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## Strengthening quality of maternal and newborn care using catchment based clinical mentorship and safe delivery app: A case study from Somali region of Ethiopia

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### Abstract

The study was a case study that described the use of catchment based clinical mentorship and use of Safe Delivery App to improve the knowledge and skills of health workers to provide quality maternal and newborn health services. It used qualitative and quantitative methods and was conducted in 10 project rural health centers in Somali region. The knowledge of the mentees increased significantly from mean average percent score of  $54.41 \pm 12.56$  at baseline to  $75.86 \pm 18.19$  following 3 months mentorship. The skills of the mentees on management of Postpartum Haemorrhage and Hypertension in pregnancy increased significantly from mean average percent score of  $68.23 \pm 17.32$  at baseline to  $85.51 \pm 13.65$  at endline and  $62.18 \pm 18.13$  at baseline to  $80.27 \pm 14.21$  at end line respectively. The use of both clinical mentorship and Safe Delivery App approaches has great potential of synergistic effect on strengthening the capacity of health workers in providing quality maternal and newborn health care.

**Keywords:** Safe delivery app, catchment based, mentorship, maternal and newborn health, skills

### Introduction

Ethiopia has made great efforts in recent years to improve maternal, newborn health in the last 15 years and the country aims to reduce neonatal mortality rates to 21 per 1,000 live births and the maternal mortality rate to 279 per 100,000 live births as detailed in the health sector transformation plan II <sup>[1]</sup>. To reach these goals, the deployment of skilled birth attendants with adequate levels of competency to provide quality care and manage critical complications is key. <sup>1</sup> In spite of the progress and improvement in maternal and newborn care, quality of care is still a major challenge with significant gaps in knowledge and skills among health care providers reported <sup>[2]</sup>. In 2018, the Ethiopian FMOH launched a new approach to mentorship called hospital catchment-based mentorship and developed catchment based Reproductive Maternal Newborn child and adolescent health training guide <sup>[3]</sup>. In catchment based clinical mentoring, a referral or district hospital is required to coach, communicate, and create networks with its catchment health centers. Each health centre has its catchment referral or district hospital, where they send referrals for higher level of treatment or health care <sup>[3]</sup>.

The use of mobile phone as learning aid has been found to be effective in building the capacity of health workers to provide quality health care service <sup>[4, 5]</sup>. Safe Delivery App (SDA) has been introduced in Ethiopia to provide training and onsite coaching to healthcare workers especially for those in rural and hard to reach health facilities. The Safe Delivery App is a free innovative smartphone application developed by Maternity Foundation in partnership with Universities of Copenhagen and Southern Denmark <sup>[6]</sup>. It provides skilled birth attendants evidence based and up-to-date clinical guidelines on basic emergency obstetric and neonatal care (BEmONC), to handle potentially life-threatening complications during pregnancy and childbirth. The Safe Delivery App uses easy-to-understand intuitive animated instruction videos, quizzes, practical procedures, action cards and drug lists. It's both a training tool and an on-the-job reference resource that midwives and skilled birth attendants can be easily taught to use <sup>[6]</sup>. The SDA aims to improve knowledge and skills of health workers located in the periphery of the health system in order to improve quality of care and potentially save the lives of mothers and newborns.

The study described the pilot of catchment based clinical mentorship and use Safe Delivery App approaches to improve the knowledge and skills of health workers to provide quality

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maternal and newborn health services in rural health centers in Somali region of Ethiopia

### Materials and methods

**Study design:** A case study and used qualitative and quantitative methods.

**Study sites:** This study was conducted in 10 project rural health centers in Awbare, Kebribeyah and Kebridahar woredas/districts in Somali region. The health centers were project sites for the pilot of catchment based clinical mentorship and use of Safe Delivery App to improve health workers capacity and quality of maternal and newborn care.

### Data Collection and analysis

The qualitative data was extracted from the project reports that described the process for the mentorship and the use of Safe Delivery App. The quantitative data on the knowledge and skills on management of hypertension in pregnancy and Post-Partum Hemorrhage among the 22 mentees in the 10 project health centre was collected using Kobo Collect at baseline and endline after 3 months of intervention.

Following the completion of data collection, the quantitative data was cleaned, entered into and analyzed using SPSS version 24. Analysis was done using paired t test to compare the mean difference in knowledge and skills percentage scores of the mentees at baseline and endline and p value was set at significant level of 5%. The outcome measure was the mean difference in knowledge and skills scores of mentees on management of hypertension in pregnancy and post-partum haemorrhage before and after 3 months of clinical mentorship and use of Safe Delivery App.

