



SUPPLEMENT ARTICLE

RED for PMTCT: An adaptation of immunization's Reaching Every District approach increases coverage, access, and utilization of PMTCT care in Bondo District, Kenya☆

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ABSTRACT

Gaps exist in coverage, early access, and utilization of prevention of mother-to-child transmission of HIV (PMTCT) services in Kenya. The Maternal and Child Health Integrated Program, led by Jhpiego, piloted an adaptation of immunization's Reaching Every District (RED) approach in Bondo District as a way of improving PMTCT care. Routine district-level monthly summary service delivery pre- and post-implementation data were analyzed. Marked improvements resulted in the proportion of HIV-infected and non-infected pregnant women completing four focused prenatal care visits, from 25% to 41%, and the proportion of HIV-exposed infants (HEIs) tested at six weeks, from 27% to 78% ($P < 0.001$). The proportion of HEIs tested for HIV infection at 12 months was 52%, while 77% of HEIs were issued antiretroviral prophylaxis by the end of the pilot. Implementation of RED for PMTCT demonstrated that PMTCT services can be delivered effectively in the context of the existing community strategy and resulted in increased coverage, access, and utilization of care for HIV-positive pregnant women and their children.

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1. Background

An estimated 35.3 million people are living with HIV globally, around 70% of whom are in Sub-Saharan Africa [1]. Although new HIV infections among children have dropped by 52% since 2001, and access to services for the prevention of mother-to-child transmission (PMTCT) of HIV has increased over the years, children are still disproportionately affected, with an estimated 260 000 (230 000–320 000) of new HIV infections in 2012 occurring among children [1]. In Kenya, HIV transmission from mother to child is considered one of the biggest health and development challenges. Out of Kenya's estimated population of 38.6 million in 2009 with 1.55 million births [2], the national HIV prevalence among pregnant women in 2013 was 6.0% [3], with an estimated 81 000 children exposed to the virus through maternal-to-child transmission

[4]. The number of HIV-positive infants from those HIV-positive pregnancies is estimated at 22 000 [3,4].

The Government of Kenya's Ministry of Health (MOH) PMTCT program was launched in 2000 and has achieved nearly universal facility-based coverage, with 4,000 of the 4,400 (90%) health facilities offering maternal, newborn, and child health (MNCH) services including PMTCT services [5]. However, there have been challenges to the full scale-up of PMTCT in Kenya that included: late prenatal care attendance; low utilization of prenatal care services and facility-based births; lack of integration of PMTCT services with reproductive health and family planning services; and lack of integration of early infant diagnosis in the MNCH continuum, resulting in missed opportunities for pediatric diagnosis, care, and treatment [6,7].

At the time of the present study, the relevant WHO PMTCT recommendations (2010) called for initiating antiretroviral (ARV) prophylaxis as early as 14 weeks of gestation and continuing through to delivery (also known as "Option A") [8]. To study the programmatic possibilities for and challenges of implementing this recommendation in Kenya's national PMTCT strategy, the USAID-funded Maternal and Child Health Integrated Program (MCHIP), led by Jhpiego, adapted the WHO's successful Reaching Every District (RED) approach for scaling up

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immunization services in several African countries [9] to PMTCT service delivery and piloted this RED for PMTCT model in Bondo District, Kenya. The RED approach emphasizes five operational components that are specifically aimed at improving programmatic coverage: (1) better planning and management of resources; (2) reaching all target populations through outreach services; (3) supportive supervision for service providers; (4) linking communities with service delivery; and (5) monitoring for action [9].

