Effect of community-based distribution of misoprostol on facility delivery: a scoping review

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Abstract

Introduction: Community distribution of misoprostol to pregnant women in advance of labor is one of the compelling strategies for preventing postpartum hemorrhage. Concerns have been reported that misoprostol distribution could reduce facility delivery or lead to misuse of the medication. This scoping review was conducted to synthesize the evidence on the effect of community-based misoprostol distribution on rates of facility delivery, and to assess the frequency of mothers taking distributed misoprostol before delivery, and any harmful outcomes of such misuse. Methods: We included peer-reviewed articles on misoprostol implementation from PubMed, Cochrane Review Library, Popline, and Google Scholars. Narrative synthesis was used to analyze and interpret the findings, in which quantitative and qualitative syntheses are integrated. Results: Three qualitative studies, seven observational studies, and four experimental or quasi-experimental studies were included in this study. All before-after household surveys reported increased delivery coverage after the intervention: ranging from 4 to 46 percentage points at the end of the intervention when compared to the baseline. The pooled analysis of experimental and quasi-experimental studies involving 7,564 women from four studies revealed that there was no significant difference in rates of facility delivery among the misoprostol and control groups OR 1.011; 95% CI: 0.906-1.129. A qualitative study among health professionals also indicated that community distribution of misoprostol for the prevention of postpartum hemorrhage is acceptable to community members and stakeholders and it is a feasible interim solution until access to facility birth increases. In the community-based distribution of misoprostol programs, self-administration of misoprostol by pregnant women before delivery was reported in less than 2% of women, among seven studies involving 11,108 mothers. Evidence also shows that most women who used misoprostol pills, used them as instructed. No adverse outcomes from misuse in either of the studies reviewed. Conclusions: The claim that community-based distribution of misoprostol would divert women who would have otherwise had institutional deliveries to have home deliveries and promote misuse of the medication are not supported with evidence. Therefore, community-based distribution of misoprostol can be an appropriate strategy for reducing maternal deaths which occur due to postpartum hemorrhages,
especially in resource-limited settings.

Introduction

Maternal mortality ratios (MMR) remain high in low-and-middle-income countries (LMICs), and reduction of MMR continues to be a priority challenge in the Sustainable Development Goals (SDG) era [1]. Accordingly, to achieve the SDG of reducing the global MMR to 70 per 100,000 live births by 2030, LMICs needs to implement innovative and high impact interventions aimed at preventing and managing the main causes of maternal deaths and providing high-quality services in the continuum of maternity care [2, 3].

A wealth of evidence shows that hemorrhage is one of the major causes of maternal mortality [4-7]. More than two-thirds of maternal deaths due to hemorrhage occur during the postpartum period, which accounts for 20% of all maternal deaths in developing regions [5]. However, in Ethiopia, a systematic review of national evidence shows that PPH accounts for 30% of maternal deaths [8, 9]. Most maternal deaths occurring due to PPH are in poorly resourced facilities or outside of a health facility where there is no access to skilled obstetric care [10-12]. Women who deliver at home face the highest risk of PPH, as they do not benefit from the support of skilled birth attendants and are less likely to receive timely care and medications that prevent and manage PPH [12]. Evidence shows that most PPH-associated deaths could be avoided if active management of third stage of labor (AMTSL) is implemented [13], adverse outcomes and complications are prevented or managed using safe drugs in communities and facilities, and effective referral mechanisms are implemented during delivery and in the postpartum period [14]. Intravenous or intramuscular administration of uterotonics are the most essential component of AMTSL [15] and oxytocin remains the first choice uterotonics for the prevention of PPH [14].

Misoprostol distribution at community level to women during pregnancy is one of the interventions for preventing PPH to reach women who deliver at home without skilled attendant [16-18]. Misoprostol is a generic, inexpensive, heat-stable, and potent uterotonic that can be administered orally, sublingually, rectally, and vaginally [19] for the prevention of PPH. It has considerable advantages over other uterotonics in resource-poor settings to reach woman without access to institutional
delivery. Misoprostol has been studied in different setups and is endorsed by the World Health Organization (WHO) as a solution for women who give birth in facilities without oxytocin or where there is low coverage of skilled attendance [16]. Clinical trials have verified the effectiveness and safety of community distribution of misoprostol [20, 17, 21, 14] where access to skilled birth attendance and oxytocin is limited. A pooled estimate of randomized controlled trials (RCT) comparing 600μg of oral or sublingual misoprostol with placebo in primary care or home delivery settings show that misoprostol resulted in 24% and 41% reductions in the incidence of PPH and severe PPH compared with placebo, respectively [17].

