive results suggesting that these programs are likely well-designed and reasonably well-implemented. The papers demonstrated both that RH programs can be implemented in these challenging settings and that women and men will use RH services when they are of reasonable quality. In comparison to the program evaluation papers identified, three times as many papers were found that reported RH descriptive or prevalence data in humanitarian settings. While data demonstrating the magnitude of the problem are crucial and were previously lacking, the need for RH services and for evaluations to measure their effectiveness is clear [45, 46]. It is critical to more directly link research to interventions and increase the evidence base for RH service delivery strategies in humanitarian settings. This includes not only the research but also publication and sharing of results. An increased focus on implementation science is needed to explore how best to improve delivery and use of RH services as well as the use of research to improve practice [47].

Although published articles are not representative of RH programs implemented in humanitarian settings as most programs do not publish their results, they may reflect relative attention, both programmatic and financial, to particular areas. A preponderance of papers reported on HIV/AIDS programs although few mentioned other STIs. While GBV was under-represented among program evaluations, one-third (32) of the descriptive papers reported prevalence and types of sexual violence perpetrated in humanitarian settings. This suggests that GBV does, in fact, receive attention in research, although perhaps less in programming which when implemented may be only rarely evaluated. FP, on the other hand, was under-represented among both program evaluations and descriptive papers suggesting that FP overall receives less attention than the other RH components. Adolescents often face additional barriers to meeting their RH needs [48], but only four HIV prevention programs targeted

adolescents and no papers evaluated adolescent-friendly RH services. No papers mentioned safe abortion which remains virtually unavailable in humanitarian settings [49], nor post-abortion care.

Programs requiring long-term follow-up faced specific challenges introduced by the instability of crisis settings and associated population movements. Some of these challenges, such as brief interruptions to treatment that arose during incidents of crisis, can and should be managed or prevented with planning, as demonstrated in the response to post-election violence in Kenya [30, 32] and an upswing in violence in DRC [33]. Training refugee or IDP health workers, who would likely move with their community, may be a potential strategy for ensuring continued access to care for displaced people after they return home. Additional challenges to the implementation of RH programs were identified in the papers. For example, highly trained health workers are needed to provide RH services, and they may require updated competency-based training, particularly for EmONC, long-acting and permanent FP and clinical care for survivors of rape. The evaluation of a training tool for providers suggested that although attitudes are challenging to change, care for survivors of rape can be improved [22].

Proven evidenced-based strategies should be adapted and implemented in humanitarian settings. For example, EmONC is crucial to reduce maternal morbidity and mortality, and is thus a component of the minimum standard in humanitarian RH service delivery (the Minimum Initial Service Package) [4]. Yet, only three of the seven maternal and newborn health programs that were evaluated aimed to improve the availability of these critical services. Only one of the evaluated programs improved the availability of long-acting or permanent FP methods; the other programs were generally limited to short-acting methods, despite evidence that a broad choice of methods is an essential component of good FP programming and also associated with increased use [50-52]. Although a foundation in social change theory has been shown to be important for behavior change [53], only one of the HIV prevention programs appears to have had such a base [35, 36]. Behavior change communication efforts implemented in humanitarian settings should adapt such proven evidence-based strategies. Moreover, it is critical that best practices be shared across the humanitarian and development fields. While the humanitarian field has adapted strategies that have been successful in development settings for many RH components, response to sexual violence is one area where the humanitarian field may be in advance of the development field, and it is crucial that these programs be implemented, rigorously

evaluated and published. Further, it would be useful for programs (and journals) to publish results of programs that were unsuccessful so others may learn from those experiences.

Fewer than half of the papers used any kind of comparison, either between pre- and post-measures or between intervention and comparison groups. This is not a call for more randomized controlled trials, however, since randomizing clients is not often appropriate, due to the fundamental principle of client choice in FP and GBV programming [54]. Evaluations using pre- and post-intervention measures or quasi-experimental designs may be appropriate, particularly where a program strategy is implemented in phases and a group that has not yet received the intervention serves as a comparison for a group in an earlier phase of the program. In addition, the challenges to collecting data in humanitarian settings are well-recognized [55, 56], and population-based surveys may be particularly challenging in these unstable and insecure settings [57]. Therefore, other rigorous measures of program quality that are feasible to collect should be explored. For example, the UN process indicators of EmONC were developed to monitor interventions proven to reduce maternal mortality without the limitations and expense of a maternal mortality survey by using information available at health facilities [10, 58]. What similar practical approximations could be used to measure the success of FP and GBV programs? It is plausible that evaluations of clinical HIV programs were in the majority because program quality could be measured using clinical data (patient adherence and outcomes) that were routinely collected. Challenges to collecting appropriate data have been noted [5, 9]; increased effort should be put into routine data collection to ensure that good quality data to measure standard indicators are collected, and shared. This may mean adapting registers to capture data on, for example, obstetric complications or to record new, continuing and switching FP clients.

Limitations of this review include its restriction to quantitative methodologies and to papers published in English, which may have excluded relevant publications. The selected search parameters may have missed papers that did not explicitly refer to conflict or humanitarian settings or natural disasters, or the general RH topics that were searched in the title, abstract or key words. While the included papers may be representative of peer-reviewed published literature, they are not representative of RH programming in humanitarian settings: humanitarian agency staff may not have time to write up results for publication and negative or null findings may be difficult to publish.

Program evaluation and implementation science should be incorporated into programs to determine the best ways to serve the RH needs of people affected by conflict or natural disaster. Standard program design should include rigorous program evaluation [59] and improved routine data collection. The results must be shared so that proven evidence-based strategies for RH are implemented in humanitarian settings. These papers demonstrated both that RH programs can be implemented in these challenging settings, and that women and men will use RH services when they are of reasonable quality.

Endnote

[a]The eight UN process indicators for EmONC were developed to monitor progress in the prevention of maternal and perinatal deaths:

1. Availability of EmONC: at least 5 EmONC facilities (including at least one comprehensive facility) for every 500,000 population
2. Geographical distribution of EmONC facilities
3. Proportion of all births in EmONC facilities
4. Met need for emergency obstetric care: proportion of women with major direct obstetric complications who are treated in EmONC facilities (acceptable level is 100%)
5. Caesarean sections as a proportion of all births (acceptable level between 5 and 15%)
6. Direct obstetric case fatality rate (acceptable level is less than 1%)
7. Intrapartum and very early neonatal death rate
8. Proportion of maternal deaths due to indirect causes in emergency obstetric care facilities

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Tables and Figures

Figure 1: Systematic review flow chart

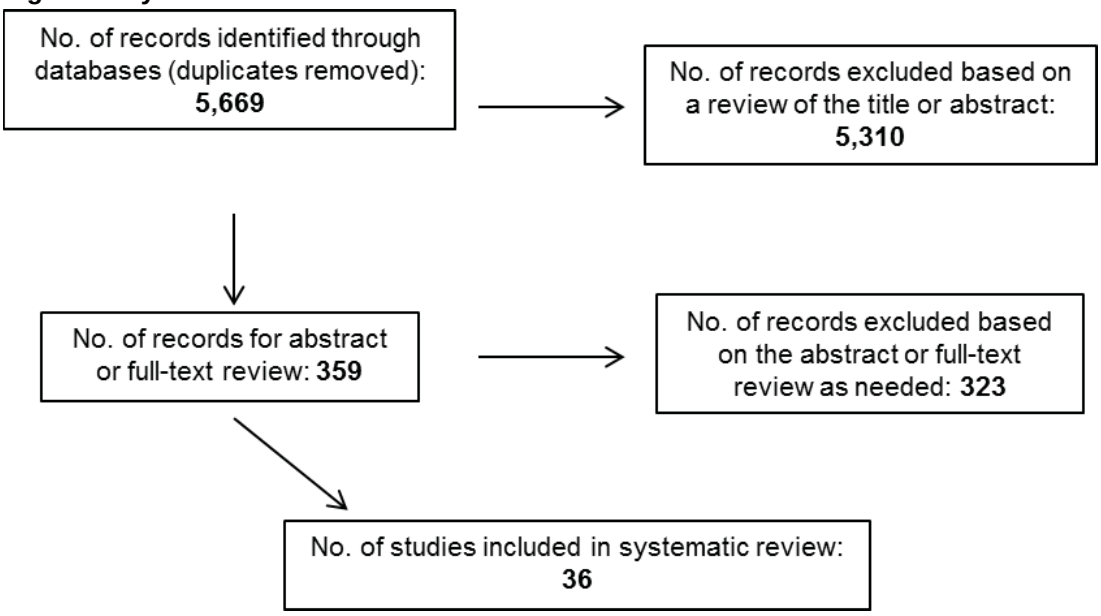

Table 1: Inclusion/exclusion criteria:

	Included	**Excluded**
Topic	Papers that described RH programs to address maternal and newborn health, FP, HIV and other STIs and/or GBV (sexual violence including rape, sexual abuse and sexual exploitation, and intimate partner violence)	Papers that reported on other reproductive health topics (e.g., female genital mutilation, forced or early marriage, reproductive cancers)
Types of Papers/ Data	Quantitative evaluations of RH programs or services, including experimental and non-experimental designs that report outcome data	Descriptive quantitative papers with no specific health intervention and no outcomes (e.g., reporting only descriptive or baseline data); purely qualitative papers
Settings	Humanitarian crises in conflict, post-conflict or natural disaster settings in lower or middle income countries	Papers in locations that were not affected by armed conflict or natural disaster; that were more than ten years post-conflict; disaster settings in higher income countries
Types of publications	Papers in peer-reviewed journals	Letters, editorials, commentaries; grey literature; review papers (although these were screened for references)
Language	English	Study titles and abstracts in languages other than English
Publication date	January 2004 – December 2013	Papers published before 2004 or after 2013

Table 2: Number of papers by RH technical component

	Number (%) of program evaluation papers (n=36*)	Number (%) of descriptive papers for comparison (n=93*)
Maternal and newborn health	7 (19%)	20 (22%)
Family planning	6 (17%)	4 (4%)
Gender-based violence	3 (8%)	32 (34%)
HIV and other STIs	20 (56%)	27 (29%)
Adolescent RH	5 (14%)	5 (5%)
General RH	2 (6%)	7 (8%)

*The sum of the RH components is greater than the total number of papers as some papers reported on multiple components.

Table 3: Description of papers included in the review

Author (Year)	Country	Intervention	Evaluation design	Key findings	Quality
Maternal and newborn health					
Ayoya et al (2013) [14]	Haiti	Established baby tents in five cities to promote and sustain optimal infant feeding practices: breastfeeding and nutrition support, infant growth monitoring, assessment of nutritional status of mother-infant pairs and pregnant women	Program data review (February 2010-June 2012) from nutritional cluster database (n=193 baby tents)	70% of infants less than 6 months old were exclusively breastfed. 10% of "mixed feeders" less than 6 months changed to exclusive breastfeeding while enrolled.	Low
Howard et al (2011)[1] [12]	Guinea	Seconded refugee health workers to health facilities serving refugees, provided free RH services and trained refugee women as lay health workers	Cross-sectional post-intervention multi-stage cluster survey in intervention area of women (n=444) and men (n=445) of reproductive age (Liberian and Sierra Leonean refugees) living in one of 48 refugee camps in Guinea in 1999.	Higher odds of facility delivery for those exposed to intervention education activities (OR=2.03, 95%CI 1.23-3.01), formally educated (OR=1.93, 95%CI 1.05-3.92), or grand multipara (OR= 2.13, 95%CI 1.21-3.75). No significant differences found in maternal health knowledge or attitudes.	Medium
Krause et al (2006) [9]	Global (9 countries)	Improved availability of basic and comprehensive EmONC services in 12 conflict affected settings in 9 countries, Jan 2001-Apr 2005	Pre and post intervention facility assessments (n=31 health facilities)	Increased availability of EmONC 24 hours a day. CEmONC facilities increased from 3 facilities at baseline to 10 at endline; BEmONC facilities increased from 2 at baseline to 10 at endline. The number of signal functions available increased in all 31 facilities.	Medium
Lori et al (2010) [15]	Liberia	Trained traditional midwives in maternal care using the home-based life-saving skills series in 2006	Pre- & immediate post-training assessments (n=412 traditional midwives), 1-year follow up assessment (n=389)	Mean scores in 4 topic areas: 1) first actions, 2) post-partum hemorrhage 3) woman referral, 4) baby referral, improved from pre- to post-test and remained stable one year later (p<.001 for all 4 topics)	Medium

