MATERNITY foundation

FROM PROOF OF CONCEPT TO NATIONAL SCALE: LESSONS LEARNED FROM IMPLEMENTING THE SAFE DELIVERY APP IN ETHIOPIA

Maternity Foundation has been working in Ethiopia for almost fifteen years in the field of maternal and newborn health, leveraging digital health, primarily through the Safe Delivery App, since 2013.
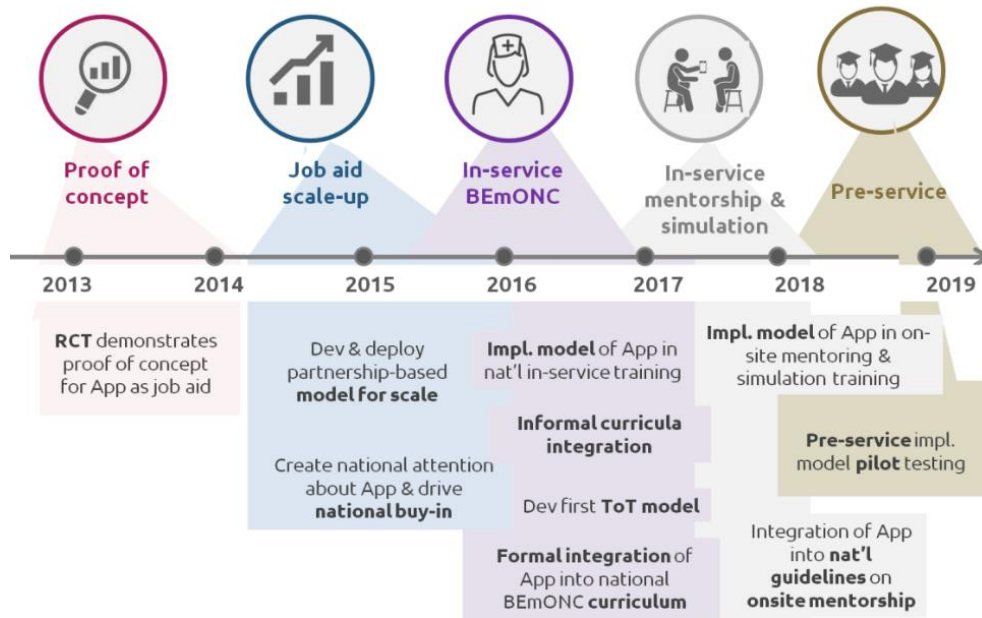
This document describes five phases of growth, learning and evolution in our work with the Safe Delivery App in Ethiopia illustrated in the image below. These phases are not mutually exclusive; rather they build upon one another and often overlap. In each phase, we narrate in brief the activities carried out, but focus primarily on lessons learned, challenges and successes, with the aim of sharing this knowledge with other implementers of the Safe Delivery App, and the digital health community at large.

Contents

Phases of learning and growth in Ethiopia with the Safe Delivery App

Proof of concept	Job aid scale-up	In-service BEmONC	In-service mentorship & simulation	Pre-service
2013 — 2014	2015	2016	2017	2018 — 2019
RCT demonstrates proof of concept for App as job aid	Dev & deploy partnership-based **model for scale** Create national attention about App & drive **national buy-in**	**Impl. model** of App in nat'l in-service training **Informal curricula integration** Dev first **ToT model** **Formal integration** of App into national BEmONC **curriculum**	**Impl. model** of App in on-site mentoring & simulation training Integration of App into **nat'l guidelines** on **onsite mentorship**	**Pre-service** impl. model **pilot** testing

About the Safe Delivery App

The Safe Delivery App provides skilled birth attendants with instant, evidence-based and up-to-date clinical guidelines on how to handle complications connected to pregnancy and childbirth – straight from their phones or tablets.

Developed in collaboration with Southern Denmark, the App uses simple, animated instruction videos, practical procedures, drug lists and a personalized learning component, MyLearning, to guide skilled birth attendants in basic emergency obstetric and newborn care.