Despite the existing evidence, community-based distribution of misoprostol is still the least prioritized intervention in the maternal survival strategies [22-24, 18, 25]. This is due to concerns of policymakers’ and practitioners’ [21, 17, 25, 12] that misoprostol distribution at community level might decrease facility deliveries, possibly lead to misuse of misoprostol (including taking the drug before delivery, and using the drug for the purpose of inducing abortion), and lack of technologies and expertise to diagnose multiple pregnancies before using it at community levels in resource-limited settings [20, 26]. A range of other barriers at the health system, community, and policy levels are also impeding access to misoprostol for prevention of PPH. These barriers include: 1) absence of registration of misoprostol for the management of PPH [27, 25], 2) fear and apprehensions of providers and policymakers regarding its use [27, 25], 3) lack of evidence-based guidelines and provider training [25], 4) inadequate staffing and lack of knowledge and skill of providers regarding causes of PPH, and 5) limited knowledge of the community regarding the appropriate dosage and timing of administration for PPH presentation and management [27, 20].

This scoping review was, therefore, conducted to synthesize the evidence on the effect of community-based misoprostol distribution in advance of delivery on rates of facility delivery, and to assess the frequency of mothers taking distributed misoprostol before delivery, and any harmful outcomes of such misuse.

Methods

Criteria for inclusion
In this study, researchers used a scoping review methodology to get a wide range of information from both qualitative and quantitative studies. All types of literature on community-distribution of misoprostol for the prevention of PPH reported in English language were included, with no specification on timing of publication.

**Search strategy**

We identified peer-reviewed articles on implementation of community distribution of misoprostol from PubMed, Cochrane Review Library, Popline, and Google Scholars which were made available from February 1-15, 2019. We also applied a snowball approach of searching from the references of papers of the initial search.

The following search strategy was used to search literature from PubMed and CENTRAL databases;

“(((((((((Africa OR Asia OR Caribbean OR West Indies OR South America OR Latin America OR Central America OR Middle East)) OR (developing countr* OR less developed country * OR under developed country * OR underdeveloped country * OR middle income country * OR low income countr*))))) AND ((((postpartum hemorrhage) OR post partum hemorrhage) OR postpartum haemorrhage) OR post partum haemorrhage)) AND misoprostol)) AND (((community distribution) OR community)) OR community based))) AND ((((adverse effects) OR adverse outcomes)) OR ((misuse) OR ("Drug Misuse"[Mesh] OR "Prescription Drug Misuse"[Mesh]))) OR ((((skilled delivery) OR institutional delivery) OR "Delivery, Obstetric"[Mesh]) OR delivery))”

Moreover, a combination of terms, including ‘misoprostol’; ‘misuse’; ‘adverse outcomes’; ‘fear of diversion of facility birth’; ‘misconceptions’; ‘misperceptions’; ‘post-partum hemorrhage’ (and variations i.e. ‘post-partum hemorrhage’, ‘postpartum hemorrhage’); ‘community-based maternal’; ‘maternal health interventions’; ‘maternal mortality’; and ‘low-income setting’, ‘developing country’, ‘resource-poor setting’ have been used to identify the required literature from Popline and Google Scholar.

First, any research output with the above-mentioned terms in either the title or abstract of the article was downloaded, and then a combination of these terms was also used to download more resources.

**Critical appraisal**
The methodological quality of each study was assessed using the Joanna Briggs Institute (JBI) critical appraisal checklists for different study designs as appropriate [28-30]—to assess the methodological quality of studies and to determine the extent to which included studies have addressed the possibility of bias in its design, conduct, and analysis. Two review authors (GT and MY) independently did appraising the quality of each study included and discrepancies between scores were resolved through discussions.

The quality of the studies was assessed based on the core items recommended for the assessment of methodological quality. To obtain an overall quality score, publications scored “1” point for each item fully met and “0” for none or very little information reported. Items were given equal weights and a percentage score was generated. Studies that scored 75% or more were categorized as high quality, scores in the range of 50-74% were ranked as medium, and scores less than 50% were rated as poor. Moreover, standard review protocol, Preferred Reporting Items for Systematic and Meta-Analysis for Scoping Reviews (PRISMA-ScR) checklist, was followed to establish minimum information that should be included when reviewing and reporting [31]. The protocol, however, was not registered in any databases.

