ORIGINAL RESEARCH ARTICLE

Increasing Access to Prevention of Postpartum Hemorrhage Interventions for Births in Health Facilities and at Home in Four Districts of Rwanda

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Abstract

To assess coverage, acceptability, and feasibility of a program to prevent postpartum hemorrhage (PPH) at community and facility levels, a study was conducted in 60 health facilities and their catchment areas in four districts in Rwanda. A total of 220 skilled birth attendants at these facilities were trained to provide active management of the third stage of labor and 1994 community health workers (ASMs) were trained to distribute misoprostol at home births. A total of 4,074 pregnant women were enrolled in the program (20.5 % of estimated deliveries). Overall uterotonic coverage was 82.5%: 85% of women who delivered at a facility received a uterotonic to prevent PPH; 76% of women reached at home at the time of birth by an ASM ingested misoprostol—a 44.3% coverage rate. Administration of misoprostol at the time of birth for home births achieved moderate uterotonic coverage. Advancing the distribution of misoprostol through antenatal care services could further increase coverage. *(Afr J Reprod Health 2015; 19[4]: 58-67).*

Keywords: postpartum hemorrhage; active management of the third stage of labor; misoprostol; community health worker; coverage; home birth

Résumé

Pour évaluer la couverture, l'acceptabilité et la faisabilité d'un programme de prévention de l'hémorragie du postpartum (HPP) au niveau des communautaire et des formations sanitaires, une étude a été menée dans 60 établissements de santé et de leurs zones de couverture dans quatre districts au Rwanda. Au total 220 accoucheuses qualifiées de ces formations sanitaires ont été formées pour assurer la gestion active de la troisième phase du travail et 1994 agents de santé communautaire (ASC) ont été formés pour distribuer le misoprostol à des femmes qui ont accouché à domicile. Un total de 4,074 femmes enceintes ont été inscrites dans le programme (20,5% des accouchements estimés). Couverture globale en utéroniques était de 82,5%: 85% des femmes qui ont accouché dans un établissement a reçu un utérotonique pour la prévention de l'HPP; 76% des femmes vues à la maison au moment de la naissance par un ASM ont ingéré le misoprostol – un taux de couverture de 44,3%. L'administration de misoprostol au moment de la naissance pour les accouchements à domicile a atteint une couverture utérotonique modérée. La distribution à l'avance de misoprostol par les services de soins prénatals pourrait davanatage augmenter la couverture *(Afr J Reprod Health 2015; 19[4]: 58-67).*

Mots-clés: l'hémorragie du post-partum; la gestion active de la troisième phase du travail; misoprostol; agent de santé communautaire; couverture; accouchement à domicile

Introduction

Rwanda has made significant progress in maternal and newborn health over the past decade. There has been an increase in the proportion of facility-based births, up from 28% in 2005 to 69% in 2010[1]. Over the same five-year period, the maternal mortality ratio declined from 750 to 476 maternal deaths per 100,000 live births[1]. As in other sub-Saharan African countries, the main direct causes of maternal death in Rwanda are hemorrhage, sepsis and hypertensive disorders[2]. The Rwandan Ministry of Health (MOH) estimates 46.1% of maternal deaths are due to severe bleeding—31% from postpartum hemorrhage (PPH), 11% from intrapartum hemorrhage and 4% from antepartum hemorrhage[3].

To prevent PPH, the World Health Organization recommends the use of a uterotonic drug during the third stage of labor for all women[4], which is an essential component of active management of the third stage of labor (AMTSL) performed by a skilled birth attendant (SBA). The recommended uterotonic is oxytocin, which is typically administered during childbirth in health facilities; however, oxytocin has limited use in low-resource settings because it requires cold chain storage and administration via injection by a SBA. Misoprostol is less effective than other uterotonics at reducing blood loss[5], but can be used in settings where oxytocin is not feasible as it is heat-stable and manufactured in tablet form. The current recommended dose of misoprostol for PPH prevention is 600 micrograms (mcg) (three tablets, 200 mcg each)[4]. Various studies have demonstrated misoprostol's effectiveness in reducing PPH in a variety of community-based settings where community health workers (CHWs) effectively provided misoprostol for use at home births[6].