### Results

This is divided into two parts: (1) the description of the process of Catchment Based Clinical Mentorship (CBCM) and use of safe delivery App and (2) the analysis of the change in knowledge and skills following 3 months of mentorship

#### The description of the process of Catchment Based Clinical Mentorship (CBCM) and use of Safe Delivery App

At the beginning of the project, a sensitization meeting was held with stakeholders at the regional and woreda levels to have a common understanding about the concept of Catchment-based clinical mentorship and the use of Safe delivery App. In line with the national guideline, Catchment Based Clinical Mentorship is an approach in which health facilities are mentored according to the health system tier. Primary level hospitals mentor health centers that are found under their catchment area. The management of the 3 hospitals under which catchment areas the 10 pilot health centers were located were briefed and 20 practicing midwives from the maternal and newborn section of the hospitals were selected to be assessed as mentors. They were assessed by experienced midwives who are trainers on Basic Emergency Obstetric and Newborn care (BeMONC) and use of Safe Delivery App using BeMONC assessment tools on knowledge and skills and those who scored more than 80% on knowledge and 85% on skill were considered to be mentors. Following the assessment, six mentors who volunteered and were not engaged during the project period from the hospitals were selected and each assigned to health

centers in their catchment areas.

A baseline assessment was conducted in June 2021 in all the ten health centers to identify the mentees' knowledge and skill gap and also facility readiness assessment covering the availability of basic infrastructure, medical equipment, drugs, supplies and staffing was done in all the ten project health centers. In addition, facility register review was done on maternal and newborn health service utilization data that covers a period of one year before the project started.

The assessment was done using a modified tool which has a component of the BEMONC assessment checklist which was used for knowledge assessment and Maternity Foundation's simulation case drills which was used for skills practice assessment<sup>[7, 8]</sup>. This involved physical onsite assessment and observation and the data collected using a data collection software, Kobo Collect. The assessment was conducted by experienced midwives who are trainers on BEMONC and use of Safe Delivery App along with the mentors.

The mentors were trained on clinical mentoring skills using the national guideline on Catchment Based Clinical Mentorship<sup>[3]</sup>. The training was comprised of a four-day theoretical session, followed by a one-day practical session. The objectives of the training were to provide them with understanding of the goals of mentoring and their expected roles and responsibilities and the concept of adult learning. They were also provided guidance on the use of the Reproductive, Maternal, Neonatal, Child and Adolescent, Health Monitoring and Evaluation tools for mentoring and the use of effective process for mentoring. A section of the training sessions was focused on the skills and competencies. The mentors and 26 selected mentees from the 10 project health centers were also provided with 5 days training on helping baby breathe (HBB) and Helping Mothers Survive (HMS) and the use of the Safe Delivery App. The Safe Delivery App in English and Somali languages was installed on the phone of all the mentors and mentees. The majority of mentees identified were midwives working in the maternal and newborn care unit of the health centers.

The mentors used the report of the baseline assessment for each mentee to develop standard clinical mentoring checklists to monitor the progress in the capacity of their mentees in the domains of knowledge, skills and attitudes. Using the clinical mentoring approach, clinical mentors encouraged mentees to maintain skills where they demonstrated strengths, while supporting them to improve the gaps in skills observed during the assessment. Mentors were provided with a range of tools including mentoring logbook, mentoring checklist, counselling tools and weekly reporting template. The mentors traveled to the health centre to provide onsite hands-on mentoring to the mentees 7 days every month for 3 months, depending on the schedule agreed upon between the health centre, the clinical mentors, and the implementing NGO.

The mentorship focused on recording and documentation, partograph filling and interpretation, Active Management of Third Stage of Labour, Manual removal of placenta, abdominal aortic compression, Non-pneumatic Antishock Garment (NASG) application and removal. It also included administration of uterotonic drugs, administration of anti-hypertensives and anti-convulsant for management of a woman with eclampsia, Infection prevention, Essential New-born Care and neonatal resuscitation. They were also

mentored and guided on the use of the Safe Delivery App. To simulate real time scenario, high fidelity models, such as Mama Natalie and NeoNatalie were used. To guide the skills learning, simulation drill cases and Safe Delivery App were used. To ensure confident care, coaching was also undertaken while performing procedures on actual clients. In addition to ensuring shared learning and best practice learning, a WhatsApp group consisting of all mentors and mentees was formed in which everyone shared their daily activity through text, video and pictures. The mentees continued to practice using the Safe delivery App and the Mama Natalie and NeoNatalie regularly even when the mentors were not around.