Author (Year)	Country	Intervention	Evaluation design	Key findings	Quality
Purdin et al (2009) [8]	Pakistan	Established EmONC facilities, trained Afghan refugee community members on safe motherhood, linked primary health care with education on danger signs of pregnancy and the importance of skilled birth attendance, and improved the health information system.	Program data review 2000-2007	Maternal mortality ratio improved from 291 per 100,000 live births in 2000 to 102 in 2004. Case fatality rate for obstetric complications=0.2%. Skilled birth attendance increased from 5% in 1996 to 67% in 2007. Complete ANC coverage increased from 49% in 2000 to 90% in 2006; post-natal coverage increased from 27% in 2000 to 85% in 2006.	Medium
Maternal and newborn health and family planning					
Mullany et al (2010) [11]	Burma	Trained community-based skilled health workers in basic EmONC, evidence-based ANC and FP in Shan, Mon, Karen, and Karenni regions of Burma	Pre (2006) & post (2008) intervention cross-sectional two-stage cluster surveys in intervention areas of ever married women of reproductive age: n=2,889 at baseline, n=2,442 at endline	Use of modern FP methods increased from 24% to 45% (PRR 1.88, 95%CI 1.63-2.17). Unmet need for FP decreased 35% (95%CI 28%-40%). Skilled birth attendance increased from 5% to 49% (PRR=9.55, 95%CI 7.21-12.64).	High
Viswanathan et al (2012) [13]	Afghanistan	Deployed CHWs to promote use of RH services in community and at health facilities	Data derived from the Afghanistan Health Survey 2006: multistage cluster survey in 29 provinces (n=8,281 women)	Presence of female CHW in community is associated with increased use of FP (OR=1.61, 95%CI 1.21-2.15), ANC (OR=2.71, 95%CI 1.87-3.92) and skilled birth attendant at last delivery (OR=1.75, 95%CI 1.18-2.58). These associations were not significant with a male CHW.	Medium
Family planning					
Casey et al (2013) [16]	Northern Uganda	Provided short-acting, long-acting and permanent FP methods via mobile outreach teams and strengthened public health center provision of short and long acting FP methods	Baseline (2007) and post-intervention (2010) cross-sectional multi-stage cluster surveys in intervention area of women of reproductive age: n=905 at baseline, n=873 at endline	Current use modern FP methods increased from 7.1% to 22.6% (OR=3.34, 95%CI 2.27-4.92); use of LAPM increased 1.2% to 9.8% (OR=9.45, 95%CI 3.99-22.4). Unmet need for FP decreased from 52.1% to 35.7% (OR=0.47, 95% CI 0.37-0.60).	High

Author (Year)	Country	Intervention	Evaluation design	Key findings	Quality
Howard et al (2008)[1] [17]	Guinea	Refugee health workers seconded to health facilities provided free RH services and trained refugee women as lay health workers	Cross-sectional post-intervention multi-stage cluster survey in intervention area of women (n=444) and men (n=445) of reproductive age (Liberian and Sierra Leonean refugees) living in one of 48 refugee camps in Guinea in 1999.	Approval of FP was high, but more than 40% had not discussed FP with partner. Current use of modern FP (17%) was higher than in country of origin (3.9%) or host country (4.1%). Perceived service quality was most important determinant in choice of where to get FP.	Medium
Huber et al (2010) [18]	Afghanistan	Improved access to FP using CHWs and community-based distribution of short acting methods	Baseline (2004) and endline (2006) cross-sectional surveys using lot quality assurance sampling; verification of FP use via home visits of 150 FP users per CHW	Current FP use increased by 24-27%, with injectables contributing most to the increase.	Low
Raheel et al (2012) [19]	Pakistan	Provided subsidized or unsubsidized health care to Afghan refugees in Karachi	Cross-sectional study in 2008 using systematic random sampling of 2 comparison groups: married Afghan women of reproductive age receiving subsidized care (n=325) and unsubsidized care (n=325)	Refugee women receiving subsidized care were more likely to have heard of FP (OR=10.12 95%CI 6.7-15.31) and currently use FP (OR=3.65, 95%CI 2.61-5.10).	High
Gender-based violence					
Bass et al (2013) [20]	Democratic Republic of the Congo (DRC)	Adapted group cognitive processing therapy (1 individual session and 11 group sessions) provided by paraprofessionals supervised by psychosocial staff and clinical experts	Random assignment of 16 villages to intervention group (8) or individual support (8) for female sexual violence survivors in 2011	65% in intervention group and 52% in control group completed all 3 measures. Improvements in all 3 sets of symptoms were significantly greater in therapy group than in individual support group. Mean scores for combined depression and anxiety improved significantly more in the therapy group compared to the individual support group ($p<0.001$ for all comparisons).	High

Author (Year)	Country	Intervention	Evaluation design	Key findings	Quality
Hustache et al (2009) [21]	Republic of Congo	Provided medical care and psychological support to women raped by an unknown perpetrator in military clothing	Initial assessment January 2002-April 2003 (n=159 female survivors of rape); follow-up 1-2 years post-treatment, June-July 2004 (n=70)	56 women were evaluated using the Global Assessment of Functioning (GAF) scale at both time periods, and global functioning significantly improved (p=.04); this improvement was maintained 1-2 years later	Medium
Smith et al (2013) [22]	DRC, Ethiopia, Kenya, Jordan	Multimedia training tool for health providers to encourage competent, compassionate, and confidential clinical care for rape survivors	Assessment pre-training and 3 months after, medical record review, in-depth interviews (November 2010 to June 2012)	Although negative attitudes did not significantly decrease, respect for patient rights increased (p<.05), and provider practice improved from before the training to 3 months post-training (p<.01).	Medium
HIV/AIDS and other STIs					
Ahoua et al (2010) [24]	Northern Uganda	PMTCT program including either short-course AZT or single dose nevirapine and follow-up for 18 months post-partum including infant HIV testing	Retrospective record review of all mother-infant pairs enrolled July 2000-July 2005 (n=517). Cross-sectional survey of infant status at 18 months following tracing of mother-infant pairs who were lost to follow up (n=327 women and 368 babies).	53% of mother-infant pairs were lost to follow-up before completing infant testing at 18 months; the risk of death or being lost to follow-up was higher among infants with no or incomplete intrapartum ARVs (OR=1.9, 95%CI 1.07–3.36) and of weaning before age 6 months (OR=2.55, 95%CI 1.42–4.58).	Medium
Atwood et al (2012)[3] [35]	Liberia	Evidence-based HIV prevention curriculum adapted for in-school Liberian youth. The 8-modules promoted positive condom attitudes and increased skills and self-efficacy to refuse sex, negotiate condom use and use condoms effectively.	Attention-matched, group RCT: 4 matched pairs of schools randomly assigned to HIV prevention curriculum or general health curriculum. Students completed baseline, immediate post-test, 3- and 9- month follow-up surveys to assess program efficacy (n=740 completed all measures)	The intervention significantly improved protective peer norms (p<.05) and positive condom attitudes (p<.05) at the 9 month follow-up. Among those who were sexually active at baseline, the intervention group used condoms more consistently in the last 3 months (p<.05) at the 9-month follow-up. The intervention did not impact sexual initiation or multiple sex partnerships.	Medium

Author (Year)	Country	Intervention	Evaluation design	Key findings	Quality
Atwood et al (2012)[3] [36]	Liberia	Evidence-based HIV prevention curriculum adapted for in-school Liberian youth. The 8-modules promoted positive condom attitudes and increased skills and self-efficacy to refuse sex, negotiate condom use and use condoms effectively.	Attention-matched, group RCT: 4 matched pairs of schools randomly assigned to HIV prevention curriculum or general health curriculum. Students completed baseline, immediate post-test, 3- and 9- month follow-up surveys to assess program efficacy (n=714 who responded to questions about transactional sex)	Risk behaviors for adolescents who engaged in transactional sex were no different in the intervention or control groups.	Medium
Bannink-Mbazzi et al (2013) [23]	Northern Uganda	PMTCT program including couple VCT, care and treatment for HIV+ individuals, home-based care, partner involvement, follow-up at 18 months post-partum including infant HIV testing	Retrospective record review of PMTCT program data 2002-2011	Of 140,658 women starting ANC, 94.4% received HIV testing. Testing of male partners increased from 5.9% in 2002 to 75.8% in 2011 (p=.001) compared to 15.5% nationally. 79% of HIV+ women started ARVs, compared to 52% nationally. HIV prevalence among exposed infants tested by 18 months decreased from 10.3% in 2004 to 5.0% in 2011 (p=.001).	Medium
Casey et al (2006)[2] [37]	Sierra Leone	HIV/AIDS and STI prevention program comprised of intensive outreach education by peers including a focus on improving negotiation skills and distribution of free condoms targeting youth	Baseline (2001) and post intervention (2003) cross-sectional surveys using purposive quota sampling of youth: n=244 female, 293 male (baseline); n=250 female, 299 male (endline)	Respondents able to name 3 effective means of avoiding AIDS increased from 4% to 36% among female youth and from 4% to 45% among male youth; reported condom use at last sex increased from 16% to 46% (female) and from 16% to 37% (male) (p<.01 for all comparisons).	Medium

Author (Year)	Country	Intervention	Evaluation design	Key findings	Quality
Chen et al (2008)[1] [39]	Guinea	Refugee health workers seconded to health facilities provided free RH services and trained refugee women as lay health workers	Cross-sectional post-intervention multi-stage cluster survey in intervention area of women (n=444) and men (n=445) of reproductive age (Liberian and Sierra Leonean refugees) living in one of 48 refugee camps in Guinea in 1999.	Self-reported STI symptoms were common: 30% among women and 24% among men. Only 25% correctly named key STI symptoms. Respondents citing program facilitators as sources of information were more likely to correctly name key STI symptoms (OR=5.2, 95% CI 1.9-13.9 (men)) and identify effective means of protecting against STIs (OR=2.9, 95% CI 1.5-5.8 (men)) and (OR=4.6, 95%CI 1.6-13.2 (women)).	Medium
Ciccio and Sera (2010) [41]	Northern Uganda	HIV/AIDS prevention activities with youth including media campaigns, peer counseling, life skills training, and activities for youth in particularly vulnerable circumstances to spread prevention messages and help them develop the skills necessary to protect themselves.	Cross-sectional post-intervention survey using lot quality assurance sampling in intervention area (n=1,781 youth age 15-24) in 2008	29% had comprehensive HIV prevention knowledge (knew 3 main means of prevention and rejected common misconceptions). 86% knew where to get tested for, but only 51% had been tested and received their result in the last 12 months. Gender, geographical location, marital status and education were associated with this knowledge (p<.001)	Medium
Culbert et al (2007) [33]	DRC	Voluntary counseling and HIV testing (VCT), care and treatment for HIV+ individuals, HIV prevention activities	Program data review: May 2002-Jan 2006	11,076 people received VCT, of whom 19% were HIV+; 94% of these received follow-up care in the HIV clinics. 12-month mortality among ART patients was 7.9% (95%CI 3.6-12.1), and 12-month loss to follow-up was 5.4% (95%CI 3.2-7.5), both comparable to stable low resource settings. Only 5 of 66 ART patients experienced treatment interruption during violent period of May-June 2004.	Medium

Author (Year)	Country	Intervention	Evaluation design	Key findings	Quality
Garang et al (2009) [26]	Northern Uganda	Care and treatment for HIV+ individuals	Cross-sectional study using systematic sampling of self-reported adherence over 4-day period in February 2008 (n=200 adults on ART)	Mean 4-day adherence (self-reported) was 99.5%, with no difference between IDPs and non-IDPs. Being on a 1st line ART regimen (OR=22.2, 95%CI 1.5-333.3), feeling facility staff were condemning (OR=22.2, 95%CI 1.5-333.3), and lack of privacy at facility (OR=9.7, 95%CI 0.9-111.1) were associated with non-adherence.	High
Kiboneka et al (2008)[4] [28]	Northern Uganda	Care and treatment for HIV+ individuals, facility and home-based care, mobile clinics to IDP camps	Prospective cohort study using program data June 2005 - Feb 2008 (n=57 HIV+ children receiving combination ART)	Adherence was consistently excellent in 92% of patients. No deaths and no major opportunistic infections were recorded after initiation of ART.	Medium
Kiboneka et al (2009)[4] [27]	Northern Uganda	Care and treatment for HIV+ individuals, facility and home-based care, mobile clinics to IDP camps	Prospective cohort study using program data, June 2005 - Jan 2008, (n=1,625 HIV+ adults receiving combination ART)	The mortality incidence rate was 3.48 (95%CI 2.7-4.3) per 100 person years. Of patients with adherence data, 92% had adherence greater than 95%. 4.3% of patients died during follow-up, a mortality rate comparable to ART patients in stable settings. Lower mortality was associated with female sex, higher baseline CD4 count and ≥95% adherence. IDP camp residence and age were not associated with mortality outcomes.	Medium
Larsen et al (2004)[2] [38]	Sierra Leone	HIV/AIDS and STI prevention program comprised of intensive outreach education by peers including a focus on improving negotiation skills and distribution of free condoms targeting commercial sex workers (CSW) and military men	Baseline (2001) and post intervention (2003) cross-sectional surveys using purposive quota sampling: n=201 sex workers, 202 military men (baseline); n=202 sex workers, 205 military men (endline)	Those able to name 3 effective means of avoiding AIDS increased from 5% to 70% among CSWs and from 11% to 75% among military men. Reported condom use at last sex increased from 38% to 68% (CSW) and from 39% to 68% (military) ($p<.01$ for all). Although the proportions of both CSWs and military men who believe HIV+ people should be treated or counselled increased, the proportions believing they should be isolated or reported did not change.	Medium