To prevent PPH in Rwanda, a comprehensive program was implemented that introduced community-based administration of misoprostol for home births by community health workers, called *Animatrices de Santé Maternelle* (ASMs), and improved the use of AMTSL for births at health facilities.

Methods

Design

A longitudinal observational study was conducted to answer the following research questions: 1) Is it feasible and effective to have ASMs provide education and administer misoprostol for PPH prevention to women who deliver at home; 2) does the availability of misoprostol for preventing PPH at home births affect skilled birth attendance at facilities; 3) is misoprostol acceptable to Rwandan women for PPH prevention; and 4) what do ASMs think of the program. The study aimed to assess the coverage, acceptability and feasibility of program efforts to prevent PPH at community and facility levels.

Setting and population

The program was implemented in four districts of Rwanda: Nyanza, Musanze, Gakenke, and Rubavu, which included approximately 1,994 villages. Based on the Rwanda Demographic and Health Survey, the catchment areas of these districts record approximately 43,943 births each year (Table 1). There were 60 health facilities—five district hospitals and 55 health centers—and 1,994 ASMs in the program area. The districts were selected from the 13 districts where the Maternal and Child Health Integrated Program (MCHIP) was implementing activities and represented the four different geographical provinces of Rwanda**.**

Pregnant women were the primary study population. All women who delivered during the study period in the four districts were considered in need of a uterotonic regardless of their place of delivery. Based on census data, a total of 21,972 deliveries were projected for the six-month implementation period and a total of 5,010 women were expected to be enrolled in the program and receive misoprostol from ASMs after a home birth. This figure reflects an estimate of the total number of expected births in the health facility catchment areas of the four districts, the ASM home visit coverage rates by region, and an estimated 15% rate of refusal to participate in the program.

Pregnant women age 15 and older were recruited by ASMs at the community level in the course of their routine work and written informed consent obtained. ASMs provided the pregnant women information about PPH prevention, the importance of skilled attendance at birth (especially at a health facility), and the availability of misoprostol from their ASM at the time of birth. During counseling, all women were strongly encouraged by the ASMs to deliver in a facility. Those pregnant women who met all of the eligibility criteria and provided informed consent

Table 1: Population and Maternal Health Parameters for Program Districts

District	Nyanza	Musanze	Gakenke	Rubavu	Total
Population[a]	262,713	331,254	334,236	349,224	**1,277,427**
Estimated total annual deliveries, based on crude birth rate[a] **of 34.4**	9,037	11,395	11,498	12,013	**43,943**
Total deliveries at facility (HMIS 2010)[b]	6,812	9,417	8,332	9,714	**34,275**
Facility-based deliveries (%)[c]	75.4%	82.6%	72.5%	80.9%	**78.0%**
Number of pregnant women attending at least one antenatal care (ANC) visit	11,842	10,503	8,691	12,995	**44,031**
ANC coverage (%), at least one visit[d]	131.0%	92.2%	75.6%	108.2%	**100.2%**
Number of villages in each district	420	432	617	525	**1,994**
Number of ASMs	420	432	617	525	**1,994**

[a] Rwanda Demographic and Health Survey, 2010
[b] HMIS = Health Management Information System, 2010
[c] Calculation: Total deliveries at facility/estimated total yearly deliveries in districts
[d] National coverage 98%, RDHS 2010. Percentages above 100% are due to people coming from other districts for ANC

were enrolled in the program. Eligibility criteria included no known history of allergy to prostaglandins and no previous cesarean section. In addition, women who had or developed a chronic disease over the course of her pregnancy (such as cardiac disease, diabetes, pregnancy-related hypertension, or any other high-risk condition) were also not eligible. To receive misoprostol, women had to have delivered immediately or within two hours of the ASMs' arrival at her home.

A sample of postpartum women was interviewed, including all women who ingested misoprostol after a home birth. And, at health facilities, the in-charge of the CHWs, who supervise ASMs, conducted one postpartum interview every 15 days with women who delivered at the health facility.

ASMs were a secondary study population. In Rwanda, ASMs are CHWs that are responsible for maternal health. They provide counseling during home visits to pregnant women on various topics and they often escort women in labor to facilities, but they do not attend home births. ASMs are also expected to conduct a routine postpartum visit within the first week after delivery. Verbal informed consent was obtained from all ASMs participating in the program prior to data collection. ASMs were asked to complete a self-administered questionnaire and a subset were observed providing education and counseling to pregnant women.