1. Infection Prevention
2. Post Abortion Care
3. Hypertension
4. Active Management of Third Stage of Labor
5. Prolonged Labor
6. Post Partum Haemorrhage
7. Manual Removal of Placenta
8. Maternal Sepsis
9. Neonatal Resuscitation
10. Newborn Management
11. Low Birth Weight
12. Female Genital Mutilation
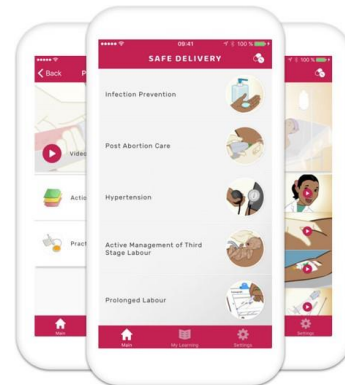
In MyLearning, users can improve and test their knowledge and earn certification as Safe Delivery Champions once completing expert levels in all modules.

The App consists of 12 content modules addressing key interventions of childbirth emergencies (Basic Emergency Obstetric and Neonatal Care- BEmONC) and preventative procedures, all aligned to international guidelines.

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Phase 1: Proof of Concept

The Safe Delivery App was tested in a randomized controlled trial (RCT) in five districts in West Wollega, Ethiopia, with findings leading to the development, refinement and deployment of the implementation model of the App as a job aid.

When: 2013- 2014, with findings shared in dissemination meetings in 2015 via various publications (see phase 2 and footnotes 1, 2 and 3).

Summary: To test whether the App could be used to improve newborn health outcomes and the competencies of midwives, a pragmatic, cluster randomized, controlled trial was conducted with support from the University of Copenhagen and the University of Southern Denmark in five rural districts in West Wollega, Ethiopia. 73 health facilities were randomized to either mobile phone intervention or standard care. 3,601 women in active labor were included at admittance and followed until 7 days after delivery. Knowledge and skills in neonatal resuscitation and post-partum hemorrhage (PPH) were assessed at 0, 6 and 12 months amongst 176 health workers at the included health facilities.

The App was associated with an insignificant lower perinatal mortality. However, skills and knowledge scores of intervention health care workers increased significantly compared with those of controls.

PPH skills scores increased from 6 months and 12 months from baseline, corresponding to 152% and 198% respectively, above the control level. Knowledge scores of PPH increased significantly compared with those of controls from 6 months to 12 months from baseline, corresponding to 27% and 33% respectively, above the control level.

With regards to neonatal resuscitation, skills scores of intervention healthcare workers increased significantly compared with those of controls at 6 months and 12 months from baseline, corresponding to 80% and 107%, respectively, above the control level. Knowledge scores also significantly improved in the intervention compared with the control group at 6 months and at 12 months, corresponding to 39% and 38%, respectively, above the control level.

Qualitative findings indicated that users perceived the tool as very relevant to them. The visual animated instruction videos and the guiding steps in the local language were appreciated and made the health workers refer to the App as a "practical" tool (as opposed to a "theoretical" tool like a handbook). Health workers saw the tool as useful to them, both as an educative tool to help improve/retain their knowledge and skills and as an emergency tool to give immediate guidance on how to recognize and manage obstetric and neonatal complications. The health workers widely reported that the App improved their ability to manage emergent childbirth situations, which they were previously insecure of or would abstain from handling. Findings also indicated that the App helped boost the professional authority of the health workers in the eyes of their communities and increase the recognition and trust from their communities.

The results showed the App to be an effective tool to improve and sustain the healthcare workers' knowledge and skills in post-partum hemorrhage and neonatal resuscitation for as long as 12 months after its introduction, and there was a positive attitude among healthcare workers in using it. Therefore, this implementation approach was considered successful and thus was the base for scaling up the App across Ethiopia.

The results from the RCT were subsequently published in JAMA Pediatrics[1] in 2016, in Cogent Medicine[2] in 2019, and in Reproductive Health in 2019[3].

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[1] Lund S, Boas IM, Bedesa T, Fekede W, Nielsen HS, Sørensen BL. Association Between the Safe Delivery App and Quality of Care and Perinatal Survival in Ethiopia: A Randomized Clinical Trial. JAMA Pediatr.2016;170(8):765–771. doi:10.1001/jamapediatrics.2016.0687

Challenges:

➡ <u>Sample size:</u> the study was underpowered in the number of births, meaning that it was less likely that the study could detect any impact on perinatal health outcomes. Furthermore, we learned that it is very difficult to prove an impact on health outcomes by a digital health intervention that is focused on improving skills and knowledge of healthcare workers. This is a predominant point of view held by most of the digital health community.

