Introduction of Misoprostol for Prevention of Postpartum Hemorrhage at the Community Level in Kenya

FINAL REPORT
The Division of Reproductive Health (DRH) sits within the Kenya Ministry of Public Health and Sanitation and is tasked with implementing maternal, newborn and reproductive health policies for Kenya and providing health care services at the primary or community levels, for the people of Kenya.

Venture Strategies Innovations (VSI) is a California-based nonprofit organization committed to improving women’s health in developing countries by creating access to effective and affordable technologies on a large scale. VSI’s innovative approach involves partnerships that build upon existing infrastructure, resources and markets. VSI focuses on reducing barriers to access and enhancing human capacity to bring about sustainable improvements in health.

Kenya Obstetrical and Gynaecological Society (KOGS) was formed in 1974 and currently has a membership of over 200 specialists and professionals, with networks throughout the country and four branches in Mombasa, Eldoret, Nakuru and Nyeri. It is an affiliate member of the International Federation of Obstetrics and Gynecology (FIGO). Since its foundation, KOGS has acted as an advocate for the advancement of women’s sexual and reproductive rights and has more recently articulated its position on sexual and reproductive health and rights during the ongoing constitutional review process. Additionally, KOGS publishes a quarterly peer-reviewed journal and organizes annual scientific conferences of international standards. KOGS is also involved in training, continuing professional development, research, and development of clinical guidelines.
Acknowledgements

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Prepared by:

Joseph G. Karanja, Zahida Qureshi, Martine Holston, Alice Cartwright, Rachel Weinrib and Ndola Prata

Additional Contributors:

Catherine Kamau, Natalie Williams, Emma Nesper, Molly Moran and Deborah Koh
Executive Summary

Persisting high maternal mortality rates continue to be a key concern for many countries in Africa, including Kenya. Postpartum hemorrhage (PPH), or excessive bleeding after childbirth, is among the leading causes of maternal death in Kenya. PPH can be prevented and treated using uterotonic drugs, like misoprostol. Misoprostol comes in tablet form and has been recognized by the international community for its potential to reduce PPH-related maternal mortality and morbidity in low-resource settings due to its relative efficacy, ease of administration, and stability in field conditions. The Pharmacy and Poisons Board of Kenya approved the importation, sale and distribution of misoprostol for the prevention and treatment of PPH in August 2008, and for the treatment of incomplete abortion in July of 2009.

Presently, over half of Kenyan women (56%) still give birth at home, without access to emergency obstetric care services. The rate of home delivery is even higher (63%) in rural areas, with similar rates of women delivering without a skilled birth attendant (KNBS & ICF Macro, 2010). Current interventions that can prevent or treat PPH, such as uterotonic injections, are out of reach for the many women who deliver without skilled attendants; however, almost all Kenyan women (92%) utilize antenatal care (ANC) services during their pregnancy (KNBS & ICF Macro, 2010). ANC clinics can serve as a key point of contact to reach women with messages about safe motherhood and to distribute misoprostol for PPH prevention to women who may not reach a facility for delivery. Utilizing Community Midwives (CMs), retired midwives who can provide skilled delivery services at the community level and ensure a back-up system for emergency referral to a hospital, can also help fill the gap of uterotonic coverage for those women who are unable to reach a facility to deliver. High rates of ANC attendance and relatively low rates of facility delivery provide a strong case in favor of distribution of misoprostol to women at ANC visits as well as at the community level for use at home births.

The goal of this pilot project was to reduce maternal mortality and morbidity by increasing access to uterotonic drugs for the prevention of PPH, as well as to provide empirical evidence to inform policy in Kenya on the use of misoprostol for PPH at the community level, particularly regarding misoprostol distribution through ANC and by CMs. The project was conducted in two districts in Kenya: Kitui and Maragua.

This project consisted of two components. The first was a community awareness campaign on birth preparedness, PPH and misoprostol. Community Health Workers (CHWs) educated their communities about the risks of PPH, the importance of delivering in a health facility, and the use of misoprostol for the prevention of PPH. They conducted these education campaigns by distributing printed materials and holding community meetings and one-on-one sessions with pregnant women. The second component of the project was the distribution of misoprostol at the community level. ANC providers distributed misoprostol to pregnant women during routine ANC care in Kitui and Maragua districts after screening the women for eligibility and educating them on the use of misoprostol for PPH prevention. In Maragua, women could also receive misoprostol from CMs at the time of delivery.

ANC providers and CMs began enrolling women in the project in mid-December 2009 and continued through June 2010. Providers collected service delivery data on 3,844 women across the two districts, either during ANC or at delivery with a CM. The collection of postpartum follow-up data was completed
at the end of October 2010, with the Postnatal Follow-up Form completed for 2,812 women. There was no change in the proportion of women delivering at a health facility during the course of the project (60%). Seventy-eight women delivered with CMs and are included in the sample of postpartum data.

The overwhelming majority of women enrolled in the project during ANC took misoprostol home with them (98%). Most of the women who did not take the tablets home from ANC were ineligible to receive misoprostol due to the project’s screening requirements.

Uterotonic coverage at delivery was high in both districts: of the women who delivered at home, 95% used misoprostol at delivery. These deliveries would otherwise not have received any uterotonic protection against PPH. The contribution of misoprostol distribution to births protected from PPH is evident, particularly in districts where health facility deliveries are low. While home deliveries were more prevalent in Kitui (57% vs. 27% in Maragua), women in Kitui had the same coverage of protected home births (94%) as Maragua (96%) because of misoprostol use at home births. Misoprostol taken at home deliveries increased uterotonic coverage for 55% of the deliveries in Kitui.

Overall, misoprostol use protected over 60% of births in Kitui and over 35% of births in Maragua against PPH. These births would not have otherwise received a uterotonic drug. Coverage with a uterotonic drug at delivery was universal for the 5% of women who delivered with CMs in Maragua, most often with misoprostol (94%).

Of the 1,084 women who delivered at home and used misoprostol, only two experienced perceived PPH. Neither required any additional interventions. Of the women who delivered at a health facility, one perceived experiencing PPH, and required IV fluids and other drugs. Three women delivering with CMs reported perceived PPH, though none required additional interventions. Women used misoprostol at home deliveries correctly (correct dose, route, and timing) 97% of the time. The majority of women who took misoprostol during delivery did not experience any symptoms (90%). Of those who did report postpartum symptoms, the most common was shivering (6%).

Findings from this report demonstrate that the distribution of misoprostol to women through ANC visits, as well as through CMs for deliveries, has the potential to increase the number of women who receive a uterotonic drug for prevention of PPH at the time of delivery. This finding is particularly relevant for the large proportion of women who deliver at home and do not have access to uterotonics such as oxytocin, which requires refrigeration.