The Intervention

The PPH prevention program was implemented from September 2012 through February 2013 by the Maternal and Child Health Unit of the Rwanda MOH and MCHIP, which is funded by the United States Agency for International Development (USAID), in collaboration with Venture Strategies Innovations (VSI).

The program had two components: strengthening the use of AMTSL by skilled providers in health facilities; and introducing misoprostol administration by trained ASMs to eligible women immediately after a delivery at home. Misoprostol was distributed and administered at the time of home birth, which required that an ASM be present.

Trainings for health care providers at facilities, in-charges of CHWs, and ASMs were conducted in July and August 2012. To strengthen AMTSL use at health facilities, a one-day on-the-job refresher training on AMTSL was conducted at all 60 participating health facilities. Providers were trained to record AMTSL-related data in the existing maternity register. Providers also were trained on misoprostol and how to manage PPH for a woman who has taken misoprostol. The head nurse at each facility was trained to conduct the postpartum interviews with women who gave birth there.

For misoprostol distribution at home births, ASMs were trained for three days on how to

provide counseling on birth preparedness to all pregnant women, including the importance of a facility delivery and the risks of PPH. ASMs training also included screening for eligibility to take misoprostol, consent, referrals, and follow-up. PPH educational materials were developed in local languages to be used by ASMs during counseling sessions with pregnant women. ASMs also were trained to conduct postpartum interviews. ASMs were not authorized or trained to provide advance distribution of misoprostol for pregnant women in case of a home birth.

When called to a home delivery, participating ASMs were trained to offer misoprostol (600 mcg oral), ideally immediately after delivery but for up to two hours after birth, if the woman met the program selection criteria. For multiple births, the ASM ensured that the misoprostol was taken after the last baby was delivered. After delivery, all women were referred to the nearest health facility for postpartum care as required by the MOH. For women who took misoprostol, participating ASMs were expected to conduct two additional home visits to ensure that the woman and her baby were healthy and no complications had arisen due to misoprostol use or for other reasons.

ASMs were also expected to conduct a postpartum interview. They used a modified register to record information on misoprostol administration (whether it was offered, taken, and timing of administration), delivery outcome, and any additional interventions needed for maternal complications of women who delivered at home. Misoprostol distribution was closely monitored. ASMs returned the empty package with her ASM register when she met with the CHW in-charge at her affiliated health facility. Each facility accounted monthly for misoprostol tablets and stored the tablets in a safe, locked cabinet only accessible to nurse-midwives trained by the program.

Halfway through the project, all participating ASMs were asked to complete a short, self-administered, anonymous questionnaire with quantitative and qualitative questions to assess practice, knowledge, and attitudes toward use of misoprostol and the feasibility of incorporating this intervention into their existing scope of work.

ASMs met with their supervisor monthly to submit their registers and the empty misoprostol packages. Supervisors tracked misoprostol distribution. MOH and MCHIP staff conducted regular monthly monitoring visits to assess the program status and provided supportive supervision to ASMs, the in-charge of CHW, and health facility staff. Data were reviewed by the nurse in charge of ASMs at the district level and then by MCHIP to assess enrollment progress as well as drug distribution and tracking.

Data Collection

Quantitative and qualitative data were gathered through existing government health systems and program data collection tools. Service statistics were gathered from existing health facility labor and delivery registers (the year before and during the implementation of the project) and AMSTL data were collected from partographs. ASM registers were modified by the program to capture additional information about misoprostol distribution. ASM registers are part of the community component of the national health management information system (HMIS), which is called SIScom. Data from the modified ASM registers were extracted monthly by the in-charge of CHWs using a data collection form. The in-charge of CHWs also collected data on adverse events and household supervision visits. Data at health facilities were collected in the maternity register by nursing staff and reported monthly by the nurse in-charge at each of the 60 facilities.

Household interviews were conducted with a sample of postpartum women who delivered during the program. Postpartum interviews were completed by ASMs and submitted monthly to their supervisors. Self-administered questionnaires were completed by ASMs and also submitted to their supervisors. ASMs' supervisors used a checklist to observe them during their counselling sessions with pregnant women to ensure they were delivering key messages about PPH. The in-charge of CHWs provided all forms to MCHIP staff for data entry and analysis.