Successes:

➡ <u>Implementation setting:</u> the location of the RCT was very rural, with low levels of literacy and English skills, poor connectivity, and relatively low phone ownership. Learning from working in this challenging setting further supported our decision to develop a highly visual and auditory application, to develop multiple local languages versions and a flexible backend system to allow for nimble and cost-effective adaptation and translation, and ensuring the App could be used entirely offline once downloaded. Subsequently, we also found ways to download the App without access to internet or mobile coverage - with APK file transfers over Bluetooth.

➡ <u>Use of local language:</u> The version of the Safe Delivery App used was in *Oromiffa*, a predominant local language. This was essential in its use as a job aid in an implementation setting where English skills are very low. This experience cemented that it would be essential to translate the App into local languages for it to be effective.

➡ <u>Demonstration of impact on skills and knowledge:</u> these positive results helped make the case for use of the Safe Delivery App as a job aid to improve and sustain health care workers skills and knowledge.

➡ <u>Implementation model:</u> The first implementation model of the App was developed. This was the job aid model in which the App is introduced to healthcare workers through simple one-day training in the App and how to use the technology.

➡ <u>Dissemination of results</u>: helped gain partner and funder interest and support (see phase 2 below for more).

➡ <u>Test/survey tools:</u> The co-developers of the Safe Delivery App from the University of Copenhagen and the University of Southern Denmark developed and validated the first scientific assessment tools for the App for the study. These skills and knowledge assessment tools have informed subsequent versions of M&E tools as well as the MyLearning platform on the App. Having such validated Safe Delivery App assessment tools in place have strengthened our evidence base and allowed us to provide support to partners who want to conduct research or M&E.

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[2] Christina Marie Braüner Klokkenga, Ulrika Enemark, Richard Adanu, Stine Lund, Bjarke Lund Sørensen & Jørn Attermann | Yaşam Kemal Akpak (Reviewing editor:) (2019) The effect of smartphone training of Ghanaian midwives by the Safe Delivery application on the incidence of postpartum hemorrhage: A cluster randomized controlled trial, Cogent Medicine, 6:1, DOI: 10.1080/2331205X.2019.1632016
[3] Thomsen, C.F., Barrie, A.M.F., Boas, I.M. *et al.* Health workers' experiences with the Safe Delivery App in West Wollega Zone, Ethiopia: a qualitative study. *Reprod Health* **16,** 50 (2019) doi:10.1186/s12978-019-0725-6

**Phase 2: Scaling up the Safe Delivery App as a Job Aid**

Building on the promising findings from the RCT, Maternity Foundation scaled up the implementation model of the Safe Delivery App through its own program in Ethiopia, but also through a partner-based approach, ultimately securing government buy-in for scaling within national programs.

When: focused effort in 2014- 2016, but the work continues to this day

Summary: Maternity Foundation held a stakeholder workshop in Addis Ababa in 2015, where results from the RCT were shared at a national level. This convening helped place the App on the radar of national level stakeholders, and helped address the Ministry's fears of "pilotitis" – the proliferation of many unsustainable, disconnected digital health pilots implemented without adequate approval of relevant authorities in Ethiopia. After learning about the promising results of the RCT and meeting with Maternity Foundation, both the Federal Ministry of Health and the Oromiya Regional Health Bureau gave their permission and support for further testing the implementation of the App in the Maternal and Newborn Health project in West Wollega project beginning in 2016.

Maternity Foundation then worked to roll out the Safe Delivery App as a job aid in 28 new health centers in the 8 new project districts, as well as to all 15 health centers in the five old study districts where the App was tested in 2013 and 2014. A total of 107 midwives were equipped with the App as an on-the-job aid by September 2016.