**Data extraction and analysis**

The form for abstracting data from reviewed literature was designed and review team members agreed on the contents of the form. Two reviewers (GT and YT) read each identified literature and populated the sheet designed for the purpose. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram (Figure 1) was used for the selection of articles to be used in this scoping review.

Facility delivery rate, misuse, adverse effects from misuse of the drug, and misconceptions on the use of misoprostol and fear of diversion of facility delivery to home delivery because of misoprostol’s access to mothers were the main points considered in this scoping systematic review.

A narrative synthesis was used to analyze and interpret the findings in which quantitative and qualitative syntheses are integrated. Descriptive information about the eligible studies was summarized using text and tables. Findings from the quantitative resources were narrated
thematically followed by findings of qualitative resources. For intervention studies, a random-effects meta-analysis model [32, 33] was used to pool the estimates of prevalence of facility birth, accounting for the variability among studies using Stata v15 [34]. The results were presented as average treatment effects (odds ratio) with 95% confidence intervals.

Results

Description of studies

Table 1 presents the characteristics of the studies included in this review. Fourteen studies were included in the review. Seven of the studies were from Africa and the remaining seven were from Asia. Three qualitative studies [35, 26, 12], seven observational studies [36-42], and four experimental or quasi-experimental studies [43-46] were included in this review. All studies were published from 2006 to 2018.

Interventional activities in observational and experimental studies included training to health workers, antepartum and/or postpartum home visits, identification of pregnant women, provision of prenatal education, community sensitization, and distribution of 600μg misoprostol to women.

Methodological quality of included studies

According to the JBI quality appraisal tool, two of the RCTs scored high quality (88%) and a quasi-experimental study scored medium (61%). On the other hand, the cluster RCT study included scored low (46%) where it had baseline imbalances as well as lacked masking of study of participants, personnel, and assessors [43]. All experimental and quasi-experimental studies provided adequate information about random sequence generation as well as thorough description of the interventions. Overall, the seven cross-sectional studies scored medium quality (70%) in which most lacked strategies to deal with confounding as well as some lacked appropriate use of statistical methods of analysis. Likewise, all qualitative studies scored medium (65%) in which they are subjected to reporting bias in which philosophical perspectives as well as researchers’ experiences, beliefs, wishes, attitudes, culture, views, and personality not stated which might bias analysis and reporting.