Data Analysis

MCHIP staff reviewed all data collection forms for completion and accuracy. Data entry and analyses were conducted using Microsoft Access and Stata SE 10.1 (Stata Corp, 2010). Descriptive analyses, including frequencies, means, and cross-tabulations, were conducted.

Ethical approval

The program was approved by the Institutional Review Board at the Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA (IRB00003836) and the Rwanda National Ethics Committee (RNEC 225/RNEC 2012).

Results

Final sample

Among the 1,994 ASMs in the study area, all (100%) were trained and 1,946 (97%) participated in the program: a total of 1,184 participating ASMs (61%) were monitored during supervision visits while they were visiting women's homes and 1,745 ASMs (90%) completed the self-administered questionnaire. Forty-eight of the 1,994 trained ASMs dropped out during implementation for various reasons, including no longer living in the catchment area, quit for another job, and retirement.

During the six-month program, a total of 4,074 pregnant women in the four participating districts were consented and participated in the program after counseling by the ASM. The enrollment rate was 20.5% of HMIS/SIScom-recorded deliveries. A total of 1,231 postpartum interviews were conducted: 598 with women who delivered at home and took misoprostol and 633 with women who delivered at a participating health facility.

A total of 18,276 deliveries were recorded in the labor and delivery registers at the 60 participating health facilities and 791 were recorded as home births in ASM registers, for a total of 19,067 deliveries (Table 2). The MOH reporting systems—the HMIS and SIScom—recorded a total of 19,864 deliveries during the same period: 18,515 facility births (HMIS monthly facility reports and district reports) and 1,349 home births (SIScom).The total number of HMIS and SIScom reported deliveries was used as the basis for the program intervention coverage calculations.

Coverage, performance and assessment of the program

ASMs reached 791 women who had a home birth—58.6% of the total births outside of a health facility according to HIMS/SIScom data (Table 2). For about 40% of these births, the ASMs arrived at the house during childbirth and 60% after delivery. Of those reached, 599 (75.7%) met the eligibility criteria and were offered misoprostol and 598 (99.8%) consumed misoprostol offered by the ASM. The coverage rate for misoprostol was 44.3% of HMIS/SIScom-recorded home births.

Figure 1 presents findings of ASMs observed providing services during supervision visits, from checklists completed by in-charges of CHW during supervisory visits. Of ASMs observed, 860 (72.6%) correctly provided four key counseling messages to pregnant women related to the appropriate timing of misoprostol administration. The majority of ASMs provided correct information about misoprostol being dangerous if it is taken before the delivery of the baby (85.8%), correct time to take the tablets when a woman has twins (83.7%), not taking the drug for antepartum hemorrhage (84.0%), and the correct timing and number of tablets to take (86.7%).

The results of the ASMs self-administered questionnaire are presented in Table 3. Most ASMs felt confident to provide counseling to the pregnant women and their families (70%), but the majority (87%) felt the three-day training was too short. More than 90% of ASMs (57% mostly agreed, 36% strongly agreed) felt it was easy to add the counseling and distribution of misoprostol to their routine work and said that the new information added to the education session was valuable (56% strongly agreed). From open-ended questions in the ASM self-assessment on program implementation,

Table 2: ASM Coverage during Pregnancy and at the Time of Birth for Home Births, Based on HMIS/SIScom data

INDICATOR	PPH Prevention Program Results	Percentage of HMIS/SIScom Reports
Total number of recorded deliveries (Health facility births and home births)	19,067	96%
Total pregnant women consented in the PPH prevention study	4,074	20.5%
	Program Results	**Percentage of Home Births HMIS/SIScom Reports**
Home births: women reached by an ASM at the time of birth	791	58.6%
Misoprostol distribution rate: Women who met criteria and were offered misoprostol by an ASM	599	44.4%
○ Percentage of women reached by an ASM at the time of birth who were eligible and were offered misoprostol	75.7%	—
▪ **Misoprostol coverage rate at the community level:** Women who consumed misoprostol provided by an ASM	598	44.3%

which were analyzed for a subset of respondents (n=329), 44% of these ASMs said that the additional work did not affect them and 13% felt the increased time spent to educate mothers allowed them to get closer to the women in the village and increased the mothers' confidence in them. About half (47%) reported they did not experience any challenge, although some mentioned the lack of infection prevention kits and torches for when the mothers delivered on the way to the health facility (9%).