The endline data was collected in December 2021 after completion of 3 months mentorship and continues use of the Safe delivery App using the same assessment tool used as baseline [7, 8]. The mentees' knowledge passing score was set at 85%, and their skill passing score was 90% for a mentee to graduate. The endline assessment was done only by the experienced midwives and trainers without the mentors so as to ensure objective and unbiased assessment of the mentees. However, the endline assessment was done only for 22 mentees who completed the 3 months mentorship schedule. In each health centre between 2 and 3 midwives/nurses available in the health centers were mentored.

Five mentees with minimum set scores following the endline evaluation graduated as peer mentors for other colleagues in their health centers and will be used as mentors in other health centers/health facilities in their clinic catchment areas for the second phase of the project. All the mentees are planned to be followed up and evaluated 6 month and 12 months to know the retention of the knowledge and skills while the those who graduated will be supported to mentor others.

The challenges faced during the project included shortage or lack of basic infrastructure, some equipment, supplies and drugs though some of them that are critical were provided by the project. Another challenge faced was absence of some of the mentees during mentorship visits and this was addressed through discussion with the health facility managers to ensure all mentees are available and on duty

during the scheduled mentoring periods and by giving prior information a week before site visit so they can be available. Some of the health centers had very low patient/client flow and community awareness and mobilization was conducted with the help of the community leaders and health centers to improve utilization of the services in the health facilities. To ensure confidence in providing care to clients, mentees who work at facilities with low case flow were brought to the catchment hospital for skills transfer and coaching. Difficulty in accessing some of the health centers by the mentors because of long distance, poor terrain which was worsened when it rained and limited means of transportation especially the health centers in hard-to-reach areas. This increased the operation costs in the deployment of some of the mentors to these areas.

The project planned to mentor 40 midwives, 4 in each of the health centers, however due to the limited number of health workers especially midwives and only 22 could be mentored.

**Analysis of the change in knowledge and skills following 3 months of mentorship**

Even though the knowledge and skills of the mentees on all the signal functions of BEmONC was assessed, however the management of hypertension in pregnancy and post-partum haemorrhage at baseline and endline were used in analysing the changes in their knowledge and skills in the study.

Table 1 shows that the knowledge of the mentees increased significantly from mean average percent score of 54.41±12.56 at baseline to 75.86±18.19 post intervention with paired t test of 5.033 and p value of 0.0006.

Likewise, the skills of the mentees in managing Postpartum Haemorrhage (PPH) increased significantly from mean average percent score of 68.23±17.32 at baseline to 85.51±13.65 post intervention with paired t test of 4.33 and p value of 0.0003.

The skills of the mentees in Managing Hypertension in pregnancy (HIP) increased significantly from mean average percent score of 62.18±18.13 at baseline to 80.27±14.21 post intervention with paired t test of 4.203 and p value of 0.0004.

**Table 1:** Changes in the knowledge and skills of 22 mentees on PPH and HIP pre and post 3 months mentorship

Variables	Knowledge on PPH and HIP		Test statistic	Skills on PPH		Test statistic	Skills on HIP		Test statistic
	Pre-mentorship	Post mentorship		Pre-mentorship	Post mentorship		Pre-mentorship	Post mentorship	
Mean	54.41	75.86	t = 5.033 [CI: -28.22 to -8.96] P=0.0006	68.23	85.51	t = 4.33 [CI: -27.56 to -9.53] p=0.0003	62.18	80.27	t = 4.203 [CI: -25.75 to -8.80] P= 0.0004
SD	12.56	18.19		17.32	13.65		18.13	14.21	

**Discussion**

This study described the implementation of Catchment Based Clinical Mentorship and use of Safe Delivery App to improve the capacity of health workers to provide quality maternal and newborn care. The combined approach of onsite Catchment Based Clinical Mentorship (CBCM) and use of Safe Delivery App in the study improved the knowledge and skills of mentees in management of hypertension in pregnancy and post-partum haemorrhage (PPH). Even though the mentees were mentored on all the signal functions of Basic emergency obstetric and newborn care (BEmONC) however the management of hypertension in pregnancy and post-partum haemorrhage was used in

assessing their knowledge, skills, and competencies in the study.

Most studies on capacity building of health workers on maternal and newborn care either evaluated the use of Safe Delivery App or use of clinical mentorship. However, this study assessed the use of both approaches and so there are very limited studies to compare the findings on combined approaches with.