Author (Year)	Country	Intervention	Evaluation design	Key findings	Quality
O'Brien et al (2010) [29]	Global	Programs of care and treatment for HIV+ individuals in conflict and post-conflict settings	Program data review 2005-2009 (n=20 programs with complete data and n=4,145 HIV+ adults on ART with complete data)	64% of ART patients remained on ART, 10% died, 11% were lost to follow-up. Median 12-month mortality and loss to follow-up were 9% (95%CI 8.8-9.1) and 11% (95%CI 9-12) respectively. Median 6-month CD4 gain was 129 cells/mm^3.	Medium
Pyne-Mercier et al (2011) [30]	Kenya	Care and treatment for HIV+ individuals	Retrospective record review for clients on ART during post-election violence, Dec 30, 2007 - Feb 28, 2008, and same time period 1 year earlier (n=2,534 HIV+ adults)	The odds of treatment interruption were 71% (95%CI 34-118) higher during the post-election violence period compared to 1 year earlier. Men (OR=1.4, 95%CI 1.1-1.8) and those traveling ≥3 hours to clinic (OR=1.9, 95%CI 1.3-2.7) were more likely to experience treatment interruption.	High
Rutta et al (2008) [25]	Tanzania	2-year pilot PMTCT program in refugee camp: community education, training providers, VCT, infant feeding, counseling, administration of nevirapine	Program data review Oct 2002 - June 2004 (n=6 health facilities)	92% of ANC clients were tested for HIV. 93% of HIV+ women agreed to take nevirapine at 34 weeks of gestation. 36% of the HIV+ women were repatriated before delivery, but 98% of those remaining took nevirapine at the start of labor and their infants received nevirapine within 72 hours. Only 15% of HIV-exposed infants were tested at 18 months due to repatriation, death or refusal of testing.	Medium
Tanaka et al (2008) [42]	Tanzania	HIV/AIDS prevention including youth peer education, VCT, free condom distribution in Nyarugusu refugee camp	Post-intervention survey of systematically selected Congolese refugees of reproductive age (n=570 male and 570 female) living in the refugee camp in 2005	HIV risk increased after displacement due to increased transactional sex and forced sex (p<.001). Condom use at last sex with a non-regular partner was 14% and associated with citing the program health teams as a leading source of influence regarding HIV prevention	Medium

Author (Year)	Country	Intervention	Evaluation design	Key findings	Quality
Vreeman et al (2009)[5] [31]	Kenya	Care and treatment for HIV-infected children	Retrospective cohort analysis of HIV+ children under 14 years seen from Oct-Dec 2007 in 18 clinics (n=2,585), and then followed from Dec 2007 until April 2008.	93% of HIV-infected children returned to care in the 4 months after the violence, and 98% of children on ART reported perfect adherence during last 7 days (p<.001). Children on ART were more likely to return than those not on ART (OR=1.4, 95%CI 1.2-1.6). Orphan status and sex were not associated with return to clinic.	Medium
Walldorf et al (2012) [34]	Haiti	HIV/AIDS clinical services including VCT, PMTCT, care and treatment for HIV+ individuals	Program data Oct 2008-May 2010 comparing pre-earthquake (prior to Dec 2009) to post-earthquake outcomes (n=126 facilities)	Mean monthly enrollment for VCT, PMTCT and ART services were from 41-46% of baseline levels in Jan 2010 but rose to 79-89% of baseline levels in May 2010. Current ART patients rose 3.6% Jan – May 2010 compared to a 9.8% increase during the same period in 2009.	Medium
Woodward et al (2011)[1] [40]	Guinea	Refugee health workers seconded to health facilities provided free RH services and trained refugee women as lay health workers	Cross-sectional post-intervention multi-stage cluster survey in intervention area of women (n=444) and men (n=445) of reproductive age (Liberian and Sierra Leonean refugees) living in one of 48 refugee camps in Guinea in 1999.	HIV knowledge was high. Participants exposed to program peer education had higher odds of reporting changes in sexual behavior to avoid HIV (OR=2.5, 95%CI 1.5-4.1). Exposed participants were less likely to report staying faithful (OR=0.6, 95%CI 0.4-0.9) and more likely to report fewer sex partners (OR=1.7, 95%CI 1.05-2.85).	Medium
Yoder et al (2012)[5] [32]	Kenya	HIV/AIDS care and treatment for HIV-infected children	Retrospective cohort analysis for 3 time periods: pre-election, Oct 26-Dec 25 2007; immediately post-election, Dec 26, 2007 - Apr 15, 2008; and long-term post-election, Apr 16-Dec 31, 2008 (n=2,549 HIV+ children)	Children on ART had less initial loss to follow-up (p<.01) and less complete loss to follow-up (p<.0001) than children not on ART. Immediately post-election, 8.2% of children on ART had imperfect medication adherence, and 9.0% long-term post-election.	Medium

Author (Year)	Country	Intervention	Evaluation design	Key findings	Quality
General RH					
McGinn & Allen (2006) [44]	Guinea	Literacy training using RH information as the content and participatory adult education techniques for Sierra Leonean and Liberian women living in refugee camps	Post-intervention cross-sectional survey of RH literacy program students who participated in 1999, 2000 and 2001 RH literacy courses and were still in the area in 2002 (n=549)	The proportion of women who reported communication with their partners on RH topics increased to 87% (p<.001). Current use of FP was 50%. The proportion of women who reported feeling more empowered than other women increased from 32% (based on recall) to 82% after the program (p<.001).	Medium
Sullivan et al (2004) [43]	Thai-Burma border	Program to improve quality of RH services and build health providers' capacity in monitoring and evaluation	Pre- and post-intervention facility audits, observations of client-provider interactions during ANC and FP visits, client exit interviews (2001-2003)	Improved program readiness contributed to improved quality of information given to clients, technical competence and integration of services, although some contradictory findings from client exit interviews warrant further exploration.	Low

[1,2,3,4,5] *These articles refer to the same program.*

Paper 2: Contraceptive availability leads to increased use in conflict-affected Democratic Republic of Congo: evidence from surveys and facility data

Abstract

Humanitarian assistance standards mandate specific attention to address the sexual and reproductive health (SRH) needs of conflict-affected populations. Despite these internationally recognised standards, access to SRH services is still often compromised in war. CARE strengthened public health facilities to provide contraceptive services in eastern Democratic Republic of the Congo. Cross-sectional surveys in 2008 (n=607) and 2010 (n=575) of women of reproductive age using a multi-stage cluster sampling design and facility assessments were conducted in Kasongo health zone in 2008 and 2010. Data on the numbers of clients who started a contraceptive method were also collected monthly from supported facilities. Current use of any modern contraceptive method doubled from 3.1% to 5.9% (adjusted OR 2.03 [95%CI 1.3-3.2]). Current use of long-acting and permanent methods (LAPM) increased from 0 to 1.7%, an increase that was no longer significant after adjustment. Program changes were made to improve quality in 2010; provider skills and counseling improved and commodities became routinely available. Service statistics indicate that the percentage of clients who accepted a LAPM at supported facilities increased from 8% in 2008 to 83% in 2014. This study demonstrates that when good quality contraceptive services, including LAPM, are provided among conflict-affected populations, women will choose to use them.

Introduction

Complex humanitarian emergencies caused by armed conflict devastate already weak national health systems through the destruction of health facilities and flight of trained health workers [1]. Women living in conflict and post-conflict settings may face many sexual and reproductive health (SRH) concerns including high risk of mortality or morbidity due to pregnancy-related causes, unintended or unwanted pregnancy due to lack of information or access to contraceptive services, complications of unsafe abortions, gender-based violence and sexually transmitted infections including HIV [2, 3]. The ten countries with the highest maternal mortality ratios in the world are affected by, or emerging from, war; these countries are also characterized by low contraceptive prevalence [4, 5]. Minimum standards of humanitarian assistance now recognize this increased risk and require attention to the SRH needs of the population [6]. Despite this, the availability of contraceptive services and information is still weak [7].

Implementing comprehensive contraceptive services reduces the number of maternal deaths, particularly in countries with low contraceptive prevalence [8]. Maternal mortality and contraceptive prevalence have a strong negative correlation indicating that contraceptive services are a key intervention to prevent maternal mortality [8, 9]. According to the Countdown to 2015 for Maternal, Newborn and Child Survival, a reduction in maternal mortality and morbidity requires, among other changes, increased coverage of comprehensive contraceptive services [10, 11]. Good quality contraceptive programs provide a broad range of methods, and evidence suggests that increased method choice is associated with increased contraceptive use [12, 13].

Context and program description

Nearly two decades of war and instability in eastern Democratic Republic of the Congo (DRC) have resulted in a compromised health system. Between 1998 and 2004, the conflict resulted in an estimated 3.9 million excess deaths [14]; the crude mortality rate was more than 70% higher than pre-war levels [15]. DRC has the sixth highest maternal mortality ratio in the world at 730 maternal deaths per 100,000 live births and a lifetime risk of maternal death of one in 23 [5]. The World Health Organization (WHO) determined that DRC made ‘insufficient progress’ towards achieving the fifth millennium development goal of improving maternal health [5]. For example, the DRC government contributes less

than 1% of the cost of procuring contraceptives compared to 1-60% among other African countries [16, 17]. An index measuring the efforts of national contraceptive programs ranked DRC among the ten lowest performing countries in the world [18]. Modern contraceptive prevalence remains low at 7.8% in 2013, a small increase from 2007 (5.8%) [19]. Since 2012, the DRC government has made a greater commitment to contraceptive services; however, this has yet to diffuse to the provincial level, especially the conflict-affected eastern provinces [16].

Kasongo, in southern Maniema province in eastern DRC, was heavily affected by the conflict in the late 1990s and early 2000s and subsequent population displacement. The conflict exacerbated Kasongo's already substantial isolation by halting river and railroad traffic; the poor roads fell further into disrepair. CARE International began supporting Ministry of Health (MOH) health services in Kasongo health zone in 2002, including limited contraceptive services: short-acting methods in all government health facilities and IUDs in two facilities beginning in 2004. According to current DRC MOH policy, health centres are mandated to provide all short- and long-acting reversible methods while referral hospitals are expected to also provide permanent methods. In late 2007, CARE partnered with the Reproductive Health Access, Information and Services in Emergencies (RAISE) Initiative [20] to improve SRH services in Kasongo. The partnership improved emergency obstetric care and contraceptive services in the referral hospital and 20 government health centers in the zone (increased to 21 centers in late 2009 when a health post was upgraded). CARE collaborated closely with the MOH zone team to strengthen their capacity to supervise SRH services at the facilities in their health zone. In 2009, short and long-acting reversible contraceptive methods were reinforced or introduced in the 22 health facilities, once basic emergency obstetric care was established. Tubal ligation was available at the hospital, primarily conducted during caesarean sections, although it was not as strongly reinforced as other methods; vasectomy was not available. In 2011, CARE's program shifted to provide more in-depth support for contraceptive services in a smaller number of facilities (nine) in Kasongo [21].

To address personal preferences and respond to changing clinical needs over the life course, a broad range of methods is an essential component of good contraceptive programming [22-25]. According to Bruce's quality of care framework, essential elements of good quality contraceptive services include clinical competence of providers, counselling skills including the information given to clients,

interpersonal skills, support for continuation of method use and integration with other health services [22]. CARE support to the health facilities included the essential components of good quality contraceptive services: competency-based clinical training for providers with supportive supervision, training on contraceptive counselling, provision of essential equipment and supplies and monitoring and evaluation. Mechanisms to improve continuation of method use and follow-up of short-acting method users were put in place. In addition, support was provided to the MOH to improve supply chain management, and revise contraceptive services registers to collect relevant data.

Few data are available to guide the effective provision of contraceptive services in conflict-affected settings, and the challenges to collecting data in these settings are well-recognised [26, 27]. An evaluation using pre-intervention and post-intervention cross-sectional surveys is appropriate when randomising clients is not, due to the fundamental principle of client choice in contraceptive programming [28]. In this paper, we discuss the results of cross-sectional population-based surveys and facility assessments conducted in 2007/2008 and 2010 to evaluate the effectiveness of the health facility provision of contraception, by the MOH with CARE support, in Kasongo health zone.

Methodology

Survey design & sample

Two cross-sectional population-based surveys were conducted in Kasongo health zone in February 2008 and October/November 2010. A multi-stage cluster sampling design was used to ensure representation of the entire health zone population. Sampling was based on a 95% confidence interval and 50% prevalence, the most conservative estimate which requires the largest sample size [29]. Using MOH population estimates for villages in the catchment areas of each health facility, 25 clusters were selected using probability proportional to size. Within each cluster, 25 (2008) or 23 (2010) households were systematically selected. In 2008, after selection of the 25 clusters, two clusters were found to be inaccessible due to poor roads impassable because of rain; therefore, two additional clusters were selected. A single woman of reproductive age (15-49 years) was selected from all eligible women in each household using a Kish table [30]. Anticipating an 80% response rate, a total of 625 households was selected in 2008 to achieve the required sample of 500 women; the response rate of 97% resulted in 607

respondents. In 2010, expecting a similarly high response rate, 575 households were selected resulting in a total of 564 respondents.