All ANC providers should be trained to distribute misoprostol to pregnant women during routine ANC care. CHWs increase awareness of misoprostol and provide reinforcement of messages on correct use; community awareness efforts should continue and the contributions of CHWs should be recognized. The CM program should be supported. Not only do CMs make an important contribution to increasing the percentage of women who deliver with skilled attendants, CMs can help ensure that women are protected from PPH with misoprostol, even at home deliveries.

In addition, since misoprostol covered 10% of deliveries at the facilities in this project, all facilities where deliveries take place should be consistently stocked with misoprostol as a second uterotonic drug in case of stock-outs.
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<td>CHW</td>
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<td>CM</td>
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1. Introduction

1.1 BACKGROUND

1.1.1 Postpartum Hemorrhage in Kenya
Persisting high maternal mortality rates continue to be a key concern for many countries in Africa, including Kenya. According to the most recent Demographic and Health Survey, Kenya’s maternal mortality ratio is 488 maternal deaths per 100,000 live births (KNBS & ICF Macro, 2010), indicating that substantial effort remains to reach the fifth Millennium Development Goal of reducing the 1990 maternal mortality ratio by three-quarters to 147 maternal deaths per 100,000 live births by 2015 (KMOH, 2005).

Postpartum hemorrhage (PPH), defined as bleeding during and after delivery in excess of 500 mL (WHO, 1990), is among the leading causes of maternal death in Kenya. It is both a preventable and treatable condition. However, blood loss is generally underestimated (Maslovitz et al., 2008) and PPH should also be assumed if bleeding is sufficient to cause deterioration in the woman’s clinical condition (McCormick et al., 2002). Most often, PPH occurs soon after delivery, and there are no risk factors that consistently identify who will experience PPH.

1.1.2 Misoprostol for Prevention of PPH
The use of uterotonic agents in the management of the third stage of labor reduces the amount of bleeding and the need for additional treatments or interventions (Begley et al., 2010; Rajan & Wing, 2010). However, current recommended uterotonic drugs, such as oxytocin, require administration by injection and refrigeration, rendering them infeasible in areas such as rural Kenya where the majority of women deliver at home without a skilled provider.

Misoprostol provides an important alternative due to the limitations of injectable uterotonics. Misoprostol is a prostaglandin analogue tablet that has been recognized by the international community for its potential to reduce PPH-related maternal mortality and morbidity in low-resource settings due to its relative efficacy, ease of administration, and stability in field conditions (Parsons et al., 2007; Derman et al., 2006; Alfirevic et al., 2007). Extensive research has that demonstrated 600mcg of misoprostol taken orally is the ideal dose for prevention of PPH (Alfirevic et al., 2007). Symptoms such as shivering or nausea can be dose-dependent and are generally self-limiting (Lumbiganon et al., 1999).

Where oxytocin is not available or feasible – due to lack of refrigeration, supplies (such as syringes) or trained staff – misoprostol can be an essential drug for prevention and treatment of PPH (Geller et al., 2006). The convenience, low cost and ease of administration also make misoprostol a key drug for maternal health programs. The International Confederation of Midwives (ICM) and the International Federation of Gynecology and Obstetrics (FIGO) have recommended that in home births where a skilled attendant is not present, misoprostol may be the only available technology to control PPH (ICM/FIGO, 2006).
1.1.3 History of Misoprostol in Kenya
The Pharmacy and Poisons Board of Kenya approved the importation, sale and distribution of misoprostol for the prevention and treatment of PPH in August 2008, and for treatment of incomplete abortion in July 2009. A second product was registered in August 2010 for the same indications.

In 2010, misoprostol was included in the Clinical Guidelines for Facility Levels Four to Six and its accompanying revised Essential Medicines List. As these policies were in development, the Ministry of Public Health and Sanitation (MOPHS) requested research to demonstrate the effectiveness of misoprostol at the community level in Kenya. In early 2009, participants at the Maternal and Neonatal Health Technical Working Group agreed to carry out a pilot to demonstrate that misoprostol distribution through ANC education and CMs were appropriate strategies to increase protection against PPH in the context of Kenya’s health system.

1.2 RATIONALE FOR MISOPROSTOL DISTRIBUTION AT ANC OR AT DELIVERY WITH COMMUNITY MIDWIVES FOR PREVENTION OF PPH AT HOME BIRTHS
Numerous barriers keep women from reaching facilities for delivery, especially in rural areas, including costs and availability of transportation, delays in identifying life-threatening complications, and other cultural factors (Cotter et al., 2006). Presently, over half of Kenyan women (56%) still give birth at home, and thereby do not have access to emergency obstetric care services (KNBS & ICF Macro, 2010). In rural areas, the rate of home delivery is even higher (63%) with similar rates of women delivering without a skilled birth attendant (KNBS & ICF Macro, 2010). Without skilled attendants at delivery, current interventions such as uterotonic injections that can prevent or treat PPH are out of reach for many women. Women who deliver alone or with an attendant that is not medically trained for delivery may be unaware of the fatal outcomes of delay in management of obstetric emergencies, especially PPH. These delays in treatment and referral can quickly lead to debilitating morbidities or death for women experiencing PPH.

Despite the high home delivery rates, most Kenyan women (92%) utilize antenatal care services during their pregnancy (KNBS & ICF Macro, 2010). The high utilization of antenatal care services by Kenyan women presents an important opportunity to improve maternal health outcomes. ANC clinics can serve as a key entry point into the health care system and point of contact for messages about safe motherhood and the importance of facility-based delivery. Furthermore, Kenyan women who attend their first ANC visit early in pregnancy are more likely to deliver in a facility than those who attend late, and ANC attendance can be a strong predictor of skilled assistance at delivery (Ochako et al., 2011). Community messaging about ANC attendance may help increase early ANC attendance, which has the potential to improve maternal health for poor women.

The CM model operates in a selected number of districts in Kenya with the goal of meeting the needs of women unable to access facility-based care during pregnancy, childbirth and the postnatal period. CMs must be retired health professionals living in the selected community to enroll in the program; District Public Health Nurses (DPHNs) train and manage the CMs.

1.2.1 Evidence from Other Countries
High rates of ANC attendance and relatively low rates of facility delivery provide a strong case in favor of ANC and community-level misoprostol distribution directly to women for use at home births. When
misoprostol is available for home births, higher numbers of women receive a uterotonic for prevention of PPH, especially lower-income women and women living in remote areas (Rajbhandari et al., 2010).

Safety is not compromised by including community health workers in misoprostol distribution and the incidence of adverse events is often found to be higher in areas without misoprostol due to the use of traditional medicines and herbs. Operations research conducted by Venture Strategies Innovations (VSI) and partners in Tanzania and Ethiopia has demonstrated the capacity of community health workers and traditional birth attendants to distribute misoprostol safely and effectively to women (Prata et al., 2009; Prata et al., 2005). More recently, a double-blind randomized, placebo-controlled trial in Pakistan demonstrated that 600 mcg misoprostol was safely and effectively administered to women by traditional birth attendants (TBAs) and resulted in a 24% reduction in the incidence of PPH (Mobeen et al., 2011).