Table 1: Characteristics of included studies

| Study ID   | Country  | Study design            | Objectives                                                                 | Description of the intervention                      |
|------------|----------|-------------------------|---------------------------------------------------------------------------|------------------------------------------------------|
| Geller 2014| Ghana    | Facility-based study: before and community distribution of            | Midwives provided misoprostol women who came for antenatal                  |
| Study       | Country          | Design/Methodology                                                                 | Objectives                                                                                                                                                                                                                                                                                                                                 |
|------------|------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Haver 2016 | Afghanistan      | Pre- and post-intervention household surveys in 20 districts                        | To assess whether or not third-trimester distribution of misoprostol would result in adverse events related to child delivery                                                                                                                                                                                                                      |
| Rajbhandari 2010 | Nepal | Before- and after-intervention household survey                                      | To assess whether advance distribution of misoprostol at community reduces (prevents) PPH occurrence and maternal mortality                                                                                                                                                                                                                       |
| Sanghvi 2010 | Afghanistan      | Community-based: Non-randomized control trial                                     | To assess whether community distribution of misoprostol was safe and acceptable To assess whether community distribution of misoprostol was effective and feasible to prevent postpartum hemorrhage                                                                                                                                              |
| Weeks 2015  | Uganda, Mbale District | Community-based study: placebo-controlled randomized trial | To assess whether self-administration of misoprostol by pregnant women at home was safe and effective                                                                                                                                                                                                                                        |
| Study Year | Country/Region | Study Type | Study Design | Objective | Findings |
|------------|----------------|------------|--------------|-----------|----------|
| Smith 2014 | Liberia        | Longitudinal observational study | - | To evaluate whether antenatal distribution of misoprostol was feasible, safe and effective for PPH prevention | - Trained traditional midwives CHWs to educate and women on misoprostol use. CHWS distributed misoprostol at home. Misoprostol use was assessed delivery. |
| Ononge 2015 | Uganda         | Cluster RCT | - | To assess whether misoprostol distribution to pregnant women to administer at home (if she decided to deliver at home) during antenatal care reduces PPH | - Women were offered misoprostol of gestation during antenatal care. They were counseled on how if they delivered at home. |
| Durham 2018 | Lao People’s Democratic Republic | Qualitative study | - | To explore contextual factors that were linked to acceptability misoprostol and whether there was a need to distribute misoprostol at community level for prevention of PPH | - No intervention was done. Interviews were conducted with stakeholders at different levels. |
| Spangler et al 2014 | Ethiopia | Qualitative study | - | To assess decision-makers’ understanding of Ethiopia’s health policy with regard to community-based use of misoprostol for PPH prevention | NA |
| Wells et al 2016 | Ethiopia, Ghana | Desk review and qualitative methods | - | To assess what models existed and implemented to ensure access to misoprostol at community level in Ethiopia, Ghana, and Nigeria | NA |
| Sibley 2014 | Ethiopia | Household survey and record reviews | - | To assess misoprostol use over a period of time. To assess women’s awareness and use of misoprostol and factors associated with its use (before and after a project). | - Trained community health development agents to hold meetings with pregnant caregivers at home. Community health development agents and TBAs in Oromia intervention areas. |
| Rajbhandari | Nepal | Mixed methods | - | To assess whether | - No intervention |
| Year | Location | Study Type | Interventions | Findings |
|------|----------|------------|---------------|----------|
| 2017 |          | Program evaluation | Distribution of misoprostol during antenatal care during a project was effective or not | Household interviews with women who had given birth in the last 12 months in different geographic locations |

Parashar 2018
- Cross-sectional program evaluation
- To develop a framework to assist with designing and implementing community-based distribution of misoprostol
- Pregnant women were more likely to deliver at home (based on criteria) were provided with misoprostol in the 8th month of pregnancy
- Pregnant women were counseled about how to use misoprostol if they delivered at home

Derman 2006
- RCT
- To assess whether oral misoprostol could be an alternative drug to oxytocin for PPH prevention
- Auxiliary nurse midwives were trained for 5 days on implementation protocol; attended deliveries; and followed mothers and their newborns postpartum for 6 weeks
- Midwives attended deliveries and administered misoprostol in intervention group and placebo in control group and measured blood loss

The results of our review are presented under three sections: 1) diversion of facility birth, 2) misuse, for purposes of either abortion or labor induction/augmentation, and 3) adverse events from misuse.

**Diversion of facility birth**

Ten studies (five observational before-after studies, four experimental or quasi-experimental trials, and one qualitative study) reported on the impact on facility birth as the outcome [38, 39, 37, 36, 41, 35, 43-46]. All five before-after household surveys reported increased facility delivery coverage after the intervention: four percentage points increase in Nepal [39] and Liberia [38], 11% points in Afghanistan [37], 39% points in Ghana [36], and 46% points in India [41] at the end of the intervention when compared to the baseline (Figure 2).

A quasi-experimental study in Afghanistan demonstrated an increase of 3.3 percentage points in
facility birth rates comparing between the intervention and control areas (p< 0.001); while a RCT in India showed a decrease of 1.6 percentage points (p>0.05) and two cluster randomized trials in Uganda showed a decrease of 1.5 and 2.1 percentage points (p>0.05) in facility birth rates, comparing between the intervention and control areas [43, 44, 46]. The pooled analysis involving 7,564 women, from four of the studies, revealed that there is no significant difference in facility delivery among the advanced distribution of misoprostol and control groups [OR 1.011; 95% CI: 0.906-1.129] (Table 2).