Procedures

The survey questionnaire was adapted from the US Centers for Disease Control and Prevention's *Reproductive Health Assessment Toolkit for Conflict Affected Women* [31]. The same questionnaire was used in 2008 and 2010 with minor adaptations to enhance clarity. The questionnaire covered multiple SRH topics; this paper focuses on the results related to contraception. The original CDC questionnaire was translated into French; all adaptations were made in the French version which was then translated into Congolese Swahili. The translation was reviewed and revised by the baseline survey team.

All interviewers were female to ensure cultural appropriateness while increasing the likelihood of accurate data collection on SRH topics. During consecutive trainings for supervisors and interviewers, they learned SRH terminology and survey techniques, and participated in practical exercises to assure mastery of material. The questionnaire was piloted in villages that were not included in the survey samples.

Ethical considerations

Respondents were asked to give oral informed consent; names were not entered on survey questionnaires to preserve anonymity. Ethical approvals for the survey were obtained from the Institutional Review Board of the Mailman School of Public Health, Columbia University and the Congolese MOH.

Statistical Analysis

Data were double-entered into CSPro Version 3.1 and subsequently exported to PASW (SPSS) Version 21 for cleaning and analysis. Data were weighted according to the number of eligible women of reproductive age in the household to reflect the population of Kasongo health zone. Logistic regression was used to calculate odds ratios (ORs) to compare contraception outcomes in 2008 and 2010, adjusting

for differences in the distribution of key population demographics which may influence contraception outcomes.

Modern contraceptive methods are defined as oral contraceptive pills, injectables, male and female condoms, implants, IUDs, tubal ligation, vasectomy. Long-acting methods are defined as implant and IUD; permanent methods as tubal ligation and vasectomy. Results are reported for all women, married and unmarried, unless otherwise specified. Regression models excluding unmarried women who were not sexually active produced the same results as those including all women.

Facility assessments

Facility assessments were conducted in November/December 2007 and in July 2010 to detail the capacity of 22 health facilities to provide SRH services. The assessment teams used a standardized tool and methods including interviews with facility staff, a room by room inventory of equipment and supplies and clinical records review to evaluate physical infrastructure, human resources, infection prevention procedures and SRH service readiness defined as the availability and functionality of essential equipment and supplies and presence of trained providers.

Service statistics

Data on the numbers of clients who started a contraceptive method were collected monthly from the 22 facilities from January 2008 through May 2011, and from nine facilities June 2011 through December 2014.

Results

Surveys

The women in our 2008 and 2010 samples were similar with respect to age, marital or cohabitation status, ability to read, number of living children and having experienced an unwanted pregnancy (Table 1). Most respondents were under 35 years old, married, unable to read well or at all and had three or more children. More women reported being Muslim in 2010 (73.1%) than in 2008 (66.4%), while fewer reported being Protestant in 2010 (3.7%) compared to 2008 (8.0%). Although the

percentage who reported being able to read easily remained the same, more women reported having at least some secondary education in 2010 (23.0%) than in 2008 (17.9%).

Significant increases in four categories of knowledge and use of modern contraception between 2008 and 2010 are shown in Table 2. When asked to name any modern contraceptive method, 28.0% spontaneously mentioned at least one modern method in 2008 compared to 49.5% in 2010 (p<.001). In addition, 6.0% of women in 2008 spontaneously named a long-acting or permanent method (LAPM) while 10.3% of women did so in 2010 (p=.001). The percentage who reported having received instruction on how to use a modern method increased from 28.8% in 2008 to 44.5% in 2010 (p<.001), while those who reported having been instructed how to use an LAPM nearly doubled, from 7.9% in 2008 to 16.7% in 2010 (p<.001).

Ever use of any modern method increased from 11.5% to 18.8% (p<.001), while ever use of an LAPM increased from 0.3% to 2.0% (p=.02). Current use of a modern contraceptive method doubled from 3.1% in 2008 to 5.9% in 2010 (p=.004), while use of any LAPM increased from 0 in 2008 to 1.7% in 2010 (p<.001). The increase in current use of any modern method persisted when adjusted for religion and education (adjusted OR 2.03 [95%CI 1.3-3.2]). However, the increase in current use of a LAPM was no longer significant after adjusting for these socio-demographic variables. Increases in knowledge of LAPM (adjusted OR 1.87 [95%CI 1.3-2.6]) and having received instruction on how to use LAPM (adjusted OR 2.2 [95%CI 1.7-3.0]) persisted after adjustment. An adjusted model which excluded unmarried women who were not sexually active produced the same results as above.

Among women reporting current use of a modern contraceptive method in 2010, 81.1% reported a health facility as the source of the method while 19.0% of respondents, all of them condom users, reported a pharmacy or market as their source.

Facility assessments

In 2007, all 21 facilities reported having provided pills and injectables in the three months prior to the assessment and 20 had the methods currently in stock; two reported providing IUDs and had them in stock, while no facility had implants or any staff trained to provide them (Table 3). In 2010, nearly all facilities had provided pills, injectables and implants in the three months prior to the assessment and had

them in stock, while seven facilities had provided IUDs and nine had them in stock. All facilities had staff trained to insert and remove implants and 19 had staff trained to insert and remove IUDs in 2010.

Service statistics

From January 2008 to May 2011, the 22 CARE-supported facilities provided contraceptive methods to 9,939 clients starting a method, including 2,202 who selected a LAPM (Figure 1). The percentage of clients who accepted a LAPM increased from 8% in 2008 to 30% in 2010. From June 2011 to December 2014, 17,872 clients started a method at nine CARE-supported facilities, 13,708 of whom accepted a LAPM. The percentage of clients who accepted a LAPM increased dramatically to 83% in 2014. The method mix changed from dominance of short-acting methods in 2008-2010 to long-acting methods in 2012-2014; use of tubal ligation did not change (Figure 2).

Discussion

Our results demonstrate that increasing contraceptive use, even in remote conflict-affected settings, is feasible. Kasongo is an isolated, inaccessible region that was highly affected by the conflict of the late 1990s/early 2000s in eastern DRC. Knowledge of contraception was very low in 2008, with barely a quarter of respondents able to spontaneously name a modern contraceptive method; only half were able to do so in 2010, lower than the 70% found in rural areas nationally in the 2007 Demographic and Health Survey [32]. While contraceptive use remained low overall, prevalence nevertheless doubled from 2008 levels. The contraceptive prevalence of 6% found in this study was higher than the 3.6% and 4.6% found in rural areas of DRC in 2010 and 2013 [19, 33]. We believe that the CARE program was the source of contraceptive method for most respondents who reported current use in 2010 as all except some condom users reported a health facility as their source. This program supported all of the public health facilities in the health zone; the facility assessments showed that contraceptive methods were available at all of the supported facilities; and interviews with the MOH health zone medical officer indicated that no private facilities provided contraception in Kasongo at the time.

As shown elsewhere, demand for birth spacing or limiting exists in conflict-affected populations [34], yet contraceptive services are often neglected in humanitarian settings [7, 35]. Few humanitarian

organizations have prioritized contraception, especially long-acting and permanent methods, while SRH agencies rarely work in humanitarian settings [2, 7]. When such services are available in humanitarian settings, they often are limited to short-acting methods as was the case in Kasongo prior to 2008. Previous research documents that when contraceptive method choice expands, prevalence usually increases [12, 13] perhaps because it provides more options or greater ability to meet women's and couples individual needs.

While population-level survey data are important, people only use services that are available and of reasonable quality. Long-acting reversible contraceptive methods were new in Kasongo when they were introduced under this program, as demonstrated by the low knowledge of these methods and their near absence in facilities in 2008. The facility assessments revealed that long-acting methods were available in the supported facilities by 2010, and nearly all facilities had staff trained to provide all short- and long-acting methods. While all but one facility had implants in stock and reported providing implants in the three months prior to the 2010 assessments, just under half had IUDs in stock and had provided IUDs. While use of long-acting methods increased only slowly in the first two years of service provision, the service statistics show a dramatic change after 2010. Program adjustments were made to improve quality which likely contributed to the increased numbers of clients after 2010. The proportion of clients accepting a long-acting method increased from 8% of new acceptors in 2008 to 30% in 2010, and then to 84% in 2014. Program data demonstrate a steady and sharp increase in implant acceptors, from 115 new acceptors in 2008 to over 600 in 2010 and more than 1,500 in 2014. IUD acceptors, on the other hand, increased at a much slower rate early in the program, from 11 new acceptors in 2008 to 31 in 2010, and then to over 1,400 in 2014. Our results demonstrate that demand for contraception, including long-acting methods, is present even in humanitarian settings, and that women will use them when they are available and of reasonable quality.

All CARE support was coordinated with the MOH thus strengthening the health system, an important component of post-conflict recovery [1]. Health system strengthening is a long term process. The initial focus of the program beginning in 2008 was on improving emergency obstetric care; contraceptive services were introduced in mid-2009. Improving the MOH logistics system took time. To avoid increasing demand for contraception before services were in place to meet the demand, the

program focused first on establishing good quality contraceptive services, and less emphasis was placed on community education and outreach activities. Greater emphasis was appropriately placed on community education in the latter years as described below.

These survey results led CARE to focus strongly on quality improvement after 2010 - enhancing on-the-job training to improve counseling, address provider bias towards IUDs and ensure providers maintained clinical competency [21]. One barrier to the provision of LAPM, identified here and in similar programs, is limited provider competence [36, 37]. While all facilities had providers trained to provide long-acting methods, a potential reason for the slower increase in LAPM use from 2008-2010 could be related to provider confidence in their ability to provide these methods. Although efforts were made to ensure each provider had clinical practice during training, the low numbers of IUD acceptors, in particular, early in the program made it difficult for providers to maintain their skills or confidence in their skills, which may have discouraged them from offering these methods to clients. Supervisors worked with providers to identify weaknesses in service provision and jointly develop plans to address them. For example, supervisors carried anatomic pelvic models during supervision visits to permit providers to practice inserting IUDs under observation with a checklist which gave them greater confidence in their skills. CARE and the MOH also improved training on counseling with adaptations from the Population Council's *Balanced counseling strategy* and the World Health Organization's *Decision-making tool for family planning clients and providers* which use a series of job aids and an algorithm to promote unbiased contraceptive counseling [38, 39].

Other potential reasons for the initial limited increase in LAPM use from 2008-2010 may be bias against LAPM, fear of side effects or misinformation regarding particular methods in the community [40]. To identify these potential barriers, CARE conducted a community analysis and developed education messages to address them. In addition to the program's network of community educators, local community groups and satisfied users also conducted education on contraception. CARE also established more systematic supervision and support of community educators in which they observed their competence with a checklist, established expectations and regularly discussed challenges they faced and how to overcome them. This more routine engagement allowed CARE to more quickly respond to rumors and misinformation in the community.

These survey results were used to address challenges related to provider bias and competence as well as barriers at community level. Although a third survey has not been conducted, the service statistics suggest that CARE's model of working with the MOH and community networks has resulted in increasing utilization of contraception, and particularly of long-acting methods. The data suggest that while clients are interested in long-acting methods, barriers to IUD use among the community and providers took longer to address. Making good quality contraceptive services available was challenging and required sustained effort, time and program adjustments, but was ultimately successful. Given true choice, when a range of methods was routinely available, women were able to choose the method that best served their needs, increasingly long-acting methods. This research adds to the limited evidence that increasing method choice is associated with increased contraceptive use in isolated humanitarian settings.

Limitations

Data were collected in two cross-sectional surveys in 2008 and 2010 rather than using control communities, a choice made for ethical reasons. This makes it difficult to identify changes in contraceptive prevalence that would have occurred without this program. However, the lack of alternative sources of contraceptive services in Kasongo health zone, the numbers of new clients recorded in the supported health facilities and the increases in knowledge of contraceptive methods and increased ever and current use of contraception provide strong evidence to infer success of the program [28, 41].

Conclusion

In conflict-affected countries, contraceptive availability is often limited to short-acting methods or none at all. This study demonstrated that contraceptive prevalence doubled between 2008 and 2010. Service statistics suggest that utilization of long-acting methods continued to increase to a majority among new clients after 2010, when provider skills and counseling improved and the methods became routinely available. Strengthening the health system to provide contraception enables individuals to exercise their right to prevent unintended pregnancies while improving the long-term sustainability of these services. This study demonstrates that even in remote and unstable settings like Kasongo, when

good quality contraceptive services, including long-acting and permanent methods, are in place, women will choose to use them.