Community health workers also play an important role in imparting information on safe motherhood. In Afghanistan, births with skilled providers were found to be higher in areas where misoprostol was made available directly to women due to reinforcement of messaging by community health workers of the importance of delivering in a facility (Sanghvi et al., 2010). When provided with messages about safe delivery and misoprostol, as well as the misoprostol tablets for self-administration at a home birth, women in numerous contexts have demonstrated that they understand that misoprostol is made available to them during pregnancy in the event that they cannot reach a facility to deliver.

2. Pilot Project Description

2.1 PILOT PROJECT GOALS AND OBJECTIVES
The goal of this project was to reduce maternal mortality and morbidity by increasing access to uterotonic drugs for the prevention of PPH, as well as to provide empirical evidence to inform policy in Kenya on the use of misoprostol for PPH at the community level. In order to achieve these goals, the project involved community awareness activities with information on birth preparedness, PPH prevention, and the availability of misoprostol to support the distribution of the tablets through ANC visits and CMs.

The project’s main objectives were to demonstrate the safety, feasibility, and program effectiveness of misoprostol distribution. More specifically, the project aimed to demonstrate that:

- ANC visits and CMs are feasible and effective distribution mechanisms for dispensing misoprostol for PPH prevention to women who are unable to deliver at a facility and therefore give birth at home;
- Misoprostol distribution through ANC visits and CMs will increase the number of women receiving a uterotonic drug at home births; and
- Women can safely self-administer misoprostol for prevention of PPH at home births after being educated on and receiving the drug.

Results from this project will inform the development of a model that can be applied throughout Kenya, especially in settings where most women deliver without a skilled attendant.
2.2. LOCATION

The project was conducted in two districts in Kenya totaling just fewer than one million in population. Kitui district is one of 13 districts in Eastern Province and is primarily rural. The estimated population in 2004 (most recent estimate available) was 573,354 and the district’s population growth rate is 2.2%. Further, the average distance to the nearest health facility is 5km and the doctor to patient ratio is 1:16,047 (NCAPD, 2005a). Maragua district is one of seven districts in the Central Province and is more densely populated than Kitui district, with approximately 25% of its residents living in an urban area (as opposed to 3.6% in Kitui). The estimated population of Maragua district was 409,302 in 2002 (most recent estimate available) with a population growth rate of 1.8%. The average distance to a health facility in Maragua is approximately 10km and the doctor to patient ratio is: 1:12,966 (NCAPD, 2005b).

![Map of project districts](image)

As shown in Table 1, Eastern and Central Provinces have similarly high rates of ANC attendance (93%). However, Eastern Province, in which Kitui district is located, has a much higher rate of home births (55% vs. 26%) and also has a higher total fertility rate (4.4 vs. 3.4), as compared to Central Province, in which Maragua is located.

<table>
<thead>
<tr>
<th>Percentage of live births receiving antenatal care from a trained health professional</th>
<th>Eastern Province (Kitui)</th>
<th>Central Province (Maragua)</th>
<th>Country Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fertility Rate</td>
<td>4.4</td>
<td>3.4</td>
<td>4.6</td>
</tr>
<tr>
<td>Percentage of live births delivering at:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Health Facility</td>
<td>33.5%</td>
<td>56.7%</td>
<td>32.0%</td>
</tr>
<tr>
<td>Private Health Facility</td>
<td>9.3%</td>
<td>16.2%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Home</td>
<td>54.8%</td>
<td>25.9%</td>
<td>56.2%</td>
</tr>
<tr>
<td>Percentage of live births receiving postnatal care</td>
<td>47.8%</td>
<td>53.0%</td>
<td>46.2%</td>
</tr>
</tbody>
</table>

Kitui district is in Kenya’s Eastern province and has 72 ANC sites. Maragua district is in Central Province with 56 ANC sites, including 10 clinics run by CMs. Fourteen CMs do not operate clinics. All ANC sites in both districts were included in the project.
Table 2: Maternal health statistics by project district

<table>
<thead>
<tr>
<th>Population (2008 projection)</th>
<th>Kitui</th>
<th>Maragua</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Deliveries (2009)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Facility Deliveries</td>
<td>3,621</td>
<td>4,434 (64.5%)</td>
<td></td>
</tr>
<tr>
<td>Home Deliveries</td>
<td>2,216</td>
<td>(32.2%)</td>
<td></td>
</tr>
<tr>
<td>Community Midwife Deliveries</td>
<td>---</td>
<td>223 (3.3%)</td>
<td></td>
</tr>
<tr>
<td>ANC Sites</td>
<td>72</td>
<td>56</td>
<td>128</td>
</tr>
<tr>
<td>Community Midwives</td>
<td>14</td>
<td>14</td>
<td>14</td>
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2.3 PROJECT TIMELINE
The development, implementation and analysis of this project took place over 17 months. KOGS, VSI, and the MOPHS developed the project proposal and community awareness campaign materials, manual of operations and data collection tools in September and October 2009. The initial project training by VSI and the KOGS advisory principal investigators from KOGS occurred in November 2009. Implementation of the project began in mid-December 2009 and continued through the end of June 2010. Providers completed collection of follow-up data on participants in October 2010. The Data Manager/Research Assistant in Kenya managed the data and the monitoring and evaluation team at VSI periodically reviewed the data. The monitoring and evaluation team at VSI completed the final data analysis and wrote the final report in January 2011.

2.4 ETHICAL REVIEW
Institutional Review Board approval for this project was obtained from Kenyatta National Hospital/UON Ethics and Research Committee, Kenya in September 2009.

3. Methods

3.1 STRATEGY AND DESIGN
This project consisted of two components:

1. **Community Awareness Campaign on Birth Preparedness, PPH and Misoprostol:** A variety of strategies were employed to provide education and communication of key messages about the risks of PPH, the importance of delivering in a health facility, and the use of misoprostol for the prevention of PPH. Posters and pamphlets were available and distributed in the communities.
through ANC facilities and by community health workers, who conducted group and one-on-one meetings with community members. These meetings provided the same information about safe delivery, PPH and misoprostol, and supported messages provided at ANC visits. Meetings with Community Health Workers (CHWs) allowed community members to ask questions and discuss maternal health issues and PPH.