Table 2: Comparison of facility delivery rates between the intervention and control areas

| Study          | Facility delivery rate (%) | OR     | [95% CI] | % Weight |
|----------------|----------------------------|--------|----------|----------|
|                | Intervention | Comparison |       |          |          |
| Sanghvi 2010   | 21.4          | 18.1    | 1.229    | 1.023    | 1.477    | 35      |
| Weeks 2015     | 56.5          | 58.0    | 0.940    | 0.697    | 1.269    | 13      |
| Ononge 2015    | 85.4          | 87.5    | 0.834    | 0.647    | 1.075    | 18      |
| Derman 2006    | 53.2          | 54.8    | 0.937    | 0.770    | 1.139    | 31      |
| I-V pooled OR  | 1.011         | 0.906   | 1.129    |          |          | 10      |

A qualitative study among health professionals in Laos also indicated that community distribution of misoprostol, for the prevention of PPH, is acceptable to community members and stakeholders and it is a feasible interim solution until access to facility birth is improved. The study recognized misconceptions as barriers that might hinder community-based distribution of misoprostol [35]. Another study in Ethiopia reported regional differences in understanding the implementation strategy of misoprostol and concern among policymakers that distribution of misoprostol will be seen as encouraging home birth [26].

**Misuse**

A program evaluation report in Nepal showed that there was no evidence to suggest that misoprostol distributed for the purpose of the prevention of PPH is being misused for labor induction or pregnancy termination [42]. Moreover, as presented in Table 3, in the community-based distribution of misoprostol programs, administration of misoprostol before delivery was reported in less than 2% (n=17) among seven studies involving 11,108 mothers [36, 37, 40, 38, 43].
A cluster randomized controlled trial in Uganda [43] and an operations research in Ghana [36] reported that no woman took misoprostol before their babies’ birth. Another before-after study in Afghanistan reported that only 1 out of 7,399 women in the study took misoprostol before the birth of her newborn [37]. Similarly, according to a trial in Uganda, only 2 out of 700 women took tablets before delivery. In Liberia, only 3 of 265 women took misoprostol prior to giving birth [38, 46]; while in Ethiopia, less than 2% of women took the tablets before birth [40] (Table 3).

Table 3: Percent of women who took misoprostol before delivery

| Study ID   | Country       | %  | n   | N   |
|-----------|---------------|----|-----|-----|
| Geller 2014 | Ghana        | 0.00 | 0   | 102 |
| Ononge 2015 | Uganda       | 0.00 | 0   | 2,057 |
| Haver 2016 | Afghanistan  | 0.01 | 1   | 7,399 |
| Weeks 2015  | Uganda       | 0.29 | 2   | 700 |
| Smith 2014   | Liberia      | 1.10 | 3   | 265 |
| Sibley 2014  | Ethiopia     | 1.80 | 11  | 585 |
| Total       |               |     | 17  | 11,108 |

Evidence also shows that most women used the misoprostol pills as instructed [39, 36, 44]; unused doses were returned after birth to the point of distribution; and most others either threw it away or kept it [36, 42]. However, qualitative studies in Ethiopia identified, lack of trust in women’s capabilities to use misoprostol correctly [12] and fear of misuse [12, 26], as a problem limiting the expansion of the program.

**Adverse effects of misuse**

Three studies reported minor adverse effects following misoprostol administration [44, 46, 45]. However, no adverse outcomes of misuse were reported in either of the studies reviewed.

**Discussion**

This review shows that community-based distribution of misoprostol programs have demonstrated increase of facility delivery coverage after the intervention in observational studies and no significant difference of facility delivery coverage in experimental and quasi-experimental studies among the misoprostol and control groups. The studies reviewed also found very few instances of administration
of misoprostol before delivery, and no adverse outcomes because of misuse. While some studies have illustrated a concern held by policymakers and provider about misoprostol misuse, diversion of facility birth, and adverse effects of its misuse [12, 26, 22]; this scoping review showed that, so far, community-based distribution of misoprostol has not negatively impacted facility birth rates (in fact some studies show an increase in facility delivery) and has not resulted in misuse of the medication for uses other than PPH prevention. Accordingly, there is no evidence that substantiates the fear of misoprostol misuse, diversion of facility birth, and other adverse effects of its misuse. As is evident from a qualitative study in Ethiopia [26], these misconceptions arise from the health providers’ perceptions rather than the actual behavior of women using community-distributed misoprostol.