Uterotonic coverage

Uterotonic use for vaginal births at facilities—as part of AMTSL—was recorded for the program. A total of 15,781 women were reported by the program to have received a uterotonic after birth in a health facility. Most of these women received oxytocin, the preferred drug; only 22 were given ergometrine. The uterotonic coverage rate at the health facility level is 85.2% of HMIS-recorded births (86.3% of facility births captured by the program).

For home births, ASMs administered misoprostol to 598 women at the time of birth, resulting in a coverage rate of 44.3% for the 1,349 home births recorded in SIScom.

Overall, 16,379 women were provided a prophylactic uterotonic after birth to prevent PPH, resulting in a uterotonic coverage rate for all HMIS/SIScom recorded deliveries of 82.5%.

Acceptability

Among the 598 women who took misoprostol after home births, 87.81% responded positively to all three questions concerning acceptability. Acceptability was defined as willing to: purchase it (98%); use it again for a future pregnancy (98%); and recommend it to a friend or relative (99%).

Side effects, adverse events, and complications

Women who took misoprostol after home births (n=598) were asked about side effects and complications. Among the 598 interviewed, 387 women (64.7%) reported they experienced some side effects while 211 women (35.3%) said they did not experience any side effect. Among the 387 women who experienced any side effect, the four most frequent were: nausea (30.5%), shivering (24.3%), diarrhea (16.5%), and vomiting (16.1%).There were no reported serious adverse events—defined as uterine rupture, fever more than 40 degrees Celsius, or death of a woman enrolled in the program.

Figure 1: ASM Performance Providing Correct Information about Administration of Misoprostol during Household Visits, from Supervisory Visits (n=1,184)

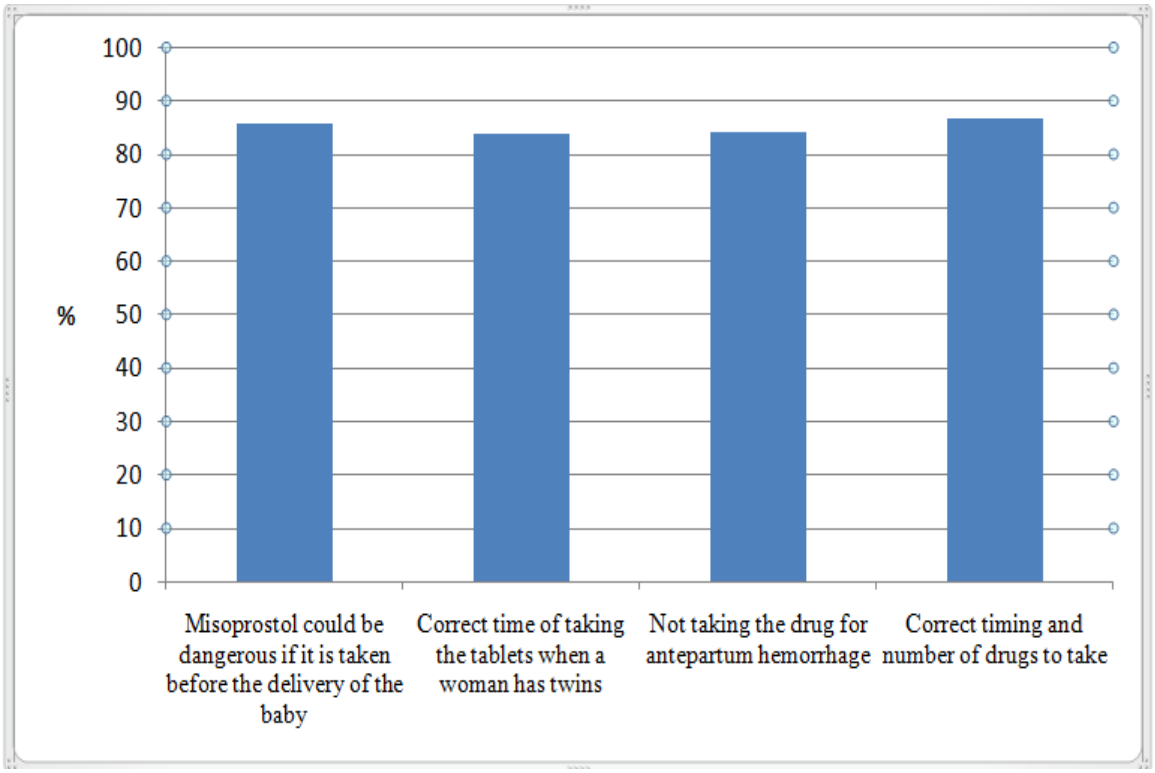

Table 3: ASMs' Attitudes: Impact of Training on ASMs' Self-Efficacy, Quality of Training, and the Burden of Additional Work (n=1,745)