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Tables and Figures

Table 1 Socio-demographic characteristics of the populations sampled in 2008 and 2010

	2008 (N=1006, 607)[1]	2010 (N=1007, 564)[1]	p-value
Age (years)			p=.088
15-24	42.9% (264)	38.1% (215)	
25-34	31.4% (187)	33.6% (193)	
35-49	25.7% (155)	28.3% (156)	
Mean age (SD), years	28.0 (9.2)	28.8 (9.6)	p=.05
Marital status			p=.099
Married & living with husband	82.8% (517)	82.5% (486)	
Married & not living with husband	5.7% (38)	7.8% (34)	
Not married, living with partner	0.7% (3)	0.3% (2)	
Not married, not living with partner	10.8% (49)	9.3% (42)	
Number of living children			p=.416
0	18.3% (96)	16.6% (77)	
1-2	29.5% (199)	27.6% (168)	
3-4	27.7% (158)	29.0% (164)	
5+	24.5% (153)	28.3% (155)	
Religion			p<.001
Muslim	66.4% (394)	73.1% (404)	
Catholic	18.8% (115)	18.8% (107)	
Protestant	8.0% (55)	3.7% (23)	
Pentecostal/Evangelical	4.5% (29)	3.1% (24)	
Other	2.4% (14)	1.4% (6)	
Formal education			p=.037
None	35.6% (204)	34.1% (205)	
Did not complete primary school	35.6% (224)	32.4% (187)	
Completed primary school	10.9% (60)	10.5% (59)	
At least some secondary education	17.9% (119)	23.0% (113)	
Self-reported ability to read			p=.307
With difficulty or not at all	76.3% (453)	74.3% (434)	
Easily	23.7% (154)	25.7% (130)	
Number of lifetime pregnancies			p=.55
0	12.1% (57)	11.3% (54)	
1-2	21.5% (145)	22.3% (130)	
3-4	21.0% (129)	22.1% (128)	
5-9	34.7% (217)	31.9% (188)	
10+	10.7% (59)	12.3% (64)	
Reported an unwanted pregnancy			p=.419
No	73.9% (443)	75.6% (441)	
Yes	26.1% (163)	24.4% (123)	

Data are % of column weighted base (absolute counts), unless indicated. Bases are smaller for some variables due to missing data. Missing data are less than 0.5% for all variables.

[1]N=weighted and unweighted base

Table 2 Reported knowledge and use of modern family planning methods in 2008 and 2010

	2008 (95%CI) (N=607)[1]	**2010 (95%CI)** (N=564)[1]	**p-value**	**Unadjusted OR (95%CI)** (N=1171)	**Adjusted OR (95%CI)[2]** (N=1171)	**p-value, Adjusted OR**
Spontaneous knowledge of modern contraceptive methods						
Any modern method	28.0% (25.1-30.7)	49.4% (46.3-52.6)	p<.001	2.5 (2.1-3.0)	2.7 (2.2-3.2)	p<0.001
Any LAPM[3]	6.0% (4.4-7.6)	10.3% (8.5-12.2)	p=.001	1.8 (1.3-2.5)	1.87 (1.3-2.6)	p<0.001
Reported prior instruction on how to use modern contraceptive method						
Any modern method	28.8% (26.2-31.7)	44.5% (41.4-47.5)	p<.001	1.98 (1.6-2.4)	1.98 (1.6-2.4)	p<0.001
Any LAPM[3]	7.9% (6.2-9.5)	16.7% (14.5-19.1)	p<.001	2.3 (1.8-3.1)	2.2 (1.7-3.0)	p<0.001
Reported ever use of modern contraceptive method						
Any modern method	11.5% (9.6-13.5)	18.8% (16.4-21.3)	p<.001	1.8 (1.3-2.8)	1.8 (1.4-2.4)	p<0.001
Any LAPM[3]	0.3% (0.0-0.7)	2.0% (1.1-2.8)	p=.02			
Reported current use of modern contraceptive method						
Any modern method	3.1% (2.0-4.2)	5.9% (4.5-7.4)	p=.004	1.96 (1.3-3.0)	2.03 (1.3-3.2)	p=.002
Any LAPM[3]	0%	1.7% (1.0-2.6)	p<.001			

[1] N=unweighted base

[2]Adjusted for religion and education

[3]Long-acting and permanent methods (LAPM) are IUD, implant, tubal ligation and vasectomy

Table 3 Number of facilities providing contraceptive services in 2007 and 2010

	2007 (n=21)			**2010 (n=22)**		
	Provided in previous 3 months (self-reported)	Method currently in stock	At least one staff trained to provide	Provided in previous 3 months (self-reported)	Method currently in stock	At least one staff trained to provide
Pills	21	20	21	22	21	22
Injectables	21	20	21	20	20	22
IUDs	2	2	2	7	9	19
Implants	0	0	0	21	21	22

Figure 1: Number of clients who started each contraceptive method and percentage who started LAPM in health facilities supported by CARE in Kasongo, DRC (n=22, 2008-May 2011 and n=9, June 2011-2014)

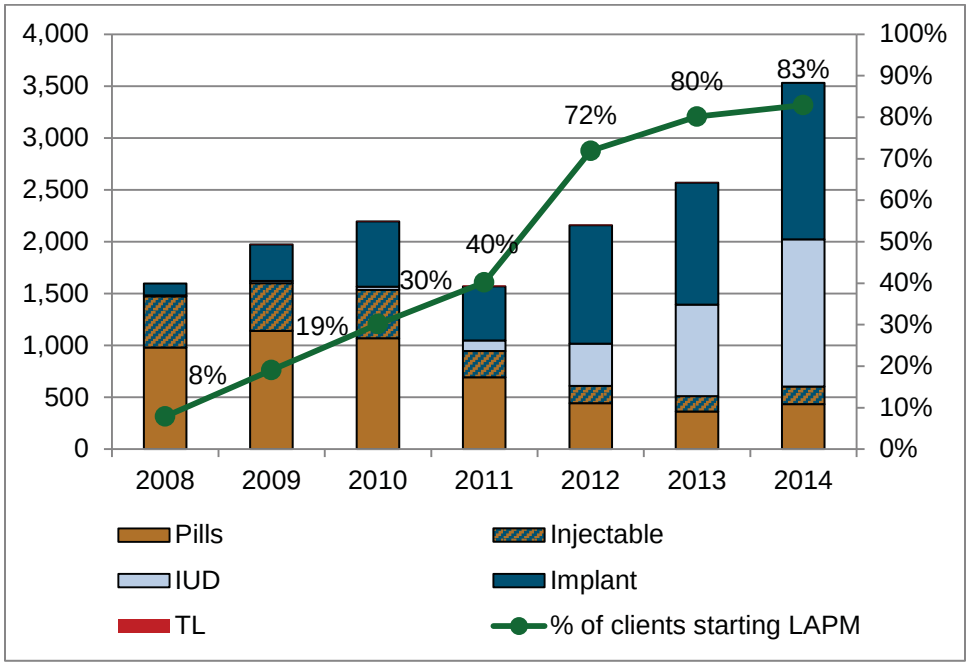
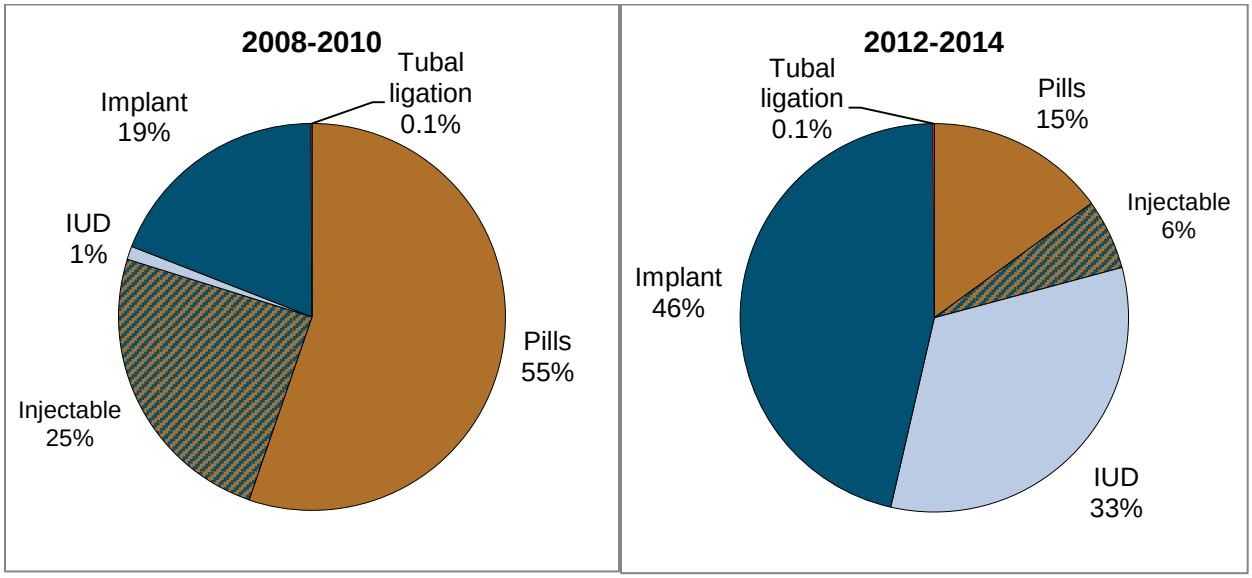


Figure 2: Contraceptive method mix from 2008-2010 (n=22 facilities) and 2012-2014 (n=9 facilities), Kasongo, DRC



Paper 3: Twelve-month continuation among women starting short- and long-acting reversible contraceptives in North Kivu, DRC

Abstract

Despite the inclusion of sexual and reproductive health (SRH) services in the minimum standards of health care in humanitarian settings, access to SRH services, and especially to contraception, is still often compromised in war. Very little is known about continuation, switching and discontinuation of contraceptive methods in these settings. An evaluation of a contraceptive services program in North Kivu, Democratic Republic of Congo (DRC) was conducted to measure 12-month contraceptive continuation. A systematic random sample of 553 women who initiated a short-acting (pills, injectables) or long-acting (IUDs, implants) contraceptive method 12-18 months prior to data collection was interviewed about their contraceptive use. At 12 months, 81.6% women reported using their baseline method continuously, with more long-acting than short-acting method acceptors (86.1% versus 78.0%, p=.02) continuing method use. Use of a short-acting method (HR 1.74 [95%CI 1.13-2.67]) and desiring a child within two years (HR 2.32 [95%CI 1.33-4.02]) were associated with discontinuation at 12 months. Given the association between service quality and contraceptive continuation, the program's focus on service quality including improvements to provider skills and activities to ensure contraceptive availability likely contributed to these results. The impressive continuation rates found here indicate that delivering high quality contraceptives services in these settings is possible, even in a difficult and unstable setting like eastern DRC.

Introduction

The complex humanitarian emergencies caused by armed conflict are characterized by social disruption, population displacement and the breakdown of national health systems [1, 2]. In addition to their need for shelter, food, water and primary health care, women living in humanitarian settings face many sexual and reproductive health (SRH) concerns including high risk of mortality or morbidity due to pregnancy-related causes, unintended or unwanted pregnancy due to lack of information or access to contraceptive services, complications of unsafe abortions, gender-based violence and sexually transmitted infections including HIV [3]. Minimum standards of humanitarian assistance now recognize this increased risk and require attention to the SRH needs of the population [4].

Although access to SRH services has improved in humanitarian settings, a 2012-2014 evaluation of SRH in humanitarian settings showed limited progress for contraception relative to other SRH components [5]. Only 14.9% of the humanitarian health appeals[3] from 2009-2013 requested funding for contraceptive services, the smallest share of any of the SRH components; contraceptive services subsequently received the lowest dollar amount among SRH components (US$76.3 million out of US$1.5 billion) [6]. Further, long-acting and permanent methods were rarely mentioned in the appeals. While some of the 63 health facilities assessed in three humanitarian settings provided pills and injectables, fewer met the minimum quality criteria to provide long-acting or permanent methods [7]. Overall, the findings of the 2012-2014 global evaluation reflected the limited attention still given to the provision of contraceptive services in humanitarian settings.

Recent evidence suggests that contraceptives, including a broad range of methods, can be effectively provided and will be used by women and men in humanitarian settings [8-10]. However, no studies have explored contraceptive continuation in these settings. Effective contraceptive programs not only help women to adopt methods when they choose, but also ensure that women are satisfied with their method or help them switch to a new one, and encourage continuity of their preferred method as long as they wish. An analysis of 60 Demographic and Health Surveys (DHS) from 25 countries in Africa, Asia, eastern Europe and Latin America found that over one-third of women discontinued their method by 12

[3]Appeals for funding are launched when needs exceed the ability of a government or a single agency to respond to a crisis. The study reviewed project and funding data from these appeals that were reported to the UN Office for the Coordination of Humanitarian Affairs' Financial Tracking Service, which records international humanitarian aid to crises where appeals have been launched.

months of use, with 17% - 62% stopping due to method-related reasons including side effects [11]. Discontinuation is generally higher for hormonal methods, for short-acting methods, and among younger women [11-13]. Evidence suggests that the availability of a broader range of methods is associated with lower discontinuation by making it easier for women to switch to a different method if they are dissatisfied with their original choice [14, 15]. Although research on the specific association between service provision and discontinuation is mixed [16], an analysis of DHS data from 15 countries found that 7%-27% of women discontinued their method in the first year for reasons related to the quality of the service delivery, most of which could be addressed through quality improvement activities [17]. Overall, the evidence suggests that service quality and continuation are associated [15, 17, 18], but no research has addressed the specific needs of women in unstable or conflict settings and how best to support them to continue contraceptive use and avoid unintended pregnancies.