2. Misoprostol Distribution: Health providers distributed misoprostol at ANC in both districts to pregnant women who were screened for eligibility and educated on the use of misoprostol. In Maragua, women could also receive misoprostol from CMs at the time of delivery.
   a. ANC distribution in Kitui and Maragua districts: ANC providers conducted the usual ANC visit, with specific emphasis on safe delivery and PPH prevention, including information on misoprostol. With this information, providers asked women if they would like to participate in the project and to sign an informed consent form if they agreed to enroll. Enrolled women were then provided more in-depth information on the use of misoprostol, screened for medical eligibility, and offered misoprostol tablets to take with them for use at home births if they were unable to return to the health facility for delivery. Women were not eligible to receive misoprostol if they had bronchial asthma or other chronic disease or if the providers anticipated a complicated delivery. Women could also enroll in the project and decide if they wanted to receive the misoprostol tablets at a later ANC visit.
   b. CM distribution in Maragua district: Enrollment in the project at home delivery with a CM also included education, screening and informed consent. Numerous CMs in Maragua run private clinics where they provide ANC and other health services. Therefore, it was also possible for women to enroll in the project during ANC at a CM’s clinic, and then deliver at home with a CM.

ANC providers asked all enrolled women to provide information about their delivery at a later date, such as when they returned to a facility for postnatal visits or neonatal vaccinations, in order to record information about their delivery experiences and knowledge and use of misoprostol. ANC providers did not follow up with women at their homes.

Box 1: The Community Midwife Program

Population Council initiated the CM program, which was subsequently taken over by the United Nations Population Fund (UNFPA). The MOPHS is in the process of moving the program from pilot phase to scale-up. CMs in Maragua contribute to the number of skilled attended deliveries; therefore, it was important to incorporate them into this pilot project. Many of the CMs in Maragua have established their own private clinics; they also travel to women’s homes to conduct deliveries when needed. To date, Kitui has not implemented a CM program.

3.2 PROJECT PERSONNEL AND TRAINING

3.2.1 Organizational Structure
Dr. Zahida Qureshi and Professor Joseph Karanja, both in the Department of Obstetrics/Gynecology, University of Nairobi, Kenyatta National Hospital, and KOGS Council members, served as the advisory Principal Investigators for this project, responsible for the oversight of implementation of the project and compliance with project protocols.
VSI staff in Kenya and California, USA assisted in the development, coordination and organization of project training, implementation and data collection. The VSI Project Coordinator in Kenya, assisted by the Data Manager/Research Assistant, oversaw the day-to-day implementation of the project, including training, monitoring, and data collection and management. VSI provided financial and technical support to this project, including the development of data collection tools, training materials, monitoring and evaluation design, and management of the data analysis.

In the project, each district had a District Reproductive Health (RH) Coordinator and a DPHN who oversaw ANC providers (and CMs in Maragua). In turn, ANC providers were responsible for the supervision of the CHWs associated with their facility (Figure 3). The reporting structure for the providers in this project followed the existing structure of supervision.

### 3.2.2 Training Structure

The project training began in November 2009, when KOGS and VSI led a one day master training for the Project Coordinator and the Data Manager/Research Assistant, the two District Coordinators, four Field Coordinators, ten Community Midwives, the medical officers of health for the two participating districts and a representative from the MOPHS or Ministry of Medical Services.

Following the master training, the Project Coordinator and the Data Manager/Research Assistant, the District Coordinators and Field Supervisors conducted 40 one-day trainings in the two districts in November and December 2009, resulting in the training of 519 ANC providers and 27 CMs, and the sensitization of over 3,000 CHWs. All project training attendees received information about the project purpose and structure, as well as the community awareness campaign messages. ANC providers and CMs received training in enrollment and misoprostol distribution procedures, as well as all necessary documentation for the project. An additional 18 ANC providers were posted in project districts during project implementation, and were trained on-the-job.

CHWs were instrumental in the implementation of the community awareness campaign. CHW trainings were organized by community groups of 50 CHWs; CHWs met in these groups once per month and were generally supervised by a nurse or public health technician. The Project Coordinator and Data Manager/Research Assistant were present at all trainings.
In December 2009, the Project Coordinator, Data Manager/Research Assistant, and Field Supervisors trained 2,450 CHWs in Maragua and 550 in Kitui. An additional 49 CHWs were trained in Kitui in June 2010. CHWs were trained on the importance of locating pregnant women within their catchment areas and communicating key messages including: importance of birth preparedness; importance of facility delivery or delivery with a skilled provider, such as a CM; PPH and its consequences; misoprostol and its use in PPH prevention; and importance of postnatal follow-up. Printed materials, including posters and pamphlets (described below in Section 4 Community Awareness Campaign Activities), helped CHWs communicate the key messages and were distributed to women and other community members.

3.3 DATA MANAGEMENT AND ANALYSIS

3.3.1 Data Collection Tools

**Enrollment at ANC**
ANC providers recorded demographic information, ANC information and whether or not they distributed misoprostol for all women who enrolled in the project during an ANC visit at the first visit and at all subsequent visits using the *Antenatal Misoprostol Provision Tool*. During enrollment, ANC providers also asked enrolled women for their permission to collect information on their delivery experience. The *Postnatal Misoprostol Follow-up Form* collected participants’ delivery information and whether and when they used misoprostol. The provider conducted postnatal follow-up either before discharge if a participant delivered at a health facility (not with a CM) or when the participant returned to the health facility for postnatal care; CHWs conducted active follow-up of women who did not return to the health facility.

**Enrollment at Delivery by a Community Midwife**
Community Midwives completed the *Community Midwife Delivery Form* for all deliveries they attended. This form included basic demographic information, information about the delivery, use of uterotonic drugs, and referral if necessary. Since women in Maragua were able to receive misoprostol for prevention of PPH either at an ANC visit OR at the time of delivery if they delivered with a CM, the CM noted whether the woman had received misoprostol prior to delivery during ANC.

3.3.2 Data Entry and Management
The Project Coordinator and the Data Manager/Research Assistant entered the data collection forms throughout the project. While collecting data during routine supervisory visits, the team addressed any challenges arising in the data collection and proper documentation, including recording of adverse events. Once entered, the Data Manager/Research Assistant sent the data each month to VSI’s Monitoring and Evaluation Coordinator and Data Analyst in California.

3.3.3 Data Analysis
The VSI Data Analyst conducted all analyses in *Stata/SE 10* (StataCorp 2007) in December 2010. The Data Analyst summarized the results using frequency tables and cross-tabulations. A criterion of p<0.05 was used to assess the statistical significance of differences between groups.
4. Community Awareness Campaign Activities

The project implemented a community awareness campaign in the two project districts to educate community members, especially pregnant women, on the importance of birth preparedness and prevention of PPH. Before the project began, the team engaged community leaders to sensitize them on the goals and objectives of this project. Their support ensured that the project could move forward with community support.

**Box 2: The Lesso**

The *lesso* is a pre-cut rectangular piece of brightly colored fabric worn by local women.

At Kenyatta National Hospital, the project principal investigator measured the amount of liquid absorbed in one *lesso* by using blood collected during one of the births at the hospital and found that one *lesso* completely soaked with liquid equaled approximately 500 mL. Similar cloth items have been used to assess postpartum blood loss in community-based settings (Prata et al., 2005; Prata et al., 2009).