Impact of training on the attitude of ASM during counseling			
Confident		1,223	70.1%
Somewhat confident		205	11.8%
Need more information to be confident		315	18.1%
No answer		2	0.1%
Quality of the training			
The length of training was too short overall		1,518	87.0%
The sessions were too short		601	34.4%
More time needed for practical sessions such as role play		410	23.5%
The sessions were too long		404	23.2%
Burden of the additional work (counseling and administration)			
It is easy to add information about safe delivery and misoprostol to my routine information sessions.	Mostly agree	990	56.7%
	Strongly agree	626	35.8%
There is enough time to discuss all the information with the women.	Mostly agree	1,103	63.2%
	Strongly agree	501	28.7%
I only tell the woman the information I think she needs to know rather than tell her all the information I was trained to tell her.	Mostly agree	905	51.8%
	Strongly agree	520	29.7%
I think the new information added to the education session is valuable.	Mostly agree	748	42.8%
	Strongly agree	969	55.5%

Table 4: Uterotonic Coverage Rate: Percentage of all Women who Delivered and Received a Uterotonic Immediately after Birth, by Place of Birth, from September 2012 to February 2013

Impact of training on the attitude of ASM during counseling			
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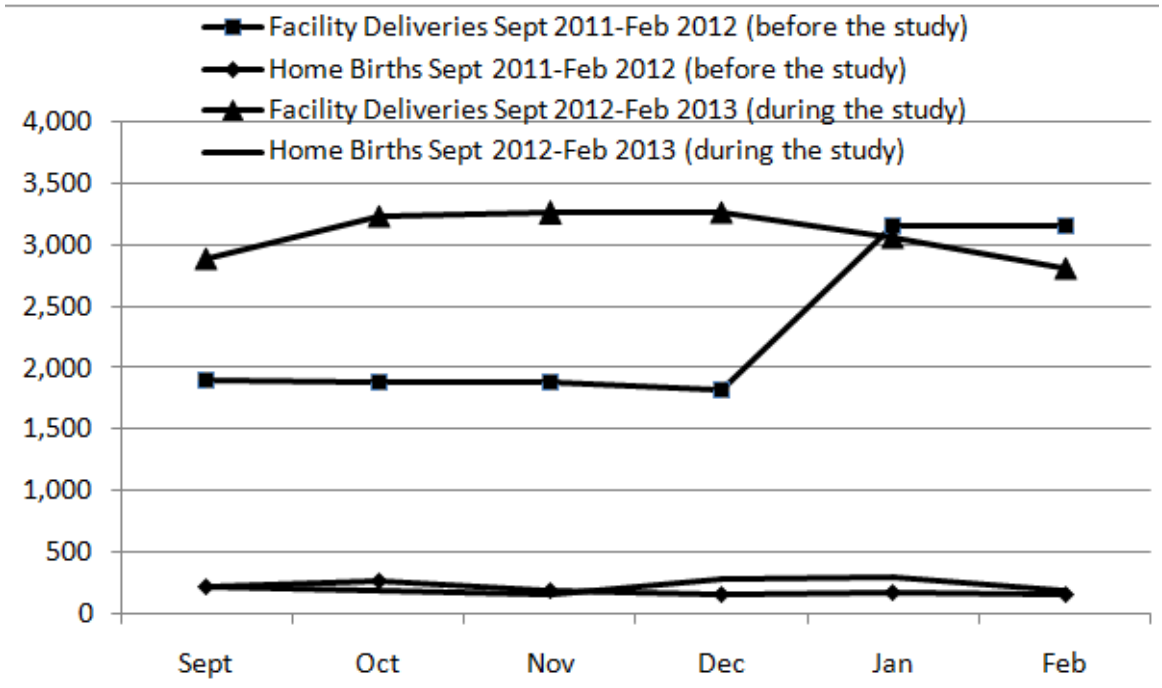
	Strongly agree	969	55.5%