Context and program description

Two decades of war and instability in the Democratic Republic of the Congo (DRC) have resulted in a compromised health system. The population of North Kivu continues to be exposed to high levels of violence and displacement [19]. DRC has the sixth highest maternal mortality ratio in the world at 730 maternal deaths per 100,000 live births [20], and is characterized by low contraceptive use. The 2013 DHS found that modern contraceptive prevalence was 7.8% nationally, and 4.6% in rural areas, with male condoms the most commonly used modern method [21]. Use of long-acting and permanent methods was very low at 1.7% nationally, and 1.1% in rural areas. Since 2012, the DRC government has made a greater commitment to improve contraceptive services; this has yet to diffuse to the provincial level [22].

Save the Children, in collaboration with Columbia University's Reproductive Health Access, Information and Services in Emergencies (RAISE) Initiative [23], began supporting the Ministry of Health (MOH) to provide contraceptive services and post-abortion care in 34 public health facilities in three rural health zones of North Kivu, DRC in July 2011, and in five facilities in Goma, the provincial capital, in November 2012. Short- and long-acting reversible contraceptive methods (pills, injectables, condoms, implants and IUDs) were introduced at health centers and hospitals. Training on post-placental IUD insertion beginning in late 2012 offered more contraceptive options at all facilities, while training on

permanent methods in 2015 made male and female sterilization more available at the hospitals. All contraceptive methods were provided free of charge in the supported facilities.

Program support to the health facilities addressed Bruce's fundamental elements of quality for contraceptive services: availability of a range of short- and long-acting methods, competency-based clinical training for providers, training on contraceptive counselling, provision of essential equipment and supplies and improved monitoring and evaluation [24]. Mechanisms to improve continuation of method use and follow-up of short-acting method users were put in place. The program also trained community health workers (CHW) as well as satisfied clients, peer educators, community leaders and local community associations to conduct education about contraception in the supported health zones. Community mobilization supervisors visited with the CHWs and provided coaching on communications skills and different strategies to present and discuss key messages. In addition, they helped the program to identify rumors about contraception in the community and respond to them quickly.

Once the services were in place, the program expanded its focus on quality improvement. Two in-depth program reviews were conducted by RAISE to identify areas needing improvement and to help program and MOH staff develop ways of addressing them. Nurses were trained to provide short- and long-acting methods to ensure their availability at health center level. The program maintained more than one trained provider at each facility to ensure that contraceptive services were sustained during staff absences. All training organized by the program was competency-based, meaning each provider practiced on anatomic models and live clients under observation by skilled trainers until competence was attained. Clinical supervisors provided regular supportive supervision, had good supportive relationships with facility staff with whom they identified problems and solutions together.

Providers and supervisors were trained to analyse and use their facility data to identify problems and improve services. Each month, the health facility team developed graphs, discussed their data and recorded specific actions to take in response to problems highlighted by the data. These included both changes in the facility as well as working with the CHWs and satisfied clients to improve community education. Quarterly data reviews by Save the Children and MOH supervisory staff reinforced this process.

The program provided essential equipment, supplies and methods to the facilities. Re-supply was organized primarily through the health zone MOH office. After some initial problems with stock-outs, facility staff received additional training in stock management and forecasting. Supervisors reviewed stock levels with staff during monthly supervision visits. Although insecurity and poor roads presented challenges to maintaining correct stock levels, stock-outs at the health zone level were minimized.

More than 50,000 women started a modern contraceptive method between June 2011 and December 2015 at the 34 supported facilities; 58% of them chose a long-acting reversible contraceptive (LARC): IUD or implant (Figure 1). The program appropriately focused on introducing high quality contraceptive services and helping clients to start a method. However, they recognized that it is also important to support women to continue use of the contraceptive method that best suits them. Understanding the reasons clients discontinue or continue contraceptive methods can help improve programs and ultimately contribute to helping them to effectively plan their families. To determine what women did after leaving the health facility with a contraceptive method, the program undertook a retrospective cohort study of clients who started a contraceptive method the previous year.

Methodology

Study design and sample

Nine Save the Children-supported MOH facilities in Mweso and Masisi health zones were selected for this evaluation based on the average client load, their accessibility and the level of security in their catchment areas. A sample of women who initiated a short-acting (pills, injectables) or long-acting (IUDs, implants) contraceptive method 12-18 months prior to data collection was drawn from the registers of these facilities for interviews. A sample size of 211 LARC and 306 short-acting method acceptors was calculated based on a 95% confidence interval (CI) assuming 20% discontinuation for LARCs and 50% for short-acting methods [25-27]. A minimum of 100 acceptors of each of the four methods was desired. We extracted a sample 70% larger than needed to account for anticipated difficulties locating women for interviews given the unstable population and far distances, and the need to exclude the high numbers of clients who lived outside the facility catchment area. A random sample of injectable acceptors, a systematic sample of implant acceptors and all IUD and pill acceptors from June through August 2014

(May through August for IUD clients) were identified. Data on the method the woman chose, the date she started the method, her name, age and village name were extracted. Women whose village was outside the catchment area of the facility were then deleted from the sampling frame.

Once data collection began, new militia movements prevented access to one facility and its catchment area. In addition, the use of CHWs to locate clients was found to be infeasible in the urban location of three selected facilities. Four additional rural facilities were selected to replace the four that could not be used. Because these facilities had lower client loads than the original four, the team listed all clients who started one of the four methods from April through September 2014 (implants for May through August only).

Study procedures

The study questionnaire was adapted from other sources for this study, including the US Centers for Disease Control and Prevention's *Reproductive Health Assessment Toolkit for Conflict Affected Women* and the DHS questionnaire [28, 29]. The consent form and survey tool were developed in French, and then translated and back-translated into Congolese Swahili and Kinyarwanda. The translations were reviewed and revised by the study team. The questionnaire was piloted among clients not included in the study sample.

The study team worked with the providers at the facilities and affiliated CHWs to identify the selected women. CHWs or nurses visited the selected women in their homes to ask if they were willing to discuss their use of health services at the facility with an interviewer. According to MOH policy and current practice, these CHWs already visit women in their homes to discuss their health care and remind them of follow-up appointments for contraception so it is not unusual for the CHWs to visit women at home. The CHWs were told that the women were selected as clients of the health facility, not as contraceptive acceptors, to maintain their confidentiality. Once a woman agreed to participate, a trained female interviewer interviewed her in private. Women who were interviewed at a location outside their villages were given a sachet of salt and a bar of soap to reimburse their travel time. Data collection took place in October and November 2015.

Ethical considerations

Respondents were asked to give oral informed consent; names were not entered on survey questionnaires to preserve anonymity, and records used to locate the client were destroyed once she was located. Ethical approvals for the study were obtained from the Institutional Review Board of the Mailman School of Public Health, Columbia University, the Ethical Review Committee of Save the Children and the North Kivu Provincial MOH.

Statistical analysis

Data were entered into CSPro 6.0 and subsequently exported to PASW (SPSS) Version 23 for cleaning and analysis. Discontinuation is defined as women's reporting they stopped continuous use of their baseline contraceptive method within 12 months of accepting the method. Two women who were missing dates for discontinuation were excluded from the analysis. Key socio-demographic characteristics of short-acting method versus LARC acceptors were compared using chi-square statistics for categorical data and t-tests for continuous data. Where significant differences were found, the characteristics were compared by method using Pearson chi-squares or one-way analysis of variance. Kaplan-Meier estimates of the probability of discontinuation stratified by type of baseline method (short-acting or LARC) were plotted using the Wilcoxon (Breslow) test to assess differences in the survival curves.

Unadjusted and adjusted Cox proportional hazard ratios were estimated to assess factors associated with discontinuation. Only factors that showed differences by baseline method type and that are commonly associated with discontinuation were added to the hazards model. These factors included type of baseline method (short-acting/LARC), age and parity (continuous variables), displacement in the past year (yes/no), and desire for more children (wanted children within two years, wanted children after two years or wanted no more children). To assess possible problems of collinearity, separate analyses were run with parity and desire for more children; because the results showed no significant differences, the results here present both variables.

Current contraceptive users are defined as those who continued their baseline method use plus those who stopped their baseline method but switched to another modern method sometime during the study period and were still using it on the interview date.

Results

A total of 548 contraceptive acceptors was interviewed: 304 who started a short-acting method and 244 who started a LARC in the 12-18 months prior to the interview. Table 1 shows that LARC acceptors were slightly older than short-acting method acceptors (mean age 28.9 versus 27.5, p=.01). Half of LARC acceptors (50.4%) reported having been displaced at least once in the previous year compared to 36.5% of short-acting method acceptors (p=.001). No other socio-demographic differences were found among short- and long-acting method acceptors. In the overall sample, most women were married or in union (82.7%) and half had no formal education (51.1%). Mean parity for the women was 5.3 with a mean of 4.2 living children. The vast majority of respondents wanted no more children (44.3%) or to wait more than two years for their next pregnancy (36.3%). An analysis by baseline method found that IUD acceptors were older (mean age 30.6, p<.001) and more likely to have been displaced (60.4%, p<.001), and had higher mean parity (6.0, p=.05) than other method acceptors.

Most women reported that their partner was aware of their contraceptive use (79.3%) and approved (79.1%). Consistent with these results, 69.9% reported the decision to use contraception was made jointly while 27.0% reported it was primarily her decision. Women reported the health center (78.6%) and community health workers (63.1%) as their primary sources of information about contraception. Before starting their baseline method, the vast majority of the women (88.3%) had never used contraception. The main reasons given for deciding to begin contraceptive use included wanting to delay pregnancy (85.4%), feeling tired or having health problems (44.9%) or wanting no more children (19.3%). Women reported that the provider discussed other methods with them (93.4%), but that they themselves decided which method to choose (75.0%) or they decided based on the provider's counselling (14.1%). Satisfaction with the services received when they started their method was very high, with 93.6% reporting complete satisfaction.

At 12 months, 81.6% women reported using their baseline method without interruption, with more LARC acceptors than short-acting method acceptors (86.1% versus 78.0%, p=.02) continuing method use (Table 2). The most common reasons given for discontinuation were that the women desired pregnancy (42.6%) or experienced side effects (32.7%). Only one discontinuer reported stock-outs as the reason for discontinuing method use. Figure 2 presents the Kaplan-Meier survival curves, with separate curves for women who started short-acting methods and LARCs; due to the low numbers of discontinuers, median time to discontinuation could not be calculated. Use of a short-acting method was associated with discontinuation at 12 months (HR 1.74 [95%CI 1.13-2.67]) when adjusted for age, parity, displacement in the last year and desire for more children (Table 3). Of these covariates, only desiring a child within two years (HR 2.32 [95%CI 1.33-4.02]) or after two years (HR 1.72 [95%CI 1.02-2.90]) as compared to wanting no more children were associated with discontinuation.

Of the 101 women who discontinued their baseline method within 12 months, 55.4% stopped using any modern method for the remainder of the observation period, 8.9% switched immediately and 35.6% switched sometime later during the observation period to another modern method. The majority of the switchers (60.0%) switched to a method of the same or similar effectiveness; 28.9% switched to a more effective method and only 11.1% switched to a less effective modern method (Table 4).

One-third (35.7%) of current contraceptive users reported having experienced problems with their current method, primarily body or headaches (69.2%) and menstrual changes (73.4%), and most of these women (90.5%) sought care at a facility (Table 5). Excluding switchers from this analysis produced similar results. IUD users were least likely to report any problem (24.7%), and also least likely to report menstrual changes as a problem (47.6%, p<.001 for both). Most women who sought care (90.8%) reported that the problem was resolved to their satisfaction. Current users reported high overall satisfaction with their method (98.7%), and planned to continue their contraceptive use (98.3%). Over half of LARC users said they wanted to continue their method for five years or longer (52.8%, p=.001), while half (51.7%) of short-acting method users projected using their method for two to four years. The majority of IUD users (60.2%, p=.001) reported wanting to continue method use for five years or more.

Discussion

More than four-fifths of women in our study were still using their baseline method at 12 months. While continuation was higher among LARC acceptors than among short-acting method acceptors (86.1% versus 78.0%), as expected, both rates were higher than commonly found in other studies [27, 30, 31]. Moreover, continuation was similarly high across age, education level and displacement status. These results provide evidence that effective contraceptive programs that result in adoption and continuation can be successfully implemented in complex humanitarian settings. Further, this evaluation lends support to the association between service quality and contraceptive continuation [15], the impressive continuation rates found here indicate that delivering high quality contraceptives services in these settings is possible. As previously described, this program addressed Bruce's six elements of quality of care which clearly enhanced the contraceptive continuation rates.