Therefore, assessing postpartum blood loss using the *lesso* was incorporated into the community awareness campaign and ANC education sessions. Providers and CHWs educated women to use the *lesso* to measure postpartum blood loss, and informed them that one *lesso* soaked with blood indicated the threshold of when to take action for excessive bleeding at home births, specifically the need for immediate referral for additional interventions.

The four key messages of the community awareness campaign were:

- The importance of delivering in a facility;
- The need for birth preparedness and planning early for a safe delivery;
- The consequences of PPH and recognition of excessive blood loss with the *lesso* or *kanga*; and
- The availability of misoprostol at ANC clinics and from CMs for the prevention of PPH.

Syokimau FM in Kitui district and Radio Maria FM in Maragua district aired two radio scripts in Kikuyu and Kamba languages. The radio advertisements ran twice a day for three months, from January to early March 2010. The radio spots explained PPH, including how to identify PPH using the *lesso*, and how it can be prevented with skilled attendance at delivery and the use of misoprostol.

VSI, KOGS and the MOPHS worked collaboratively to develop printed materials to be utilized by CHWs in the community awareness campaign and at health facilities. These materials included a pamphlet with pictorial instructions on how to use misoprostol correctly for PPH prevention should a woman deliver at home. Over the project period, 14,000 copies of the pamphlets were printed and distributed by CHWs to women. In addition, the project utilized two posters: a poster for generating awareness in the community and an instructional poster for use by service providers. CHWs and providers received 1,600 of each poster to display.
The cooperation and participation of CHWs, who are unpaid volunteers, was critical to the successful implementation of the community awareness component of this project. CHWs are integral to the Kenyan health sector’s community strategy, so their knowledge of their communities, as well as other basic health services, was an important asset to this project (KMOPHS, 2005).

CHWs conducted one-on-one and group meetings to reinforce project messages at the community level. CHWs conducted over 3,700 community sensitization meetings about misoprostol that reached approximately 23,500 people in Kitui and Maragua districts. In addition, CHWs conducted over 4,000 individual education sessions with women. In order to reach an even larger audience, the Project Coordinator partnered with PSI to train youth groups totaling over 50 young people to perform three skits during market days in areas where home delivery rates are particularly high in Maragua.

Community responses to CHW community awareness efforts were overwhelmingly positive (see comments in Box 3).

**Box 3: Selected CHW Feedback from Education Sessions**

"Many of them were not using miso, but when taught, they started using miso successfully."

"The drug should be available all the time for it is helping our wives so much."

"Most of them went to deliver at hospital, and those who delivered at home used it and it helped them."

"Women delivering now have something to boast of because miso has wiped away the fear of bleeding after delivery."

CHWs mentioned in their reports that some people did not accept or use misoprostol because they did not trust the drug or did not have enough information about it. The signing of consent also made some people less likely to accept misoprostol. While this feedback was a minority of the responses, it is extremely important to consider such responses in the future design of community education plans on misoprostol during potential scale-up to other communities in Kenya.

### 5. Results of Misoprostol Distribution

ANC providers and CMs began enrolling women in the project in mid-December 2009 and continued through June 2010. Service delivery data was collected by providers on 3,844 women across the two districts, either during ANC or at delivery with a CM. Since women could be enrolled in the project at ANC but also deliver with a CM in Maragua, some women in this district completed both Antenatal Misoprostol Provision Tools and Community Midwife Delivery Forms. Of the 78 deliveries attended by CMs, 46 women were enrolled previously at ANC and 32 were enrolled at the time of delivery by a CM. Providers completed postpartum follow-up data by the end of October 2010, with the Postnatal Follow-up Form completed for 2,812 women. Since the Community Midwife Delivery Form collected similar information about delivery experience, referral and use of uterotonic drugs at delivery, these forms were also included in the postpartum data analysis. Postpartum data was collected for a high proportion of the participants, with information collected on 75% of enrolled women either through the Postnatal Follow-up Form or the Community Midwife Delivery Form.
Table 3: Data collected

<table>
<thead>
<tr>
<th>Service Delivery Data</th>
<th>Kitui</th>
<th>Maragua</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antenatal Misoprostol Provision Tool</td>
<td>1,543</td>
<td>2,301</td>
<td>3,844</td>
</tr>
<tr>
<td>Community Midwife Delivery Form</td>
<td>--</td>
<td>78</td>
<td>78</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Postpartum Data (% of service delivery data)</th>
<th>1,148 (74.4%)</th>
<th>1,742 (75.7%)</th>
<th>2,890 (75.2%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postnatal Follow-up Form</td>
<td>1,148</td>
<td>1,664</td>
<td>2,812</td>
</tr>
<tr>
<td>Community Midwife Delivery Form</td>
<td>---</td>
<td>78</td>
<td>78</td>
</tr>
</tbody>
</table>

146 women enrolled during ANC went on to deliver with a CM and therefore had documentation completed both during ANC with the Antenatal Misoprostol Provision Tool and at delivery with the Community Midwife Delivery Form. Therefore, there were a total of 2,890 service delivery records while the total enrollment was 3,844 women.

Figure 4 shows the enrollment over the life of the project.

Figure 4: Cumulative ANC enrollment

Source: Misoprostol Addendum and Community Midwife Delivery Form

Women enrolled in the project were around 25 years old (Table 4). Women in Kitui reported having significantly more previous deliveries. Most of the women who enrolled in the project during ANC lived in the catchment areas of the health facilities (6% of participants in Maragua and 2% in Kitui were from outside the catchment area of the health facility).
Table 4: Characteristics of project population

<table>
<thead>
<tr>
<th></th>
<th>Kitui n=1,543</th>
<th>Maragua n=2,301</th>
<th>Total n=3,844</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average age (min; max)</td>
<td>25.1 (14;48)</td>
<td>25.9 (15;50)</td>
<td>25.6 (14;50)</td>
</tr>
<tr>
<td>Number of previous deliveries(^{\wedge})</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>428 (27.7%)</td>
<td>706 (30.7%)</td>
<td>1,134 (29.5%)</td>
</tr>
<tr>
<td>1</td>
<td>372 (24.1%)</td>
<td>657 (28.6%)</td>
<td>1,029 (26.8%)</td>
</tr>
<tr>
<td>2</td>
<td>276 (17.9%)</td>
<td>425 (18.5%)</td>
<td>701 (18.2%)</td>
</tr>
<tr>
<td>3</td>
<td>205 (13.3%)</td>
<td>250 (10.9%)</td>
<td>455 (11.8%)</td>
</tr>
<tr>
<td>&gt;4</td>
<td>248 (16.0%)</td>
<td>196 (8.5%)</td>
<td>444 (11.5%)</td>
</tr>
<tr>
<td>Client lives outside of catchment area</td>
<td>28 (1.8%)</td>
<td>130 (5.7%)</td>
<td>158 (4.1%)</td>
</tr>
</tbody>
</table>

\(^{\wedge}\)No response from 14 clients in Kitui and 67 clients in Maragua

Source: Misoprostol Addendum and Community Midwife Delivery Form

5.1 MISOPROSTOL DISTRIBUTION AT ANC
The overwhelming majority of women enrolled in the project during ANC took misoprostol home with them (98%) (Table 5). While more women in Maragua did not take misoprostol home from ANC than in Kitui, the majority of these women were not medically eligible to receive misoprostol (31 of 55 women). Of the remaining women who gave a reason as to why they did not receive misoprostol, three women wanted more time to think about it, one wanted to discuss it with her husband, and one said she did not have enough information about misoprostol. In Kitui, five women wanted more time to think about it, one woman was ineligible to receive misoprostol due to screening requirements, and one did not give a response.