RED for PMTCT, also known as the Reaching Every Pregnant Woman approach, was piloted in Bondo District with the aim of demonstrating increased uptake and utilization of PMTCT services. Bondo District is located in Nyanza Province (administrative structures changed from provinces to counties in 2011), in the western part of Kenya. At the time the RED for PMTCT pilot started in 2010, the district had some of the worst health indicators in Kenya, including high maternal mortality (640 deaths per 100 000 live births), infant mortality (110 infant deaths per 1000 live births), and child mortality (208 deaths of children under five years per 1000 live births) rates due to HIV/AIDS, tuberculosis (TB), and malaria (Bondo District Management Team, unpublished data, 2010). Nyanza Province also had some of the highest health disparities in the country, with an estimated population HIV prevalence of 20.2% (17.1% in men and 22.8% in women) and under-five mortality rates of 101 per 1000 live births, as compared with 60 per 1000 live births in Nairobi [10]. This burden of disease, coupled with rampant poverty and underdevelopment, contributed greatly to the poor health status of its populace [10]. Furthermore, widow inheritance, a common cultural practice where a designated male assumes social and/or economic responsibilities for the widow upon the death of her husband, has also been associated with an increased risk of acquisition of HIV infection in this region [11].

The present article reports the results and program experience of RED for PMTCT and evaluates its attempts to increase coverage, access, and utilization (proxies from the immunization field for uptake, access, and retention) relating to PMTCT services through focused prenatal care in one pilot district. We also report challenges and lessons learned to help foster replication of this approach in other resource-limited settings.

2. Program experience

The RED for PMTCT pilot intervention was conducted between July 2010 and June 2012 in Bondo District, Nyanza Province, Kenya. Before the intervention began, advocacy, consultative, and planning meetings were held at the national and regional levels to promote the active engagement of health authorities. Catchment areas were mapped, with average distances to health facilities determined. With the help of community representatives and service providers, villages with high numbers of unreached pregnant women were identified. A situational analysis done to identify barriers to access and/or utilization of health services revealed that of the 329 villages mapped, only seven (2%) were more than five kilometers from the nearest health facility. Although most communities lived within walking distance to a health facility, consistent access to health facilities remained difficult. Some of the challenges identified included: cost; lack of knowledge (majority didn't know whether it was necessary to go to attend prenatal care early or complete at least four visits); proximity of the nearest clinic; husbands (or religions) prohibiting wives (or pregnant followers) from attending prenatal care; and that they were too busy with economic activities (usually fishing). Reaching communities living on the Islands of Lake Victoria presented unique challenges for monitoring treatment utilization owing to transportation issues and the fact that these communities frequently migrated to different fishing locations, some of which were in neighboring districts and countries. Service delivery strategies therefore included those for fixed centers (established health facilities) and those for outreach to hard-to-reach areas, as defined by distance from a health facility and terrain. A mobile service was not adopted because most villages were within five kilometers' walking distance to a health facility.

Resources from other programs were leveraged to maximize the services provided to the end users. The MCHIP activities in the district were harmonized with other programs conducted by Jhpiego and other partners in the district that focused on the development of facility infrastructure, strengthening HIV commodities and supplies management, and increasing the number of health workers knowledgeable about HIV through in-service education. To prevent unintended pregnancies among women living with HIV, for example, Jhpiego's ACCESS Uzima program (preceded MCHIP) trained service providers on long-term family planning methods, ensuring availability of family planning commodities and supplies, and disseminating health messages through radio announcements and community health workers (CHWs) to educate the community on family planning with the aim of increasing family planning uptake in the district.

Other activities capitalized on the community-based approach that was set out in the MOH's community strategy [12], which empowered households and communities to strengthen their role in health and health-related development by increasing their knowledge, skills, and participation. Under this strategy, communities are organized into community units each comprising approximately 1000 households or 5000 people living in the same geographical area and sharing resources and challenges. The community units are organized around villages and other interest groups that are responsible for identifying and supporting volunteer CHWs. The CHWs report to a community health committee (CHC) through a community health extension worker (CHEW), who is an employee of the MOH and a secretary for the CHC. The health governance structure closest to the community is the CHC, whose members are elected in such a way that all the villages in the community unit are represented [12].

Because CHWs were key personnel in this RED for PMTCT pilot, facility-based healthcare workers were encouraged to partner with communities through the CHWs to ensure utilization of their health services. CHWs were recruited from all villages; one CHW served approximately 500 persons (about 100 households). The CHWs were trained on the community strategy, community-based health information systems, and the RED for PMTCT, or Reaching Every Pregnant Woman, approach. Two educational models were used: (1) training of CHEWs as master trainers who subsequently trained CHWs in their respective community units; and (2) training of some CHWs who then cascaded the training to fellow CHWs.