Nearly half of the discontinuers switched to another modern method during the study period, although fewer than one in ten did so immediately. The program could better assist women who wish to switch methods to do so immediately so they are not placed at risk of an unintended pregnancy. Of the discontinuers who switched to a different method, 60% changed to a method of similar effectiveness and 29% switched to a more effective LARC. This reflects the success the program is having with counseling and making a range of effective short- and long-acting methods truly available to this population.

While LARC acceptors were slightly older and more likely to have been displaced in the last year, few differences in other socio-demographic characteristics between baseline method types were found. These data suggest that access to methods is equitable and women choose the method they want. Displaced women may be more likely to choose a LARC to avoid the need for resupply visits given the instability of their current living situation. Few women reported previous contraceptive use, reinforcing the notion that when good quality contraceptive services are put in place, women will use them, and may in fact be highly motivated to continue use.

A recent analysis of evidence related to contraceptive discontinuation identified several key programmatic strategies to reduce discontinuation: improving service quality, reducing provider bias and improving technical competence, eliminating stock-outs, increasing access through multiple service delivery options and facilitating task sharing to lower level cadres [15]. As described earlier, the

program's strong focus on quality improvement addresses many of these issues which may therefore have contributed to the high continuation rates. For example, only one woman reported discontinuation due to stock-outs, suggesting the program successfully made all methods consistently available. Mid-level providers (nurses) were trained to provide all short- and long-acting methods at health center level, thereby increasing access to them in this rural area. To ensure technical competence, supervisors observed provider skills twice a year using a checklist and used a database to track provider performance. Clinical supervisors used the data to develop individual support based on each provider's need. For example, few clients initially chose IUDs. During supportive supervision visits, it was discovered that providers had had little opportunity to practice after their initial training, and they subsequently lacked confidence in their skills and therefore underemphasized IUDs during counselling. Supervisors subsequently carried anatomic models to their supervision visits to observe the providers' skills and provide coaching. The introduction of post-placental IUDs may have led to increases in IUD acceptance, by adding a new service delivery option, as this method became more familiar to both providers and clients. Making all methods truly available was important as a greater range of available methods increases method choice, and is also associated with lower discontinuation [14].

In addition to improving provider competence, reducing provider bias is also associated with higher continuation [15]. Few women in our sample were under 21 years old or unmarried reflecting program review findings that some providers were uncomfortable providing contraception or specific methods to adolescent and unmarried women. Values clarification activities to discuss attitudes that were unfavourable to good quality care were conducted regularly. Supervisors reinforced the need to treat all clients with respect and offer all women informed choice. The program organized refresher trainings that focused specifically on counselling skills and attitudes to ensure that the providers discussed the range of methods from which the woman could choose. These results also highlight the need for multi-year donor funding which permitted the program to focus on these quality improvement activities once the basic services were in place.

It is notable that nearly three in four women reported reasons for discontinuing related to a change in their own reproductive intention and not to program weaknesses, i.e., they desired pregnancy or wanted to switch methods. Consistent with other studies, side effects were reported by one-third of

both short-acting and LARC acceptors as a reason for discontinuation, suggesting a need for additional support to providers to respond to side effects and to improve initial counseling about them [11, 32]. Despite anecdotal evidence from program staff and providers that rumors and misinformation in the community about contraception were problems, only a few women mentioned these as reasons for discontinuation, perhaps due to the 'rapid response' mechanism the program's community mobilization team developed to respond to each new rumor before it spreads. For example, when word spread through the community that a former implant user's pregnancy ended in a stillbirth, the team identified a satisfied user who could speak to the community about her prior implant use and show the healthy baby she delivered after removal.

The vast majority of participants reported learning about contraception from program activities. The broad range of community actors helped to reach men, which may have contributed to the high rates of joint decision-making and partner approval in this population. The facilities had a system that used CHWs to remind women who did not return for their next set of pills or next injection of their missed appointments. However, during data collection for this study, we found that male CHWs were less helpful or able to find women using the available information. Female CHWs and providers were much better at knowing who their clients were. In DRC, most MOH-affiliated CHWs are male; therefore, the system to promote continuation could be improved, particularly by involving more women as CHWs. To address this gap, Save the Children trained and supported a cadre of female peer educators and satisfied users.

Just over one in three current contraceptive users reported experiencing a problem with their method; short-acting method users were more likely to report menstrual changes, especially increased menses, than LARC users. This is consistent with other studies finding high levels of side effects reported by pill and injectable users [11, 15, 33]. Since hormonal methods represent nearly 90% of this program's method mix, supporting providers to respond to side effects is crucial. The program provided extra coaching to providers on responding to side effects which may have contributed to the low discontinuation as nine in ten women who sought care for their problem reported the problem resolved. Although IUD discontinuers were as likely as other discontinuers to report side effects as a reason for discontinuation of the method, current IUD users were least likely to report any problem, and particularly a problem with menstrual changes, compared to the other method users. This suggests that if women are

supported through the early side effects after IUD insertion, they end up reporting fewer problems with their method later on.

The high percentage (over 80%) of women who did not want to become pregnant within two years likely also contributed to the high continuation rates. This program has successfully integrated LARCs into their method mix, and clients are highly satisfied with the methods. It is, however, notable that more than one in three short-acting method users said they wished to continue contraceptive use for five or more years. In this rural area with far distances, poor or non-existent roads, high insecurity and frequent displacement, these women may be interested in switching to a LARC that does not require return visits to the facility every three months. Further, nearly half of respondents reported wanting no more children, making them potential candidates for sterilization. Now that sterilization is more available, the program should improve education about permanent methods for those who are finished with child bearing. Good quality services that ensure the availability of a range of short-acting, long-acting and permanent contraceptive methods and encourage immediate switching among those who are dissatisfied with their method allow women to exercise their reproductive choice.

Limitations

Due to insecurity and poor road access, a subset of supported facilities was identified from which clients were selected rather than selecting the sample from all supported facilities. Clients from outside the catchment areas of the facilities were excluded; clients who lived more than two hours walking distance from the facilities are underrepresented as they were more difficult to locate for interviews. The sample is therefore not representative of all clients starting a method at Save the Children-supported facilities in North Kivu. Continuation may be overestimated in our sample as a woman could have reported continuous use of pills or injectables even if she returned late for a subsequent dose. In addition, those who lived furthest away from the facility, and may therefore have more difficulty returning for the next dose of a short-acting method, are underrepresented. Due to low client numbers, clients from more than one month were selected to ensure sufficient sample size, meaning that women were interviewed 13-19 months after beginning their method to ensure they had the opportunity to use it for at least 12 months at the time of the interview. The data are therefore subject to recall bias: women may have

misremembered the timing or the circumstances surrounding their starting, stopping or switching a method. Finally, courtesy bias may have affected the responses to the service quality questions.

Conclusion

This study demonstrates that women can be supported to continue use of their desired contraceptive method, even in a difficult, unstable and low prevalence setting like eastern DRC, where 82% of our sample continued method use at 12 months. A focus on service quality and efforts to address provider skills and ensure consistent availability of commodities likely contributed to the high rates of contraceptive use and continuation. This highlights the need for multi-year funding in humanitarian settings to enable this emphasis on quality improvement. When good quality services, with a choice of short-acting, long-acting and permanent methods, are in place, women will not only choose to start, but also continue, to use contraception to exercise their right to reproductive choice.

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Tables and Figures

Figure 1: Contraceptive method mix, Save the Children program, DRC, Jun 2011-Dec 2015.

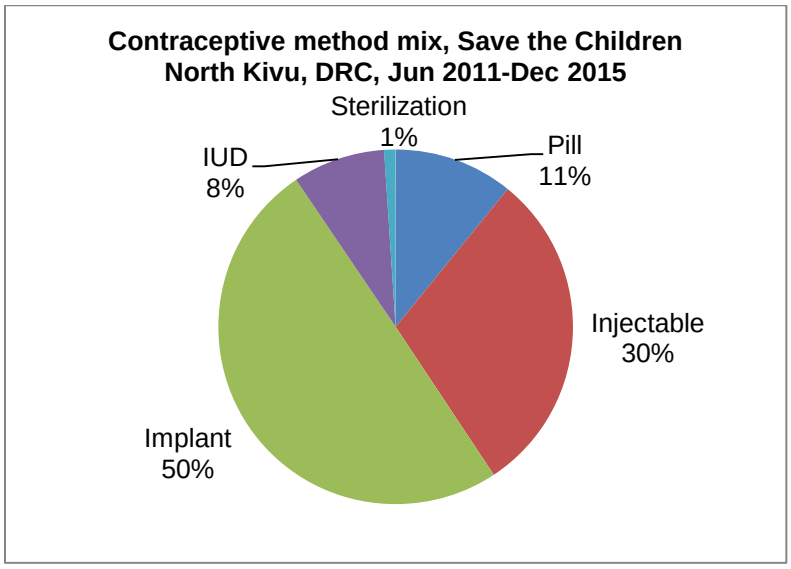

Table 1 Characteristics of respondents, by baseline method type

	Total acceptors (N=548) %(n)	Short-acting acceptors (n=304) %(n)	LARC acceptors (n=244) %(n)	p-value
Age (years)				
18-24	32.5% (178)	36.2% (110)	27.9% (68)	p=.017*
25-34	48.5% (266)	48.7% (148)	48.4% (118)	
35-49	19.0% (104)	1510% (46)	23.8% (58)	
Mean age (SD), years	28.1 (6.3)	27.5 (6.1)	28.9 (6.5)	p=.009*
Displaced in last year	42.7% (234)	36.5% (111)	50.4% (123)	p=.001*
Marital status				p=.938
Married & living with husband	82.7% (453)	82.2% (250)	83.2% (203)	
Married & not living with husband	3.3% (18)	3.6% (11)	2.9% (7)	
Not married, living with partner	1.8% (10)	1.6% (5)	2.0% (5)	
Not married, not living with partner	12.2% (67)	12.5% (38)	11.9% (29)	
Religion				p=.598
Protestant	43.8% (240)	45.1% (137)	42.4% (103)	
Catholic	16.1% (88)	16.1% (49)	16.0% (39)	
Adventist	20.8% (114)	21.1% (64)	20.6% (50)	
Pentecostal/Evangelical	17.0% (93)	16.4% (50)	17.7% (43)	
Other or no religion	2.2% (12)	1.3% (4)	3.3% (8)	
Formal education				p=.607
None	51.1% (280)	50.5% (153)	52.0% (127)	
Some primary school	18.4% (101)	17.8% (54)	19.3% (47)	
Completed primary school	11.5% (63)	10.9% (33)	12.3% (30)	
At least some secondary education	18.8% (103)	20.8% (63)	16.4% (40)	
Parity (lifetime pregnancies)				
0-1	5.5% (30)	6.6% (20)	4.1% (10)	p=.360
2-4	38.9% (213)	40.5% (123)	36.9% (90)	
5-9	46.4% (254)	44.7% (136)	48.4% (118)	
10+	9.3% (51)	8.2% (25)	10.7% (26)	
Mean parity (SD)	5.3 (3.0)	5.13 (2.934)	5.61 (3.013)	p=.063
Mean number of living children (SD)	4.2 (2.1)	4.1 (2.111)	4.3 (2.091)	p=.301
Desire for more children				p=.307
Within 2 years	18.1% (99)	20.3% (61)	15.8% (38)	
More than 2 years	36.3% (199)	34.6% (104)	39.6% (95)	
Wants no more children	44.3% (243)	45.2% (136)	44.6% (107)	
Partner aware of contraceptive use	79.3% (405)	81.0% (230)	77.1% (175)	p=.333
Partner approves of contraceptive use	79.1% (404)	81.0% (230)	76.7% (174)	p=.277
Decision to start contraception				p=.624
Joint decision	69.9% (380)	70.4% (212)	69.1% (168)	
Primarily my decision	27.0% (147)	25.9% (78)	28.4% (69)	

	Total acceptors (N=548) %(n)	Short-acting acceptors (n=304) %(n)	LARC acceptors (n=244) %(n)	p-value
Primarily husband/partner	3.1% (17)	3.7% (11)	2.5% (6)	
Ever used contraception before	11.7% (64)	12.5% (38)	10.7% (26)	p=.593
Complete satisfaction with services received[1]	93.6% (513)	93.4% (284)	93.9% (229)	p=.976

*Test of significance p<.05

[1]Includes satisfaction with the facility's cleanliness, the providers' friendliness, the amount of time spent at the facility, the privacy during her time with the provider, the care she received, the respect shown to her by the provider and the expectation that the provider will keep her information secret.