Table 5: Misoprostol distribution at ANC

<table>
<thead>
<tr>
<th></th>
<th>Kitui n=1,543</th>
<th>Maragua n=2,269</th>
<th>Total n=3,812</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrolled (% of those attending ANC)</td>
<td>1,543 (100%)</td>
<td>2,269 (100%)</td>
<td>3,812 (100%)</td>
</tr>
<tr>
<td>Took misoprostol home (% of those attending ANC)*</td>
<td>1,536 (99.5%)</td>
<td>2,214 (97.6%)</td>
<td>3,750 (98.4%)</td>
</tr>
<tr>
<td>Did not receive misoprostol (of those attending ANC)*</td>
<td>7 (0.5%)</td>
<td>55 (2.4%)</td>
<td>62 (1.6%)</td>
</tr>
</tbody>
</table>

\(^*\)p<0.01

Source: Antenatal Misoprostol Provision Tool

5.2 LOCATION OF DELIVERY AND UTEROTONIC COVERAGE
Location of delivery varied significantly between the two districts. Two in three women in Maragua reported delivering at a health facility (68%) compared to less than half of women in Kitui (42%) (Table 6). Women delivering with CMs in Maragua made up close to 5% of the total postpartum data sample. The Community Midwife Delivery Form did not include location of delivery; therefore, deliveries with CMs could either be at the woman’s home or at the CM’s private clinic.

There were also significant differences in attendant at delivery between the two districts. The majority of women in Maragua reported delivering with a nurse or midwife (66%). However, women in Kitui were almost equally likely to deliver with a nurse or midwife as with a friend or relative (41% vs. 39%, respectively). In addition, more women in Kitui delivered with TBAs (17%) compared with women in Maragua (1%). Overall, more women in Kitui delivered without a trained provider in attendance.
Overall, 60% of women who completed the *Postnatal Follow-up Form* delivered in a health facility (data not shown). Figure 5 shows that there was no change in the proportion of women delivering at a health facility during the course of the project. According to the postpartum data, the proportion of women delivering in health facilities in January 2010 is not statistically different from the proportion of women delivering in health facilities in August 2010 (66% vs. 62% respectively, p=0.61).

**Figure 5: Location of delivery by month (n=2,766)***

Uterotonic coverage at delivery was high in both districts. All women who delivered at home received misoprostol from ANC, 95% of whom used the tablets at delivery. Of the 58 women who did not use misoprostol at a home birth, 26 women gave a reason for not taking the tablets. The most common

---

**Table 6: Delivery characteristics**

<table>
<thead>
<tr>
<th>Location of delivery</th>
<th>Kitui n=1,148</th>
<th>Maragua n=1,742</th>
<th>Total n=2,890</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Home</em></td>
<td>653 (56.9%)</td>
<td>465 (26.7%)</td>
<td>1,118 (38.7%)</td>
</tr>
<tr>
<td><em>Health facility</em></td>
<td>483 (42.1%)</td>
<td>1,187 (68.1%)</td>
<td>1,670 (57.8%)</td>
</tr>
<tr>
<td><em>En route</em></td>
<td>12 (1.1%)</td>
<td>12 (0.7%)</td>
<td>24 (0.8%)</td>
</tr>
<tr>
<td>With Community Midwife</td>
<td>--</td>
<td>78 (4.5%)</td>
<td>78 (2.7%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attendant at delivery</th>
<th>Kitui n=1,148</th>
<th>Maragua n=1,742</th>
<th>Total n=2,890</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor</td>
<td>31 (2.7%)</td>
<td>56 (3.2%)</td>
<td>87 (3.0%)</td>
</tr>
<tr>
<td>Nurse/midwife*</td>
<td>470 (40.9%)</td>
<td>1,144 (65.7%)</td>
<td>1,614 (55.9%)</td>
</tr>
<tr>
<td>Community Midwife*</td>
<td>--</td>
<td>78 (4.5%)</td>
<td>78 (2.7%)</td>
</tr>
<tr>
<td>Friend/relative*</td>
<td>446 (38.9%)</td>
<td>428 (24.6%)</td>
<td>874 (30.2%)</td>
</tr>
<tr>
<td>Delivered alone</td>
<td>5 (0.4%)</td>
<td>9 (0.5%)</td>
<td>14 (0.5%)</td>
</tr>
<tr>
<td>Traditional birth attendant*</td>
<td>196 (17.1%)</td>
<td>27 (1.2%)</td>
<td>223 (7.7%)</td>
</tr>
</tbody>
</table>

*p<0.01

*Source: Postnatal Follow-up Form and Community Midwife Delivery Form*

---

*December 2009, September 2010, and October 2010 are not included in this graph due to the small number of deliveries during these months.

*Source: Postnatal Follow-up Form*
reasons were that they forgot to take the tablets (14 women), did not want to take them (six women), or could not find the tablets (six women).

The majority of women delivering in health facilities received oxytocin (89%); however, an additional 10% received either misoprostol or both misoprostol and oxytocin at delivery (Table 7). Women delivering in facilities in Kitui were more likely to receive misoprostol at delivery than women in Maragua; women in Maragua were more likely to receive oxytocin. Only 1% of women delivering in a health facility in both districts did not receive any uterotonic drug at delivery.

Uterotonic coverage at delivery was universal for women who delivered with CMs in Maragua, with misoprostol used in 94% of the deliveries.