CHW exit desks were established at all health facilities to schedule appointments for prenatal care, postnatal care, and HIV-exposed infant (HEI) visits. The CHWs thus served as links with the community. Women who missed a scheduled appointment were contacted by phone to schedule new appointments. If necessary, women were physically traced by their respective CHW. Regardless of HIV status, all MNCH clients were also connected with the CHW from their respective village to be followed up in the community. In addition, the CHWs actively engaged the male partners of the pregnant women to educate them on MNCH issues and encourage their participation in prenatal care. Pelzer et al. [13] reported that the involvement of the male partner is likely to increase the chance of successful PMTCT interventions.

Integrated community outreaches in hard-to-reach areas were conducted monthly. Prioritization was done based on distance to the nearest facility and the number of unreached pregnant women. Communities participated in service delivery by providing the venue and community resources for the outreach. Services offered at these outreaches included: prenatal care; postnatal care; early infant diagnosis (EID); HIV testing and counseling; family planning counseling; distribution of basic family planning commodities and referrals to health facilities; immunization; defaulter tracing; growth monitoring of children, deworming, treatment and referral for the sick; and health education.

Quarterly supportive supervision visits to health facilities were undertaken by the District Health Management Team (DHMT). Skills gaps among health service providers were identified and addressed through on-site mentorship, and in-service courses were conducted

for service providers when necessary. These courses covered new PMTCT [14] and Infant and Young Child Feeding (IYCF) guidelines [15], data collection tools and registers, the Reaching Every Pregnant Woman approach, and Standards-Based Management and Recognition (SBM-R, Jhpiego, Baltimore, USA) for PMTCT. SBM-R for PMTCT was the quality improvement strategy used to ensure that high-quality PMTCT services were provided as demand for services increased. This quality improvement approach involves facility self-assessments on established performance standards for given health areas and is described in Necochea et al. [16] in the present supplement. In this project, health facilities were supported to assess their performance against Kenya's national PMTCT performance standards [17], a set of 110 standards across the following intervention areas: (1) information education and counselling (IEC); (2) focused prenatal care; (3) labor and delivery; (4) postnatal care; (5) infection prevention and control (IPC); (6) human and physical resources; and (7) management systems. The IEC standards mainly assessed whether clients received all relevant information related to PMTCT. The focused prenatal care, labor and delivery, and postnatal care standards assessed whether clients received all services as per the national guidelines in a respectful manner. The IPC standards assessed whether all protocols of infection prevention were adhered to. Human and physical resources standards assessed whether there was adequate infrastructure, commodities, and supplies for provision of PMTCT services. In addition, the standards also assessed whether the service providers were adequately trained in the provision of these services. Whether facilities were ready to provide the services was assessed under the management systems' standards. Client flow, availability and display of appropriate signage, and the use of data for decision making were also assessed. The PMTCT–MNCH integrated services package was defined and disseminated to health workers as a job aid (<http://reprolineplus.org/resources/pmtctmnch-integrated-service-job-aid>).

Monitoring and evaluation was done jointly by MCHIP, national and regional MOH staff. MCHIP facilitated the availability of MOH tools and registers for use at the community level. Health facility administrators, MOH partners, and the DHMT held monthly meetings to review health facility performance, and the community units held monthly data review meetings. Strategies were re-prioritized based on the outcomes of those meetings. Technical assistance was provided to the health records team to ensure timely, complete, and accurate reporting of selected prenatal care indicators that were introduced as proxy measurements for access to prenatal care, early prenatal care attendance, and service utilization both before and after the RED for PMTCT intervention (Table 1).