In the study, the mean percentage score of the knowledge of the mentees increased significantly by over 20 percent between the baseline and endline following 3 months mentorship and use of safe delivery app. When compared with studies that implemented clinical mentorship approach,

the finding in our study is similar to the findings in a randomized control trial in India that assessed the effectiveness of a nurse-led onsite mentoring program in improving quality of care of institutional births<sup>[9]</sup>. It shows that the providers in the intervention arm had better knowledge of active management of the third stage of labour (82.4% vs.35.8%)<sup>[9]</sup>. Likewise, a study in Nigeria that evaluated health workers' knowledge following the introduction of clinical mentoring reported that over 90% of the 33 mentored health workers showed an increase in their knowledge scores<sup>[10]</sup>. The mean percentage score of the health workers increased significantly from 56.3 percent before the start of clinical mentoring to 74.7 percent six months later. Similar, a study in Malawi reported significant increase in the knowledge of health workers in emergency obstetric and neonatal resuscitation following a hospital clinical mentorship program immediately after mentorship and 6 months later<sup>[11]</sup>. A quasi -experimental study in Ethiopia that assessed effectiveness of catchment-based mentoring on improving mentees' knowledge reported mentees' mean knowledge scores significantly increased by 25.36 percent from the baseline after completion of the 6-month mentorship<sup>[12]</sup>. While an evaluation pilot midwife mentoring program in 10 health centers in Ethiopia showed an increase in the mentees' knowledge level from 67.6% to 86.3%<sup>[13]</sup>.

When compared with studies that used Safe Delivery App (SDA) to improve the capacity of health workers, our finding is similar to a mixed-methods feasibility and pilot cluster randomized trial using the safe delivery app study conducted in the democratic republic of Congo<sup>[14]</sup>. The study revealed a similar increase in PPH and neonatal resuscitation knowledge scores among health workers at 3 months post-SDA intervention. Similarly a study among midwives in rural health clinics in Northern Ghana reported 40% increase in the knowledge of the 58 midwives after piloting the use of the Safe Delivery App for just three months<sup>[15]</sup>. A study in Rwanda that's assessed the effect of SDA application on nurses' and midwives' knowledge on the management of postpartum hemorrhage reported that the knowledge scores on PPH management and neonatal resuscitation (NR) increased significantly from baseline to endline measurements by mean difference of 17.1%<sup>[16]</sup>.

On the skills of the mentees, this study found that the skills in management of hypertension in pregnancy and post-partum haemorrhage increased significantly after the 3 months mentorship.

When compared with studies that implemented clinical mentorship approach, the findings in our study is similar to a randomized control trial study in India that assessed the effectiveness of a nurse-led onsite mentoring program in improving quality of care of institutional births<sup>[9]</sup>. It revealed that providers in the intervention arm showed greater compliance with the protocols during labour monitoring (77.3% vs. 32.1%); delivery and immediate post-partum care for mothers (78.6% vs. 31.8%). A quasi -experimental study in Ethiopia that assessed effectiveness of catchment-based clinical mentorship reported improvement in the overall skill of mentees. Mentees' mean skill competency scores significantly increased by 26.64 percent from the baseline compared to the completion of the 6-month mentorship<sup>[12]</sup>. While an evaluation pilot midwife mentoring program in 10 health centers in Ethiopia showed improved skill level from a baseline of 53.5% to 84.4% in

managing major causes of maternal mortality and in reducing unnecessary referrals to hospitals<sup>[13]</sup>.

The finding of this study is in agreement with a systematic review in Malawi that reported that mentoring interventions increased adherence of health care providers to updates, guidelines, standards, and protocols<sup>[11]</sup>. Likewise a study in Nepal, reported onsite clinical mentoring of nurses, coupled with health facility management mentoring, improved nurses' clinical competencies in maternity and newborn care<sup>[17]</sup>.

When compared with studies that used Safe Delivery App (SDA) approach to improve the capacity of health workers, our finding shows higher improvement in outcome in a study in Rwanda on the effect of SDA on nurses' and midwives' knowledge and skills for the management of postpartum hemorrhage which reported a mean difference for PPH skill of 2.6% in the intervention group where SDA was used<sup>[16]</sup>. However, pre- and post-intervention skills scores were significantly different by years of experience in obstetric care which was not evaluated in our study. Likewise, a randomized control trials to determine the effects of the Safe Delivery App (SDA) on perinatal survival and on health care workers' knowledge and skills in neonatal resuscitation in Ethiopia reported more than twofold significant increase in health care workers' skills scores for neonatal resuscitation, 6 months following the SDA intervention<sup>[18]</sup>.

A qualitative study in Ethiopia that explored health workers' experiences with the Safe Delivery App reported the health workers perceived the SDA as having improved their skills and ability to manage complications during childbirth<sup>[19]</sup>. A randomized controlled trial in Ghana on the training of midwives using SDA reported that Safe Delivery App was associated with a lower incidence of PPH by improving the skills and competence of health workers<sup>[20]</sup>.