Table 7: Uterotonic at delivery

<table>
<thead>
<tr>
<th></th>
<th>Kitui n=1,148</th>
<th>Maragua n=1,742</th>
<th>Total n=2,890</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Home birth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misoprostol</td>
<td>626 (94.1%)</td>
<td>458 (96.0%)</td>
<td>1,084 (94.9%)</td>
</tr>
<tr>
<td>No uterotonic</td>
<td>39 (5.9%)</td>
<td>19 (4.0%)</td>
<td>58 (5.1%)</td>
</tr>
<tr>
<td><strong>Facility birth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misoprostol*</td>
<td>70 (14.5%)</td>
<td>92 (7.8%)</td>
<td>162 (9.7%)</td>
</tr>
<tr>
<td>Oxytocin*</td>
<td>405 (83.9%)</td>
<td>1,083 (91.2%)</td>
<td>1,488 (89.1%)</td>
</tr>
<tr>
<td>Both misoprostol and oxytocin</td>
<td>1 (0.2%)</td>
<td>3 (0.3%)</td>
<td>4 (0.2%)</td>
</tr>
<tr>
<td>No uterotonic</td>
<td>7 (1.5%)</td>
<td>9 (0.8%)</td>
<td>16 (1.0%)</td>
</tr>
<tr>
<td><strong>Community Midwife</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misoprostol</td>
<td>--</td>
<td>73 (93.6%)</td>
<td>73 (93.6%)</td>
</tr>
<tr>
<td>Oxytocin</td>
<td>--</td>
<td>5 (6.4%)</td>
<td>5 (6.4%)</td>
</tr>
<tr>
<td>No uterotonic</td>
<td>--</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

1Includes births *en route* to the health facility
*p<0.01

Source: Postnatal Follow-up Form and Community Midwife Delivery Form

Postpartum data is available for 27 of the 62 women who did not take misoprostol home from ANC. Of these women, 20 went on to deliver at a health facility and received oxytocin, and seven delivered with a CM and received misoprostol.

Over 95% of women in this postpartum data sample received a uterotonic drug for PPH prevention because use of oxytocin was high at facility deliveries and misoprostol was almost universally used at home deliveries (data not shown). As Figure 6 shows, since home deliveries were higher in Kitui, misoprostol taken at home protected more births than in Maragua (55% vs. 26%, respectively). Conversely, more births were covered by oxytocin at facilities in Maragua (62%) than in Kitui (35%).
Overall, misoprostol use protected over 60% of births in Kitui and 35% of births in Maragua against PPH, which would not have otherwise received a uterotonic drug.

**Figure 6: Coverage of births protected from PPH** (n=2,890)

<table>
<thead>
<tr>
<th></th>
<th>Kitui</th>
<th>Maragua</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>55%</td>
<td>26%</td>
</tr>
<tr>
<td>Oxytocin at facility</td>
<td>6%</td>
<td>2%</td>
</tr>
<tr>
<td>Misoprostol with CM</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Misoprostol at facility</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Misoprostol at home</td>
<td>26%</td>
<td>4%</td>
</tr>
</tbody>
</table>

1 Any uterotonic given for PPH prevention
^ Includes four women who also received oxytocin

Source: Postnatal Follow-up Form and Community Midwife Delivery Form

5.3 PROGRAM EFFECTIVENESS: PERCEIVED PPH AND THE NEED FOR ADDITIONAL INTERVENTIONS

Postpartum data collected included perceived experience of PPH and additional interventions required. Of the 1,084 women who delivered at home and used misoprostol, only two perceived PPH. Neither required any additional interventions. Of the women who delivered at a health facility, one perceived experiencing PPH, and required IV fluids and other drugs. Three women delivering with CMs reported perceived PPH, and none were referred nor required additional interventions from the CM (Figure 7).
Two women, both from Maragua, were referred to a hospital. One woman had a retained placenta, and was transferred to a hospital for manual removal. The second referral was for treatment of an infant conducted by a CM.

5.4 SAFETY: CORRECT USE OF MISOPROSTOL AT HOME DELIVERIES
Women used misoprostol at home deliveries correctly (correct dose, route and timing) 97% of the time (Table 8). Only one woman who delivered at home in Kitui reported taking two tablets instead of the three-tablet dose she was educated to take. All of the women for whom there is postpartum information reported taking misoprostol orally and 97% took the tablets immediately after delivery, before the placenta was delivered. Only 36 women (3% of women with postpartum information) reported taking misoprostol after delivering the placenta (27 women in Kitui and nine women in Maragua).
Table 8: Correct use of misoprostol at home births

<table>
<thead>
<tr>
<th></th>
<th>Kitui n=626</th>
<th>Maragua n=458</th>
<th>Total n=1,084</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dose</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three tablets (Correct dose)</td>
<td>625 (99.8%)</td>
<td>458 (100%)</td>
<td>1,083 (99.9%)</td>
</tr>
<tr>
<td>Two tablets</td>
<td>1 (0.2%)</td>
<td>0</td>
<td>1 (0.1%)</td>
</tr>
<tr>
<td><strong>Route</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral (Correct route)</td>
<td>626 (100%)</td>
<td>458 (100%)</td>
<td>1,084 (100%)</td>
</tr>
<tr>
<td><strong>Timing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immediately after delivery, before placenta is delivered (Correct timing)</td>
<td>599 (95.7%)</td>
<td>449 (98.0%)</td>
<td>1,048 (96.7%)</td>
</tr>
<tr>
<td>After placenta is delivered</td>
<td>27 (4.3%)</td>
<td>9 (2.0%)</td>
<td>36 (3.3%)</td>
</tr>
<tr>
<td><strong>Correct use of misoprostol</strong> (correct dose, route and timing)</td>
<td>598 (95.5%)</td>
<td>449 (98.0%)</td>
<td>1,047 (96.6%)</td>
</tr>
</tbody>
</table>

^Includes deliveries en route to the health facility

Source: Postnatal Follow-up Form

Most women who did not use misoprostol returned it to a facility, either by bringing the tablets to the health facility at the time of delivery or by returning unused tablets after a home birth during a postnatal care visit.

5.5 EXPERIENCE OF POSTPARTUM SYMPTOMS AMONGST MISOPROSTOL USERS

The majority of women who took misoprostol during delivery did not experience any symptoms (90%) (Figure 8). Of those who did report postpartum symptoms, the most common was shivering (6%). Other postpartum symptoms - such as nausea, diarrhea, vomiting, and increase in body temperature - were reported by fewer than 1% of women who used misoprostol. Only 1% of misoprostol-users experienced more than one symptom, which was most commonly increase in body temperature accompanied by another symptom (9 of 13 women experienced more than one symptom).

Fewer than 1% of women indicated that experiencing postpartum symptoms would prevent them from taking misoprostol in the future.

Figure 8: Reported experience of postpartum symptoms of misoprostol users at home or facility birth (n=1,323)

^Women experiencing diarrhea (n=2), increase in body temperature (n=2), and other unspecified symptoms (n=6) were fewer than 1% of women using misoprostol and not shown.