3. Program assessment

To document the utility of the RED for PMTCT intervention, we collected and analyzed cross-sectional data at two similar time points two years apart: January to June 2010 (pre-intervention) and January

to June 2012 (the last six months of the intervention). We analyzed data collected using MOH tools that were available at the community level, namely the household register, the CHW logbook, and the monthly CHEW summary. Two additional summary monthly forms (711A and 731) were used by the MOH to capture PMTCT data. Data from 33 health facilities and all the 26 community units in Bondo District were summarized and routinely entered in the national District Health Information System (DHIS2) [18] by the district health records officer. The findings for the indicators of interest from the two time periods were compared through a two-sample test of proportions, and MOH summary data and program reports were also reviewed to triangulate the information obtained from the DHIS2. $P < 0.05$ was considered statistically significant. No institutional review board determination was sought for the study because the Kenya DHIS2 data are publically available [18], and the use of program reports in aggregate form was not human subjects research.

4. Findings

4.1. Access to and utilization of PMTCT-related services though prenatal care and labor and delivery

The findings of the situational analysis showed that there was high coverage of one prenatal care visit services (>95% of pregnant women attended at least one prenatal care visit); however, utilization of prenatal care services overall was low, more than 65% of the pregnant women dropping out of care between their first and fourth visits. Although most pregnant women attended at least one prenatal care visit, more than 75% attended in the third trimester only, with just 3% attending in the first trimester. Furthermore, the majority of women did not know about the importance of attending prenatal care early and attending at least four visits. Other identified barriers included: husbands prohibiting their wives attending prenatal care; religious leaders prohibiting their followers to seek medical services; the perception that services were too costly (although in many areas traditional birth attendants charged significantly more); and conflicts with the timing of economic activities such as fishing.

Between 2010 and 2012, the proportion of pregnant women who completed four focused prenatal care visits improved significantly from 25% to 41% ($P < 0.001$), and delivery with skilled birth attendants increased from 23% to 47% ($P \leq 0.001$). Uptake of prenatal care partner testing (a proxy for male involvement) increased from 1.8% in 2010 to 19.3% in 2012 ($P < 0.001$) as more men sought testing. At the same time, the proportion of partners (men) who tested positive for HIV decreased (22.6% in 2010 vs 7.3% in 2012; $P < 0.001$). All clients were offered HIV testing and were given the option of opting out. Table 2 summarizes the findings of these comparisons between the pre-intervention and end-of-pilot periods.

4.2. Diagnostics for HIV-positive pregnant women and HIV-exposed infants

Over the course of the intervention, the proportion of pregnant women attending prenatal care who tested positive for HIV decreased only slightly from 21% to 18% ($P = 0.002$). The proportion of women at maternity who tested positive for HIV did not change significantly (25.8% in 2010 vs 27.3% in 2012) but the proportion of HEIs tested for HIV infection at six weeks increased dramatically from 27% to 78% ($P < 0.001$) (Fig. 1). By the end of the pilot, the proportion of HEIs tested at 12 months remained high, at 52%, while 77% of HEIs at 12 months were issued ARV prophylaxis. In addition, 77% of HEIs aged six months were exclusively breastfed, as shown in Table 3. Only 35 of the 765 HEIs younger than 12 months, or 4.6%, were identified as testing positive for HIV. Overall, 62% of the HIV-positive pregnant women were assessed for antiretroviral therapy (WHO staging and CD4 counts) at prenatal care clinics. For these endline results, baseline data were not available for comparison.

Table 1

Proxy measurements for access to prenatal care, early prenatal care attendance, and service utilization.

Indicator	Intended measurement
Proportion of pregnant women who attend prenatal care 1 visit (prenatal care 1 coverage)	Proxy indicator for access (the possibility of a pregnant woman reaching a health facility easily and getting the service required)
Proportion of pregnant women who attend prenatal care 4 visit	Proxy indicator for early prenatal care attendance (only those who attend prenatal care attendance early can complete the four scheduled visits)
Dropout rate ^a between prenatal care 1 and prenatal care 4 coverage	Proxy indicator for utilization
HEI testing and ARV infant prophylaxis	Proxy indicators for retention in care

^a The project adapted the dropout rate indicator usually used by immunization teams and defined it as the difference in coverage between the first and forth prenatal care visits. All other indicators are standard indicators.