We documented impact and learnings by collecting data on knowledge, skills, confidence as well as on usage and user experiences among App users at 0, 6 and 12 months. We also captured data on ANC, delivery and PNC for all the health workers equipped with a phone in the 15 districts. In the five existing study districts, we worked to assess if health workers, who had the App since 2013 and who were found to dramatically increase their skills and knowledge, retained their skills and knowledge over time. The average increase in knowledge was 10%-points from baseline to midterm. For skills, we saw an even bigger improvement from baseline to midterm including averages of 22% and 27% in management of maternal sepsis and hypertension. This resonates with the findings from the Randomized Controlled Trial in 2013-14.
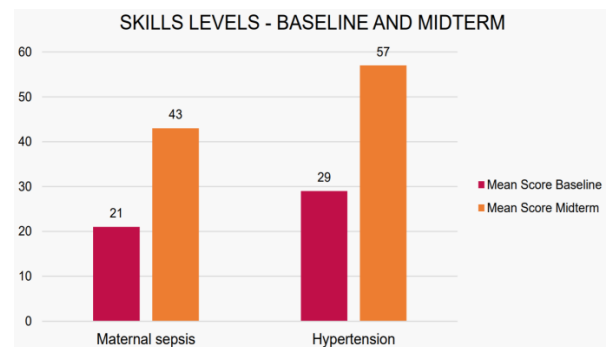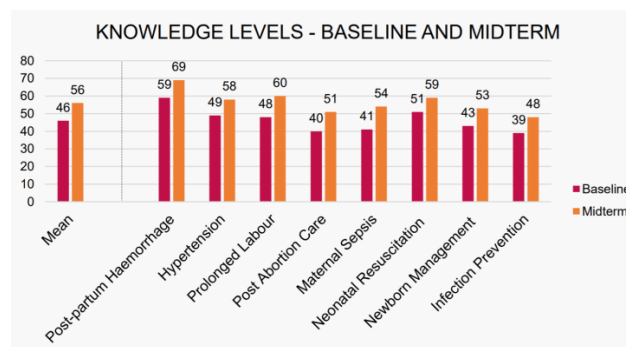
We also documented a self-reported usage frequency in which 90% of our sample used the App weekly. This may be a factor in the improvements in confidence, knowledge and skills, although there are a variety of other influencing factors too.

For confidence levels, we found an average increase of 1.5 on a scale from 1-5 (1=panic and 5=confident) in midwives' self-reported confidence in handling emergency situations.

In our user acceptability test, we assessed how well the content and guidelines in the App were perceived by users. Many of the midwives found the practical procedures and action cards helpful, and the videos were the most popular feature due to the animated audio format. We found that the App was experienced by users as an important and resourceful aid as it did not only strengthen knowledge and skills within the facility, but also because the impact of the App reaches beyond the health facility - in West Wollega. The interviews carried out found that the App is understood and experienced as something that indirectly serves the community as a whole. These qualitative findings also resonate with the qualitative findings on user experiences from the trial in 2013 – 2014[4].

In order to assess the level and success of the integration and scale of the App within the project, three Danish graduate students travelled to Ethiopia in 2016. They found that (the App was a highly integrated part of the interviewed midwives' management of complications, who) midwives reported to find the App very helpful in their daily work. One of the midwives interviewed said that though she used the App during emergencies, she never used it in front of patients. Midwives highlighted that lack of equipment referred to in the App for BEmONC and lack of fully translated content in the App into local language Oromo were barriers.

The RCT and the Gimbie 2016 project implementation led the development of a sound implementation model of a job aid consisting of: strong body of evidence and documentation, roll-out intro training, a suite of M&E survey tools and a model for hardware and how to overcome connectivity issues (APK distribution). Based on this we offered our support to partners and scaled the App as a job-aid through partners beyond Ethiopia through our partner-based approach in other countries (see successes section below).

Challenges:
- Providing smartphones: During the study and early job aid implementation phases, Maternity Foundation gave out smartphones with the App installed to participants, in agreement with relevant health facilities and authorities who signed as owners of the devices. This approach proved to be challenging in that heath care workers lost or damaged phones; gave their phones to their husbands or others, or did not use the handed out phone because they had another personal phone they would rather use. Due to such issues, and due to the continually increasing penetration of smartphone ownership, Maternity Foundation stopped handing out phones and instead recommends implementers to capitalize on personal devices, potentially supported by availing tablet devices to facilities.

- App not fully translated: The videos were the only feature of the App available in *Oromifa*, and thus the other features which were in English were highly underutilized. Additionally, the user profile was in English, which made it difficult for the midwives to understand the questions. This caused confusion, delays and midwives clicking 'I agree' to the terms, without understanding or being informed of the content. As such MF worked to fully translate the entire App into *Oromifa*, completed in 2019.

- Lack of medical supplies referenced in the App: Trainees reported that supplies noted in the App were missing from their facilities. We communicated with the Regional Health Bureau regarding the provision of medical equipment to ensure more institutions would be able to comply with BEmONC regulations.

- Difficulties with summoning participants for the training due to issues with work schedules, maternal leave, transportation and other trainings. See the final phase of this report, where we talk about moving towards training that takes place in trainees' workplace to overcome these barriers.