Table 2 Baseline method use

	Total acceptors (N=548) %(n)	Short-acting acceptors (n=304) %(n)	LARC acceptors (n=244) %(n)	p-value
Baseline method used continuously for 12 months				p=.02*
No	18.4% (101)	22.0% (67)	13.9% (34)	
Yes	81.6% (447)	78.0% (237)	86.1% (210)	
	(n=101)	**(n=67)**	**(n=34)**	
Reason for discontinuing baseline method				
Desired pregnancy	42.6% (43)	44.8% (30)	38.2% (13)	p=.678
Wanted to switch method	28.7% (29)	32.8% (22)	20.6% (7)	p=.292
Side effects	32.7% (33)	29.9% (20)	38.2% (13)	p=.532
Partner/family disliked	5.9% (6)	4.5% (3)	8.8% (3)	p=.669
Became pregnant while using	8.9% (9)	7.5% (5)	11.8% (4)	p=.480
Rumours/method bad for her	5.0% (5)	3.0% (2)	8.8% (3)	p=.332
Other reasons	5.9% (6)	7.5% (5)	2.9% (1)	p=.661
Switched to another modern method				p=.998
No	55.4% (56)	55.2% (37)	55.9% (19)	
Yes, right away	8.9% (9)	9.0% (6)	8.8% (3)	
Yes, after awhile	35.6% (36)	35.8% (24)	35.3% (12)	

*Test of significance p<.05

Figure 2 Kaplan-Meier survival curve for 12 month continuation of reversible contraceptives: short-acting and LARC acceptors, Breslow chi-square p=.015

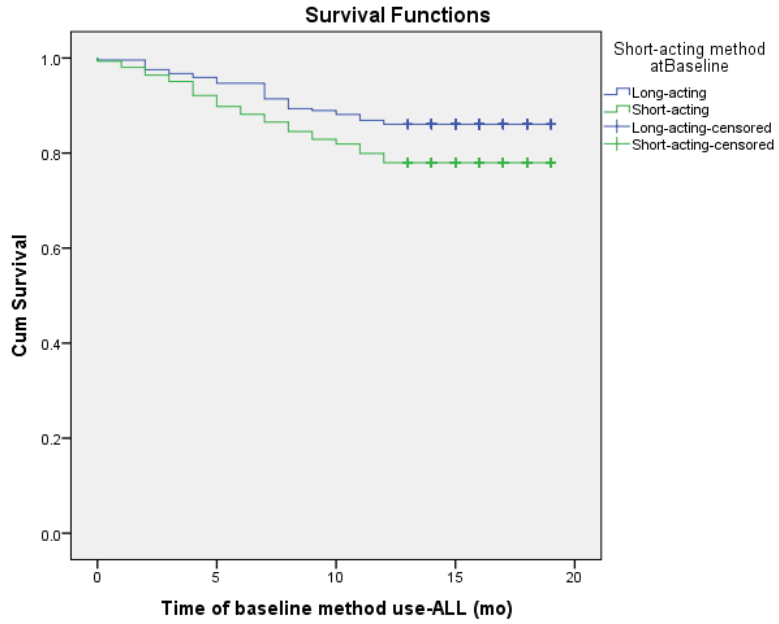

Table 3 Unadjusted and adjusted hazard models predicting risk of discontinuation of baseline method at 12 months

	Unadjusted HR (95%CI)	p-value	Adjusted HR (95%CI)[1]	p-value
Method type				
Short-acting	1.65 (1.10-2.50)	p=.017	1.74 (1.13-2.67)	p=.012*
LARC	1 (reference)		1 (reference)	
Age (years)	.983 (.953-1.015)	p=.305	.994 (.952-1.04)	p=.780
Displaced in last year (yes)	1.25 (.846-1.85)	p=.263	1.08 (.707-1.64)	p=.731
Parity (no. of lifetime pregnancies)	.874 (.932-1.06)	p=.874	1.044 (.955-1.14)	p=.343
Desire for more children				
Within 2 years	2.33 (1.40-3.89)	p=.001	2.32 (1.33-4.02)	p=.003*
More than 2 years	1.62 (1.01-2.59)	p=.045	1.72 (1.02-2.90)	p=.041*
Wants no more children	1 (reference)		1 (reference)	

[1]Adjusted for age, displacement status, parity, desire for more children (df=6)
*Test of significance p<.05

Table 4 Status of discontinuers (n=101)

Baseline method	Changed to:	n	%	Direction of change in efficacy
Short-acting (n=67)	No method or traditional method	37	36.6%	↓
	Short-acting method	17	16.8%	←→
	LARC	13	12.9%	↑
LARC (n=34)	No method	19	18.8%	↓
	Short-acting method	5	5.0%	↓
	LARC	10	9.9%	←→

Table 5 Experiences of current contraceptive users

	Current users (N=474) %(n)	Short-acting users (n=250) %(n)	LARC users (n=224) %(n)	p-value
Experienced problem with current method	35.7% (169)	39.1% (97)	32.3% (72)	p=.148
Type of problem				
Head or body aches	69.2% (117)	73.2% (71)	63.9% (46)	p=.259
Nausea or vomiting	18.9% (32)	22.7% (22)	13.9% (10)	p=.213
Menstrual changes[1]	73.4% (124)	83.5% (81)	59.7% (43)	p=.001*
Other problems	5.3% (9)	4.1% (4)	6.9% (4)	p=.645
Sought care for problem at a health facility	90.5% (153)	91.8% (89)	88.9% (64)	p=.717
Problem resolved to her satisfaction	90.8% (138)	93.2% (82)	87.5% (56)	p=.429
Satisfied overall with method	98.7% (468)	99.2% (246)	97.3% (217)	p=.157
Plans to continue method use	98.3% (466)	99.2% (249)	97.3% (219)	p=.113
Projected time to continue current method use				p=.001*
Less than 2 years	9.1% (42)	11.7% (28)	6.4% (14)	
2-4 years	46.6% (215)	51.7% (124)	40.8% (89)	
5 or more years	44.3% (204)	36.7% (88)	52.8% (115)	
Projected mean number of months to continue current method use (SD)	45.5 (26.5)	42.3 (25.834)	49.54 (26.980)	p=.007*

*Test of significance p<.05

[1]Includes reports that period stopped, increased or became irregular.

Conclusion

Overview of the dissertation

This series of studies addresses the dearth of evidence on effective implementation of contraceptive services in humanitarian settings. A systematic review of the literature examined whether programs providing SRH services in humanitarian settings were being evaluated, and which SRH technical components received more attention than others. Next, a contraceptive services program among conflict-affected and internally-displaced populations in Maniema province, DRC was evaluated using cross-sectional studies, facility assessments and routine facility data. Finally, an evaluation of a contraceptive services program in North Kivu province, DRC measured 12-month contraceptive continuation.

Summary of the Findings

The systematic review found that programs providing SRH services in humanitarian settings were not being evaluated, and that contraceptive services were mostly limited to short-acting methods and received less attention than other SRH technical components. In comparison to the program evaluation papers identified, three times as many papers were found that reported SRH descriptive or prevalence data in humanitarian settings. While data demonstrating the magnitude of the problem are crucial and were previously lacking, the need for SRH services and for evaluations to measure their effectiveness is clear. Contraceptive services were under-represented among the papers suggesting that these services overall receive less attention than the other SRH components in humanitarian settings. This finding led to the subsequent studies which responded to this lack of evidence of successful contraceptive programs in these settings.

In the second paper, current use of any modern contraceptive method doubled from 3.1% to 5.9% between 2008 and 2010 in Maniema, DRC. Current use of long-acting and permanent methods increased from 0 to 1.7%, although this increase was no longer significant after adjustment. However, service statistics indicated that utilization of LARCs continued to increase after 2010, from 8% of clients who started a method in 2008 to 83% among new clients in 2014. Program changes were made to improve quality in 2010; provider skills and counseling improved and commodities became consistently

available. This study demonstrates that when good quality contraceptive education and services, including LARCs, are provided among conflict-affected populations, women will choose to use them.

The third paper found that 12-month contraceptive continuation in North Kivu, DRC was high (86.1%) among clients who started a LARC but also among short-acting method acceptors (78.0%). Use of a short-acting method and desiring a child within two years were associated with discontinuation. This evaluation lends support to the association between service quality and contraceptive continuation. The program's focus on service quality including improvements to provider skills and activities to address provider attitudes likely contributed to these results. The impressive continuation rates found here indicate that delivering good quality contraceptives services in these settings is possible, even in a difficult and unstable setting like eastern DRC.

Implications and public health significance

This dissertation represents a major contribution to the field of SRH in humanitarian settings, and has implications for research and programs. First, these results strengthen the evidence base for the implementation of contraceptive services in humanitarian settings, and demonstrate to implementers and donors of humanitarian aid that effective programs resulting in adoption and continuation of contraceptive methods can be successfully implemented in these challenging settings. DRC presents challenges common to many humanitarian settings with periods of acute conflict and stability, internally displaced populations who settled in either camps or among host communities, and weak government services. Results from DRC are relevant to many other humanitarian settings in Africa and Asia, although they may be less relevant for middle-income countries in crisis.

The publication of this evidence from specifically conflict-affected populations demonstrates that demand exists in these settings; therefore humanitarian actors should reconsider their assumptions that women do not want or will not use contraception, and consider contraceptive services as routine components of humanitarian health response. These studies also highlight the need for multi-year funding in humanitarian settings to enable good quality program implementation. These results have the potential to change the perceptions of implementers and donors regarding the need for and the feasibility

of implementing contraceptive services in humanitarian settings and ensure that more people affected by humanitarian crises gain access to these crucial services.

Second, these programs worked through the MOH and supported MOH facilities and providers, thus strengthening the health system. Health system strengthening is a long-term process, but is an important component of post-conflict recovery [1]. The positive results found in these studies took time to achieve, again suggesting a need for multi-year funding, but are more likely to be sustained as all program components were implemented in collaboration with the MOH, including training, supervision and supplies management. While dedicated donor funding was certainly critical to achieving such positive results, the capacity-strengthening of MOH staff should continue to contribute to improvements in contraceptive services in DRC, especially in light of the government's more recent commitment to contraceptive services [2].

Third, the programs achieved these impressive results a) in rural DRC where they introduced contraceptive services, in many cases, for the first time, and b) managed by multi-sectoral, as opposed to SRH-specific, non-governmental organizations (NGOs). The programs attracted early adopters of contraception and demonstrated that these new acceptors could also be supported to continue contraceptive use as long as they wished. Demand for contraception existed in these areas, and these early adopters then talked to their friends and neighbors about their contraceptive use. It is likely that the vast majority of women living in these supported health zones know at least one woman who uses contraception. A review of facility registers found that a significant minority of clients traveled from outside the facility catchment areas to obtain contraception; this suggests that women have heard these services are available and are subsequently motivated to travel some distance to obtain them, often selecting LARCs. These services have the potential to bring about social change by enabling women, many for the first time, to plan when and if they became pregnant.

Not only were the services new to the program areas, it is important to note that the NGOs that supported these programs, CARE and Save the Children, are not SRH-specific NGOs but rather multi-sectoral agencies that support primary health care services. When we began working together a decade ago, providing good quality contraceptive services with a range of methods was new to them as well. The

positive results of this dissertation demonstrate that an NGO that provides primary health care can and should make good quality contraceptive services a priority.

Finally, both programs discussed in these papers focused strongly on quality improvement which clearly contributed to the positive findings. When specific weaknesses were identified, such as provider bias or lack of confidence with IUD insertion skills, the programs made changes to address them. Similar strategies were employed by both organizations including improved training on counseling, supportive supervision and coaching of providers to improve competence. The programs expanded the range of community educators and activities to educate the community about contraception. They established more systematic supervision and support of these community actors and regularly discussed challenges they faced and how to overcome them. Encouraging providers to understand and use their clinical data motivated them to identify and develop solutions to problems in their facilities. Finally, improvements to logistics systems ensured consistent availability of contraceptive commodities. Multi-year donor funding permitted these programs to focus on quality improvement once the basic services were in place. This emphasis on the quality of the contraceptive services contributed to the positive results of these studies.

Future research directions

As more organizations choose to implement contraceptive services in humanitarian settings, it will be important to document how these programs achieved their success so that others may learn from their efforts. It is also important to incorporate program evaluation and implementation science into more programs to determine the best SRH service delivery strategies in humanitarian settings. This includes not only conducting and applying program research but also the publication and sharing of results.

Formative research on the women who are not using or have not used contraception but who want to space or limit births is needed to understand how to reduce their barriers to access. Although male involvement was not explicitly addressed in these studies, this is an important topic, the further exploration of which would strengthen programs. A prospective cohort study to explore discontinuation, switching and continuation of contraception could provide more detail on specific reasons for stopping and starting contraceptive use.

Finally, further research is needed to address other elements needed to bring about change in the humanitarian field, including barriers and facilitators of NGOs' decision-making processes to begin providing contraceptive services that include short-acting, long-acting and permanent methods. An exploration of the broader relevant issues like gender norms, political implications of displacement and their effect on contraceptive use would further contribute to the changes needed.

Conclusion

Making good quality contraceptive services available is challenging and requires sustained effort, funding and program adjustments, but, in the programs studied here, was ultimately successful. Given true choice, when a range of methods was routinely available, women, many of whom had no prior experience with contraceptive use, were able to choose the method that best served their needs, increasingly long-acting methods, and continue to use their preferred method. These studies add to the limited evidence on contraception in humanitarian settings, and demonstrate that even in remote and unstable settings, when good quality contraceptive services, with a choice of short-acting, long-acting and permanent methods, are in place, women will not only choose to start, but also continue, to use contraception to exercise their right to reproductive choice.

References

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