Table 2Prenatal care and labor and delivery results compared between pre-intervention (2010) and end-of-pilot (2012).^a

Prenatal care attendance and HIV testing	Jan – Jun 2010 (n = 3600)	Jan – Jun 2012 (n = 3633)	P value
Proportion of prenatal care users returning for the fourth visit	25.0	41.0	<0.001
Proportion of women delivering with assistance of skilled attendants	23.0	47.0	≤0.001
Proportion of prenatal care users tested for HIV (testing uptake)	79.2	75.7	NS
Proportion of prenatal care users who tested positive for HIV	21.4	18.3	0.004
Estimated LLITN coverage among prenatal care users	80.9	81.8	NS
Proportion of HIV-positive mothers referred for follow-up	78.5	81.5	NS
Proportion of prenatal care partners tested (couple testing)	1.5	14.6	<0.001
Sub-group analyses			
Proportion of women testing positive given preventive ARVs ^b	93.1	108.0	Not done
Proportion of HIV-positive mothers given infant prophylaxis ^b	97.3	124.7	Not done
Proportion of new prenatal care partners who tested positive for HIV ^c	22.6	7.3	<0.001
Proportion of HEIs tested for HIV at 6 weeks ^d	27.5	77.5	<0.001
Maternity, labor and delivery HIV testing			
Proportion of women in maternity tested for HIV (testing uptake) ^e	88.8	87.8	NS
Proportion of women in maternity who tested positive for HIV ^e	25.8	27.3	NS

Abbreviations: ARV, antiretroviral; HEIs, HIV-exposed infants; LLITN, long-lasting insecticide-treated net; PMTCT, prevention of mother-to-child transmission of HIV; NS, not significant.

^a Values are given as percentage unless otherwise indicated.^b The denominators for these analyses are 770 for 2010 and 665 for 2012. Some HIV-positive pregnant women were counted more than once after testing and receiving ARV prophylaxis multiple times, so the results are greater than 100% in 2012.^c The denominators for this analysis are 53 for 2010 and 532 for 2012. There was a 10-fold increase in partner/couple testing.^d The denominators for this analysis are 622 for 2010 and 503 for 2012.^e The denominators for this analysis are 632 for 2010 and 800 for 2012.

4.3. Performance and quality improvement through SBM-R

An overall upward trend was observed in SBM-R performance scores on PMTCT standards between baseline and two assessment points. Overall, performance scores for all intervention areas (IEC, labor and delivery, infection prevention, and management systems) improved from a mean of 28% at baseline to a mean of 52% by the second assessment (Fig. 2). The largest change in performance occurred at labor and delivery, from 17% to 56%, although that baseline score was the lowest. The highest second (and final) assessment score was in focused prenatal care, at 70%, although it had the highest baseline value of 49%.

4.4. Other findings

CHW coverage of the catchment area of Bondo District increased from 38% in June 2010 to 100% in June 2012—a total of 26 community units. The average number of women eligible for prenatal care attendance was approximately 6000 annually between 2010 and 2012,

with virtually all pregnant women during the implementation period reached. The establishment of a CHW desk in health facilities, use of CHWs to actively identify those lost from care in their communities and link them back to services, and an improved community-to-health-facility referral system contributed in reducing the dropout rate between one prenatal care visit and four prenatal care visits from 71% in 2010 to 57% in 2012 ($P < 0.001$).