Figure 2: Number of Deliveries Reported in HMIS and SIScom from Four Districts for the Periods September 2011–February 2012 and for the Program, September 2012–February 2013



Facility use for delivery

The program also examined trends in the number of facility deliveries per month reported into the HMIS for the same time period (September–February) before and during the program (Figure 2). The total number of deliveries was 18,515 during the program in 2012–2013, compared to 13,798 for the same period the year before. Overall, HMIS appears to have captured more deliveries during the program than in the same period the previous year.

Discussion

ASMs were able to reach 20.5% of the estimated number of pregnant women in the four districts during the study period with counseling and 58.6% of estimated home births at the time of birth to provide misoprostol. These findings appear to support the recent Smith et al. PPH prevention program review that found distribution of misoprostol at home births was programmatically effective[6]. The findings also contribute evidence, where data had been lacking, from programs providing administration of misoprostol by CHWs at the time of birth. Requiring CHWs to reach laboring women and administer misoprostol after birth has some limitations, the main one being the inability of ASMs to always reach the woman's home when the delivery takes place. Among the 791 home births reached by the ASMs, 598 (75.7%) were eligible and ingested the drug and 293 (49%) took it at the correct time (after birth and before the delivery of the placenta).Coverage of other time-sensitive, delivery-related CHW tasks has also been found to be low. In Rwanda, 18% of women received a postnatal checkup within two days of delivery[1]. An analysis of Demographic and Health Survey data from 23 sub-Saharan African countries found only 13% of women who delivered at home received a postnatal care visit within two days of birth[7]. The challenges for achieving high levels of coverage of misoprostol administration by CHWs are similar to those associated with high coverage of postnatal home visits—limited geographic coverage, numerous other competing responsibilities, and limited mechanisms for notifying CHWs when a woman goes into labor[8].

To achieve high uterotonic coverage of home births, alternative distribution and administration strategies should be considered in Rwanda. Previous systematic reviews on advance distribution of misoprostol for PPH prevention have questioned its effectiveness and safety[9,10] however, new evidence has emerged recently favoring this approach[6]. The risk of misuse of misoprostol (leading to serious complications), which is one of the arguments against advance distribution, is in fact very low, according to the literature[6.]

The availability of misoprostol for home births did not appear to deter women from delivering at a health facility. Studies conducted elsewhere in developing countries have shown that, the availability of misoprostol for women who deliver at home did not have a negative impact on the facility birth rate[11-13]. This program occurred in a setting with a high institutional delivery rate (69%). A major factor to ensure that provision of misoprostol for home delivery did not adversely affect facility-based deliveries is the quality of counseling during antenatal or home visits. The counseling should stress the importance of facility-based delivery, the risk of home birth, and the danger of PPH[6]. The observed increased number of facility births over the previous year was likely the result of MOH policies to encourage institutional deliveries, which include a performance-based financing scheme for ASMs to accompany women in labor to a facility. It is also encouraging that when women were presented with misoprostol and eligible to take it, 99.8% ingested it. Coupled with the high levels of satisfaction reported among women surveyed, misoprostol for PPH prevention seems acceptable to Rwandan women. In addition, most ASMs found the added information about safe delivery and misoprostol for PPH prevention was valuable and not a burden on their routine information sessions.

There are some limitations to the study, including the relatively short duration for monitoring delivery trends and ASM performance. In addition, some home births may not have been

captured in the national HMIS/SISCOM as only births among women in contact with ASMs are included. Finally, the postpartum interviews did not include women who delivered at home who did not have contact with an ASM at the time of birth and those who did not take misoprostol so their perspectives are not represented.

Conclusion

This program achieved high uterotonic coverage of 82.5% for all births due primarily to routine AMTSL provision for the high proportion of facility deliveries. The availability of misoprostol for PPH prevention at home births did not appear to decrease the number of facility-based births. Uterotonic coverage of home births (44.3%) was lower than the expected rate of 60%. This could be increased through advance distribution of misoprostol by ASMs during home visits and/or distribution through antenatal care services.

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