In addition, evidence shows that misoprostol is safe and effective for preventing and treating PPH in remote settings where both oxytocin and timely transfer to higher-level care are not available [47, 21, 25]. Previous studies also report that community health workers or other lower-level workers are able to safely administer misoprostol [35, 16]. Women were found to have no major problem of misusing the drug and it was found to be acceptable by them [16]. Another rapid review of the literature showed that distribution of misoprostol in advance of delivery by lay health workers for self-administration was feasible and acceptable at all levels—end-user, health system, community, and policy [20, 25]. Concerns by policymakers about misoprostol distribution at community level, often unsupported by available evidence [25], impedes the strategy being translated into effective policies, programs, and practice. Concerns primarily include fear of women using misoprostol for inducing abortion or labor, and diversion of facility birth to home deliveries [48, 25, 46]. In addition to policymaker resistance, there is a range of other barriers that impede access to a uterotonic for prevention of PPH for every woman. Barriers include service delivery challenges, supply and procurement, financial, national and global policy environments, and factors more closely connected to the end-user [49]. These implementation barriers represent important threats to any community-based misoprostol distribution program, and most of these barriers are common health system weaknesses in many LMICs [20]. Community-based distribution of misoprostol is a compelling strategy to be implemented parallel to
strengthening healthcare facilities to increase safe institutional deliveries [22, 25] and ensuring universal access to uterotonics for every woman. A review by Hobday et al. recommends simultaneously promoting facility delivery and strengthening health systems to avail misoprostol at the community level [16]. Community distribution of misoprostol is thus a complementary strategy for increasing the availability of misoprostol and actively promoting facility births through increasing contact with pregnant women. Increasing interaction with pregnant women also offers the opportunity to promote early care-seeking and referral during pregnancy [20]. As such, community-based distribution of misoprostol programs should include the promotion of facility-based birth [4, 36, 35] as a critical intervention. Successful implementation of misoprostol distribution can be facilitated by creating an enabling environment through supportive policies, designing a formal plan for supplies, task shifting strategies, and appropriate use of guidelines and protocols [27]. Moreover, strong leadership and political commitment, training, and community mobilization were identified as critical success factors [20].

This study provides critical documentation of evidence to support policymakers and program managers to develop national policies and strategies for the implementation of community-based distribution of misoprostol to prevent PPH and reduce maternal mortality. It also highlights that rates of administration of misoprostol before delivery and adverse outcomes of such misuse are very low, especially when compared to the grave risks women can encounter without access to uterotonics. As such, community-based distribution of misoprostol is an appropriate strategy to be implemented while working towards achieving facility delivery as the norm.

National guidance and evidence-based policies on misoprostol distribution initiated by higher levels of the health system can facilitate reassuring reluctant policymakers and providers who hold persistent, but unfounded, fears of misuse and negative consequences. Creating opportunities for reflective discussions or policy dialogue is thus important for virtuous public health practice.

This review has some limitations. First, there may be possibility of missing some relevant studies due to the inclusion of only published studies and exclusion of studies published in a language other than English. Second, we found a small number of articles meeting the inclusion criteria and few rigorous
studies directly investigated the negative effect of community availability of misoprostol on institutional delivery, misuse and adverse effects from misuse as a primary outcome. Accordingly, we could not be able to combine all the results in a meta-analysis and show pooled estimates.

Conclusions
Community-based distribution of misoprostol programs have been associated with an increase in coverage of facility-based births. This review found very few instances of administration of misoprostol before delivery, and no adverse outcomes of misuse in any of the studies reviewed. Fears of misuse of misoprostol and increased adverse pregnancy outcomes if distributed at community level are not supported by evidence. Therefore, community-based distribution of misoprostol can be an appropriate strategy for reducing maternal deaths caused by postpartum hemorrhages, especially in resource-limited settings where many deliveries take place outside of health facilities.

Abbreviations
AMTSL Active Management of the Third Stage of Labor
CHW Community Health Workers
JBI Joanna Briggs Institute
MoH Ministry of Health
PPH Postpartum Hemorrhage
PRISMA Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RAC Research Advisory Council
RCT Randomized Controlled Trial
RMNCAH-N Reproductive, Maternal, Newborn, Child, Adolescent Health, and Nutrition
WHO World Health Organization

Declarations

Ethics Approval and Consent to Participate
Not applicable

Consent for Publication
Not applicable

Availability of Data and Materials
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing Interests
The authors declare that they have no competing interests.

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Authors’ Contributions

GT, BT, WM, YT, and AM conceptualized the paper. GT, MY, EG, and YT performed article search, data extraction, and data analysis. GT, BY, AM, WM, YT did interpretation and critical review. All authors contributed to the interpretation, commented on multiple versions, and approved the final manuscript.

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Figures
Figure 1

Study flow diagram
Figure 2

Changes in facility delivery rate before and after the intervention

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