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[4] Braüner et al 2019

⚫ <u>Need for a follow-up-training</u> to ensure that the midwives feel motivated and capable of using the App. Initial job aid trainings were reported to be too short for the midwives to feel committed and motivated for the project.

Successes:

⚫ <u>The impact of the App was documented</u> and used to build the case for national scale.

⚫ <u>Follow-up research</u> to the RCT shows similar increases in terms of knowledge and skills of App users, suggesting a positive impact of the App on knowledge in a non-research-controlled setting.

⚫ <u>Implementation models were developed</u> and fine-tuned based on implementation experiences and results.

⚫ <u>Strategy of scaling through partnership model was formulated </u> and leveraging experiences from Ethiopia, the App was rolled out as a job aid with partners in countries such as Benin in 2018 with PlanBørnefonden, Guinea in 2017 with Danish Red Cross, Ghana in 2018 with NORSAAC/GHS, Myanmar with Danish Red Cross in 2018, the Philippines in 2018 with Soriano Foundation, Sierra Leone in 2018 with UNFPA, Tanzania with Ifakara in 2017, Togo in 2018 with PlanBørnefonden. In subsequent years, the App has been used as a job aid in India, Kyrgyzstan, Somalia, among other countries.

Figure 1. Early Job-Aid Implementation Model Scales through Partnerships (2017 – 2018)
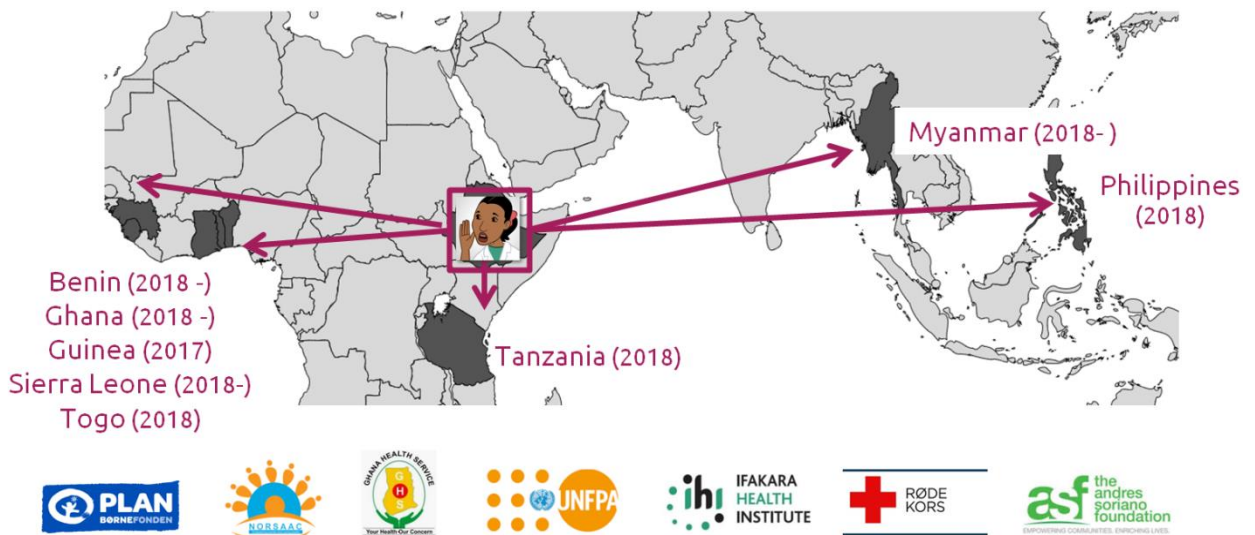
Phase 3: Scaling up the Safe Delivery App in in-service BEmONC training

Maternity Foundation developed and deployed the implementation model of integrating the Safe Delivery App into in-service training in Basic Emergency Obstetric and Neonatal Care (BEmONC) beginning with project-level curricula integration and evolving to national-level integration.

When: 2016- 2018 focused period, but work still continues to this day.

Summary: The Safe Delivery App was integrated into six of Maternity Foundation's in-service BEmONC trainings in 2016 and 2017, reaching 80 midwives. Significant implementation learnings were harvested, which resulted in the development of a well-described and replicable implementation model. This happened through a step-by-step process.