The duration of mentorship in this study is 3 months which is similar to other studies<sup>[9, 14, 15]</sup> while most studies<sup>[10, 11, 12, 16, 18]</sup> had mentorship duration of 6 month even though similar results in term of improvement in the knowledge and skills of the mentees were reported.

The mentors used in this study were selected from the hospital in the same catchment areas of the health centers where the mentees work. This will help to ensure regular and efficient mentoring and strengthen two-way referral system and management between the hospital and the health centers and improve the continuity of care even though not assessed in the study. This is unlike most studies on clinical mentorship where the mentors are not from the catchment area of the facilities they mentored but mostly selected centrally<sup>[9, 10, 21, 22]</sup>.

In our study five of the 22 mentees graduated to be mentors following their achieving the set minimum scores on knowledge and skills. They are now engaged to be peer mentors which help to increase the number of mentors in their catchment areas. This graduation of mentees into mentors is not documented or reported in most studies on clinical mentorship<sup>[9, 10, 21, 22]</sup>. However, a study in Rwanda reported that upon completion of 6 visits, mentees were requested to assist their peers who are not participating in the mentoring programme through a process of peer mentoring to ensure sustainability after the project ends<sup>[23]</sup>. Similar to our study, a previous study in Ethiopia reported that some of the mentees graduated into mentors<sup>[13]</sup>. However, the mentees in the study were evaluated by the

mentors themselves unlike our study where evaluation of the mentees was done by independent experienced clinical midwives in order to ensure transparent and unbiased evaluation of the mentees.

This study used direct observation of provider practices to assess their skills and competencies unlike a study in south India which used case sheet audits to interpret documentation of provider practices because it was not logistically feasible in the context of the low delivery volumes experience in the health facilities with the believe that the sustained support by mentors to the staff over a period of time has resulted in more comprehensive documentation, reflecting actual practice <sup>[19]</sup>. Likewise, a scoping review and a study in Rwanda used self-report by the health workers to assess their knowledge and skills <sup>[21, 22]</sup>.

This study didn't assess the confidence of the mentees unlike other studies which assessed the confidence of the healthcare workers through their own perception of confidence when managing different complications <sup>[21, 22, 24]</sup>. Some of the challenges faced in the study in terms of lack of basic equipment and supplies, transportation challenges due to distance and poor terrain by mentors, inconsistency/absence of some mentees during visit and limited number of health workers especially midwives targeted to be mentored are similar to what was reported in other studies on onsite mentorship programs <sup>[19, 23, 25, 26, 27]</sup>.

Our study is unique in the sense that it uses both clinical mentorship and Safe Deliver App approaches to improve the capacity for health worker on maternal and newborn health unlike most studies which either used mentorship or Safe Delivery App in improving the capacity of health workers. A Cochrane review concluded that educational outreach visits when coupled with other approaches, can influence better professional health practice and outcomes <sup>[28]</sup>.

A study in Kenya compared two teaching methods for postpartum hemorrhage management, interactive hands-on training and non-interactive video training <sup>[29]</sup>. It reported that both intervention groups significantly increased in performance scores after receiving hands-on training by 40% and video training by 34.5% and concluded that postpartum hemorrhage management training by mobile media might be just as effective as conventional hands-on training. Thus, the use of both clinical mentorship and Safe Delivery App approaches as done in our study has great potential for synergistic effect on strengthening the capacity of health workers in providing quality maternal and newborn health care.

### Conclusions

This study has shown that combination of catchment based clinical mentorship and digital health tool, Safe Delivery App is useful for increasing the capacity of health workers in providing quality maternal and newborn care. Some of the mentees graduated to be mentors which will increase the pool of mentors in the catchment areas. The approaches are based on the national roadmap and transformation plan and the model can be institutionalized and scaled up in the region to improve quality of service.

### Limitation of the study

Whilst this study was limited in its geographical coverage and number of mentees, the study provided opportunity on the combination of catchment based clinical mentorship and

digital health tool, Safe Delivery App to improve the capacity of health workers to manage basic obstetric complications and improve quality of maternal and newborn care. A further study is suggested to assess the effect of these combined approaches on obstetric outcomes in the health centers.

In addition, the end line assessment was done after only three months of mentorship and thus this study doesn't provide evidence about the long-term impact of clinical mentoring on the capacity of health workers. It is recommended that studies to evaluate the long-term retention of clinical knowledge and skills gained as a result of the interventions should be carried out.

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