5. Discussion and lessons learned

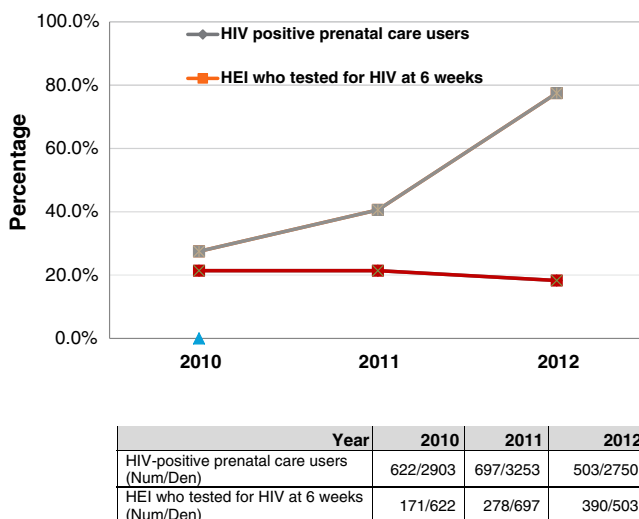
The RED for PMTCT pilot intervention was evaluated using routine program monitoring data collected electronically through a government-sponsored health information system where data are constantly updated, publicly available, and can be used in real-time for decision making. Implementation of the RED for PMTCT approach included general adherence to RED's operational components and a particular emphasis on the lowest level of service delivery, the community. Overall, the findings are suggestive that RED for PMTCT was successful at increasing access to and utilization of PMTCT services among those who attended prenatal care in Bondo District, as demonstrated by the increase in early attendance, delivery under skilled care, and HEI testing at six months by the end of the pilot. The quality of PMTCT service delivery also improved, particularly in labor and delivery, where other services might otherwise have been prioritized.

Table 3

HIV-exposed infants and early infant diagnosis services indicators at end-of pilot (January – June 2012).

Indicator	No.	Percentage
Proportion of known HIV-positive women at entry at prenatal care	438/1829	23.9
Proportion of women with unknown HIV status at entry at prenatal care	334/1829	18.3
Proportion of HIV-positive mothers assessed for ART at prenatal care	485/772	62.0
Proportion of HIV-positive mothers started on ART at prenatal care	82/772	10.6
Proportion of HEIs tested by 12 months	765/1480	51.7
Proportion of HEIs aged 6 months who are exclusively breastfed	749/973	77.0
Proportion of HEIs aged 12 months issued with ARV prophylaxis	691/897	77.0

Abbreviations: ART, antiretroviral therapy; HEIs, HIV-exposed infants.

**Fig. 1.** Trends in proportion of HIV-positive women at prenatal care and HIV-exposed infants at six weeks. Abbreviation: HEI, HIV-exposed infants.

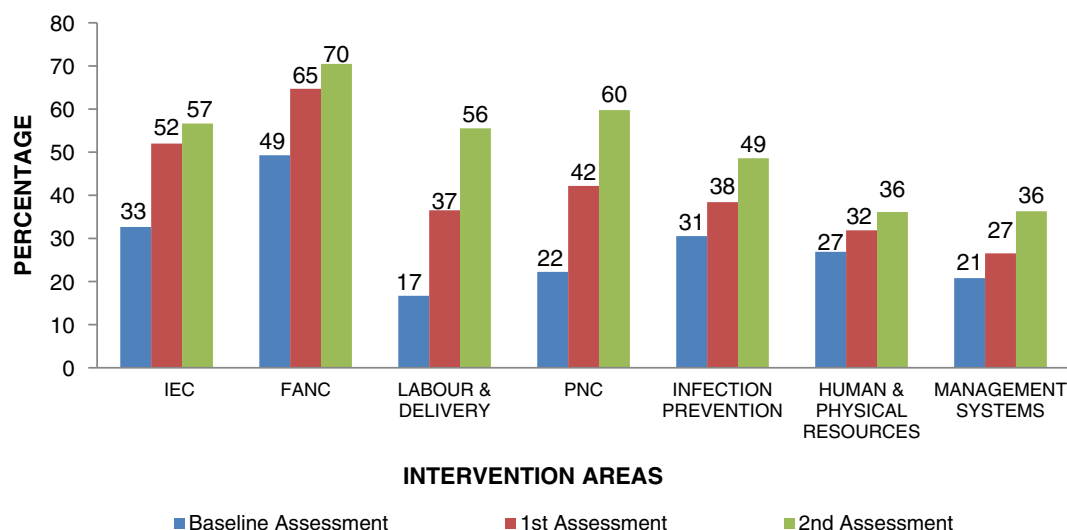


Fig. 2. Standards-Based Management and Recognition (SBM-R) performance scores by intervention areas at three assessment points. Abbreviations: IEC, information, education, and counseling; FANC, focused prenatal care; PNC, postnatal care.