Step 1: Experimenting to learn good practices of using the Safe Delivery App as a teaching aid

From 2016, Maternity Foundation collabrated with our local team of midwifery trainers in Ethiopia on how we could use the App during BEmONC training as a teaching aid. The BEmONC trainings followed the national BEmONC training curriculum of 21 days of intensive theoretical and practical in-service training. We had ideas of combining the use of the App with multiple teaching methodologies such as a reference tool in group work; when preparing presentations; as a look-up tool etc., which involved actively using all five features of the Safe Delivery App. We tasked our local team to start doing so and report on their implementation experiences. However, we encountered a barrier as the midwife trainers were resistant to change their normal way of teaching. In assessing the status of integrating the App into our program by end-2016, three MPH students concluded that: "*the videos (in the App) are used by both trainers and participants and is believed to increase the understanding and outcome of the BEmONC training",* but also reported that the trainers did not believe it to be an "easy, logical or realistic" task to integrate *all* aspects of the App into the trainings.

The reasons included a lack of access to the App among all trainees, differences between national guidelines and the guidelines in the App and lack of time/ tense training schedule. All trainers stressed time pressure as one of the greatest challenges for full integration of the App in the training.

Trainers reported that the standard BEmONC training felt like a 30-day program to be completed in 21 days. The students recommended that if other aspects of the App were to be integrated into the BEmONC training, *"a new concept of BEmONC is needed, where all power points slides are worked through and shortened down and all participants (or most) have access to the App."*

Step 2: Conducting curricula integration of the Safe Delivery App

Taking these challenges and suggestions in stride, we decided to try a different approach, and did a full review and revision of the Ethiopian BEmONC training curricula, working to integrate the App wherever possible as a teaching aid. The content of the curricula itself was not altered; instead we changed the exercises and way of delivering the content methodologically. These changes ended up reducing the number of teaching slides by more than 200, replacing them with App integrated exercises.

Step 3: Piloting the revised App-integrated BEmONC curriculum

In February of 2017, two Danish midwives introduced this revised curriculum at our BEmONC training center in West Wollega during a three-day initial pre-training and preparation workshop, with the local midwife trainer team who had experimented with using the App as a training tool during 2016. The midwife trainers delivered the revised App-integrated three-week BEmONC training for 16 participants. The team from Maternity Foundation HQ and Addis Ababa observed and held daily

debriefing sessions with the midwife trainers on what worked well and what could be improved in terms of utilizing the App to its full potential. The App was used in the theoretical parts of the training; during skills practice and in the practical work in the hospital.

The reaction from the trainers was very positive. Initial resistance to use the App more actively due to anxiety around time was assuaged after introducing the App again in a fully integrated way, where trainers found the App to actually enhance efficiency and be a time-economizer. Trainees also responded positively and reported they were less tired and more interested in the training.

A key take-away from the workshop was that when time is taken to deeply integrate *all* elements of the App methodologically into the BEmONC training curriculum, the use of the App can change the way of teaching.

Step 4: Developing a Training of Trainers (ToT) on the new Safe Delivery App-integrated curricula

In order to roll-out the implementation model of using the App as a teaching aid for in-service BEmONC training in wider Ethiopia, Maternity Foundation developed a Training of Trainers (ToT). This ToT was directed at BEmONC trainers at national level in Ethiopia who became equipped with the updated alternative curriculum and trained on how to deliver it using the Safe Delivery App as a teaching aid.

During 2017, several rounds of ToT were given to 57 trainers from primarily the Ethiopian Midwives Association (EMwA), who conducted the majority of BEmONC trainings under the ministry and other INGO partners across the country.

Step 5: Informal national scale up of the Safe Delivery App as part of BEmONC training

Some of the ToT trained BEmONC trainers started to use the App when delivering BEmONC in the country even though the methodology was not formalized or adopted by the Ministry at that time. This is how we started to distinguish between institutionalised/formal scale and a non-institutionalised/informal scale. The informal scale is non-obligatory and person/trainer dependant.

Maternity Foundation received positive user feedback from trainers and participants, and advocates for formalized national scale were found amongst the users.

> "When we apply the Safe Delivery App in BEmONC training, the training becomes more attractive. There are video animations so they can easily understand the procedures. They can grasp the procedures easily, and they can use it as a quick reference at hand."
> - Melaku Tamir, Master Trainer at Ethiopian Midwives Association

Step 6: Formal national scale of the Safe Delivery App as part of BEmONC training

Based on the results from the Safe Delivery App study and the positive user experiences of using the App as a teaching aid, the Ethiopian Federal Ministry of Health (FMoH) invited Maternity Foundation to join a Technical Working Group (TWG) on maternal health starting in the second half of 2017 and to form part of the revision of the national BEmONC curriculum. The aim was to shorten the BEmONC training, integrate the App as a training tool and develop an updated ToT training for BEmONC trainers in accordance with the revised curricula.