Source: Postnatal Follow-up Form and Community Midwife Delivery Form
6. Conclusions

CHWS ARE ESSENTIAL FOR COMMUNICATING MESSAGES
Over 3,000 CHWs were involved in this project, and their involvement allowed messages about birth preparedness, risks of PPH, and PPH prevention with misoprostol to be spread to the communities. CHWs conducted both large community meetings and one-on-one sessions with women to provide information about the project and encourage women to attend ANC and deliver at health facilities. CHWs served the essential functions of creating awareness about the project, reinforcing the messages of ANC providers, and dispelling misinformation. According to the CHWs, women and communities responded to their sessions with overwhelming positivity.

Due to the level of involvement of the CHWs, many of those working closely with the project expressed a desire to have some kind of material to distinguish themselves and their capacity within the project. As a result, the participating CHWs were provided with nametags at the project midpoint to identify them as CHWs with knowledge of misoprostol.

HIGH COVERAGE OF MISOPROSTOL DISTRIBUTION AT ANC
Women attending ANC in the two project districts, Maragua and Kitui, enrolled in the project and took misoprostol home at high rates. Misoprostol was distributed to over 98% of women attending ANC. The majority of women who did not take misoprostol home were medically ineligible to receive the tablets.

LOCATION OF DELIVERY AND SKILLED ATTENDANCE AT DELIVERY VARY BY DISTRICT
Location of delivery for women varied between the two districts in the project. Home deliveries were higher in Kitui for women for which postpartum data is available (57% vs. 27% in Maragua). Because of the higher rate of facility deliveries in Maragua, more women in the district had a trained provider in attendance at their deliveries (over 70% delivered with a nurse, midwife, or CM compared with just over 40% skilled attendance in Kitui). Despite having a lower rate of facility delivery, women in Kitui had the same coverage of births protected from PPH as Maragua because of misoprostol use at home births. Since health care utilization for deliveries can vary greatly between districts, it is important to have strategies that can reach women who deliver at home with life-saving technologies such as misoprostol.

COMMUNITY MIDWIVES CONTRIBUTE TO THE RATE OF SKILLED ATTENDANCE AT DELIVERY AND UTEROTONIC COVERAGE
Community Midwives in Maragua were an additional health resource for women in areas where they run private clinics and provide ANC services. CMs also provided skilled attendance for home deliveries to women in remote areas. All the deliveries attended by CMs in this project were protected from PPH by either misoprostol or oxytocin.

MISOPROSTOL GREATLY INCREASES UTEROTONIC COVERAGE, ESPECIALLY FOR HOME DELIVERIES
Uterotonic coverage for all women for whom there is postpartum data was very high, regardless of location of delivery. The majority of women who delivered in facilities received oxytocin at the time of delivery (89% of facility deliveries). The availability of misoprostol covered an additional 10% of facility deliveries.
Across the two districts, 95% of home deliveries were covered by misoprostol. These deliveries would not have received any uterotonic protection against PPH if misoprostol was not available. This distinction is all the more important for areas where the majority of births occur at home. In Kitui, misoprostol had a major impact: misoprostol taken at home deliveries resulted in uterotonic coverage for an additional 55% of deliveries in that district.

Finally, misoprostol was used frequently at births attended by CMs in Maragua. Slightly fewer than 94% of the deliveries that CMs attended were protected from PPH by misoprostol, with the remaining receiving oxytocin.

LOW REPORT OF PPH, NEED FOR ADDITIONAL INTERVENTIONS, AND POSTPARTUM SYMPTOMS
Women who used misoprostol, both at home and facility deliveries, reported very low perceived PPH, need for referral, and additional interventions. Of the 1,084 women who delivered at home and used misoprostol, only two perceived PPH and neither required additional interventions or referral. Reports of postpartum symptoms among women who used misoprostol were very low, with over 90% of women reporting having experienced no symptoms. Shivering was the most common symptom reported by 6% of women who used misoprostol. Few women said that experience of symptoms would deter them from using misoprostol in the future (<1%).

WOMEN REPORT USING MISOPROSTOL CORRECTLY
Correct use of misoprostol at home births was nearly universal (97%); women who took misoprostol at home demonstrated their ability to use it safely and effectively. Only one out of 1,084 women who used misoprostol at home delivery took two tablets instead of the recommended three, and all women with information about route took the misoprostol orally. Women delivering at home overwhelmingly used misoprostol as directed.

1These calculations do not include deliveries attended by CMs, as data was not collected on the location of births delivered by CMs.
7. Recommendations

The findings from this report demonstrate that distributing misoprostol to women through ANC visits and CMs has the potential to increase the number of women who receive a uterotonic drug for prevention of PPH at the time of delivery. Misoprostol has the potential to provide protection for women who deliver in facilities, particularly if oxytocin is not available. We recommend to policy makers and key stakeholders that distribution of misoprostol through ANC visits and by CMs (where they are present) be scaled up nation-wide in Kenya.

TRAIN ALL ANC PROVIDERS TO DISTRIBUTE MISOPROSTOL
All ANC providers should be trained to distribute misoprostol to pregnant women during routine ANC care. ANC providers were the main point of misoprostol distribution for this project and provided education and information directly to women. Women delivering at home used misoprostol correctly almost universally, indicating the high quality of education they received from ANC providers. With comprehensive training and supervision, ANC providers have the skills to integrate misoprostol distribution into regular ANC visits.

CONTINUE COMMUNITY AWARENESS EFFORTS AND RECOGNIZE CONTRIBUTIONS OF CHWS
Community Health Workers provided extensive community awareness and education on numerous messages, including the importance of delivering in facilities, birth preparedness, risks of PPH, and the availability and use of misoprostol. Not only did CHWs increase awareness of misoprostol, they also reinforced messages from ANC providers on correct use. CHWs are an invaluable component of increasing knowledge in any health intervention and their contributions should be recognized as such. Even small gestures, such as providing identifying nametags, can legitimize their knowledge and importance in community health promotion efforts.

SUPPORT EFFORTS TO EXPAND COMMUNITY MIDWIVES PROGRAM
Community midwives, in the districts where they are present, make an important contribution to increasing the percentage of women who deliver with skilled attendants, even at home deliveries. As much as possible, districts should be supported by the MOPHS and stakeholders in their efforts to develop sustainable models for CMs to provide essential care to women and families. In this project, CMs provided both additional ANC coverage and skilled attendance at delivery, as well as correctly providing misoprostol to women in both settings.

MAKE MISOPROSTOL AVAILABLE AT ALL FACILITIES WHERE DELIVERIES OCCUR
While the majority of women who delivered in facilities in this project received oxytocin for prevention of PPH, there are situations where oxytocin may not be available due to stock-outs, improper storage, or drug expiration. For this reason, we recommend that all facilities where deliveries take place be consistently stocked with oxytocin and misoprostol to increase the likelihood that a woman will receive a uterotonic at delivery.
8. References


Begley CM, Gyte GM, Murphy DJ et al. Active versus expectant management for women in the third stage of labour. *Cochrane database of systematic reviews* 2010;7 (7):CD007412.