Despite relatively higher prenatal care attendance at the end of the pilot than at the beginning, low early prenatal care attendance and high prenatal care dropout rate continue to be a major barrier to early and continued initiation of needed services.

From the findings, it is apparent that improvement in the community-based PMTCT initiative may have been largely due to the sustained engagement of the key stakeholders and collaboration with the various partners working in the area through all the stages of the program. Stakeholder participation was ensured in the process of identifying challenges, problem-solving, prioritizing targeted solutions, and mobilizing resources for solutions that were already well packaged in the RED approach. These same factors have been shown as catalysts for systematic changes at institutional and national levels within PMTCT programs in 34 global countries [19].

Regarding capacity building of CHWs, the master trainer model using CHEWs was found to be an efficient, inexpensive, and expedient way to train CHWs in their local setting. However, it was necessary to complement the training approach with regular and structured supportive supervision; requests to share challenges and successes; and a mechanism for more regular and timely data collection. Uwinma et al. [20] identified the need for systematic skill-building, enhanced scopes of practice, and consistent supervision of CHWs as critical to the success of PMTCT integrated programming, with the corollary need to equip these training and supervision programs with a reliable referral and monitoring and evaluation system.

The service delivery component of the RED for PMTCT approach faced other challenges, including difficulties tracking the women during the prenatal and postnatal periods, given that Kenya uses cross-sectional prenatal and postnatal care registers from which patients' histories were not documented in a manner that allowed for follow-up. To overcome this challenge, the health prenatal and postnatal care services provided were recorded in mother – child booklets that the mothers were required to present during all clinic visits. However, some mothers routinely did not carry the booklets thus obtained new ones each visit while others, in order to avoid stigmatization, altered the entries in the booklets, especially with respect to their HIV status. In addition, some community members did not want their HIV status known to their CHWs and therefore did not disclose their HIV status to them. As a result of this missing information, service providers at health facilities could not reliably generate defaulter lists for the HIV-positive population. A number of studies, including a systematic review of PMTCT services in 12 countries in Sub-Saharan Africa, confirmed the persistence of stigma as a major barrier to the uptake of ARV drugs for PMTCT [19,21].

Defaulter tracing of the HEIs is often difficult, a finding reported elsewhere [21–23]. The present study also documented this challenge. In addition, HIV-positive infants had to be referred out of their primary facilities when they were 18 months old. On top of this, there were occasional regional stock outs of HIV commodities that influenced PMTCT service delivery, especially EID.

Bondo District had a number of partners with frequently competing priorities. CHWs who were part-time volunteers often supported on many intervention areas including MNCH, HIV, tuberculosis, water and sanitation, and malaria. Frequent engagement of facility-based health workers in offsite meetings and trainings by other partners sometimes caused artificial staff shortages and adversely affected service delivery. Barron et al. [24] identified the need to ensure good coordination with technical partners, such as international health agencies and international and local nongovernmental organizations, to improve program outcomes.

6. Conclusion

Implementation of RED for PMTCT resulted in improved early access to and increased utilization of PMTCT services by HIV-positive pregnant women and their children in the low-resource setting of Bondo District, Kenya. It also enabled PMTCT services to be delivered effectively and in a sustainable manner in the context of Kenya's national community strategy, which is an important effort to bring quality services closer to the people who need them. RED for PMTCT integrates a known package of best practices and underscores the importance of community-driven approaches to improve the uptake of and retention in PMTCT services. With funding from USAID, the RED for PMTCT model will be rolled out in two other Kenyan districts, Igembe North and East Pokot, providing an opportunity to test solutions aimed at addressing the challenges observed in Bondo and collect additional data. Further scale-up of this model will be largely dependent on interest from the Government of Kenya and its implementing partners.

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Conflict of interest

The authors have no conflicts of interest.

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