As a result of the technical working group process, a new 12-day blended BEmONC course with the App integrated and a 5-day ToT training for roll-out were developed.

Maternity Foundation was the only partner organization delegated by the Ministry of Health to conduct the ToT in BEmONC for national trainers. During 2017 – 2018, Maternity Foundation provided ToT for 100 national master trainers during five training rounds. The new national BEmONC curriculum

has been used in Ethiopia since mid-2018, meaning anyone in Ethiopia who has received BEmONC training since then would have received the integrated 12-day training with the Safe Delivery App as a teaching aid. As one of the partners in Ethiopia conducting BEmONC trainings, Maternity Foundation rolled out the new curriculum through our work in the Somali, Gambella and Oromia regions.

Challenges:

→ Trainees lacked access to the App: Many trainees had issues downloading the App ahead of time to their devices. Students who observed this barrier suggested trainers allocate time on the first day of training to assist trainees in downloading and come prepared to do an APK (Android Application Package) transfer via Bluetooth where connectivity is poor.

→ Getting our trainers to think outside the box and use the App creatively: Even our own trainers initially had a hard time breaking out of traditional, familiar training methodologies and using the App to its full capacity. But when MF took the time to revise the curricula and write in the App as a time economizer, work side by side with trainers to help them think creatively about how to use all features and functions of the App and leverage its full potential, this was the key to making the training more interactive and help trainers to effectively meet objectives with less effort.

→ Shifting from a bottom-up to a top-down approach: given the ingrained respect for authorities and that the midwives were out of their comfort zone being urged to change the system themselves through the bottom-up approach.

→ Differences between national guidelines and guidelines in the App: An Ethiopian country version of the App has been produced and published based on a review process led by national midwifery experts appointed by EMwA. As of January 2019, four Ethiopian language App versions were available: Amharic, Oromifa, English and Somali.

Successes:

→ App observed and reported to improve teaching methodologies and learning: Throughout the training it was noted that the App integration made the training more engaging and the practical attachment sessions more successful, which enabled participants to practice their BEmONC skills. The outcome was a considerable change in how the App was perceived and used by the midwives.

→ Curricula integration for the first time: this was the first time Maternity Foundation wrote the App into existing training curricula. The way we went about this has been used subsequently, in Ethiopia in pre-service (see final section) and in Ethiopia with simulation-based training (see following section) as well as in other countries beyond Ethiopia, e.g. India.

→ Replication of models that we know: Maternity Foundation was able to document what worked with BEmONC in our own programs to standardize the training of trainers (ToT) so that other implementers could replicate it and take it forward.

→ Partnership with the Ethiopian Midwives Association (EMwA), a key partner to the Federal Ministry of Health in all matters relating to midwives.

→ Cemented partnership with the FMoH - demonstrating our role not only as implementing partners but also as technical partners.

→ National integration and roll-out: based on demonstrated success in our own program in West Wollega, support by the midwifery association, and continued, targeted outreach, FMoH asked us to contribute with the App and our knowledge of how to integrate it in the formal revision of the national BEmONC curriculum, which was then rolled out nationally.

Maternity Foundation HQ developed a compendium of simulation trainings supported by the App and piloted this in Ethiopia. Maternity Foundation's Addis office adapted and implemented this model as part of onsite mentoring in Gambella Refugee Camps and subsequently trained all Maternity Foundation staff in Ethiopia to roll it out across our country program. This eventually led to the integration of the App when the FMoH updated the national guidelines on on-site mentorship.

When: 2018- present

Summary: A package of simulation-based training with support from the App was developed in collaboration between Maternity Foundation's team in Addis Ababa and the clinical team in Copenhagen. This training simulates different emergency situations that can be found in the App, enabling participants to practice these situations using simulation dolls and other equipment. The simulation trainings with the App integrated were tested by Maternity Foundation Ethiopia at health clinics in and around Addis Ababa, iterated and rolled-out in project areas. Maternity Foundation HQ followed up and helped standardize and adapt this model.

In 2017, Maternity Foundation began a partnership with the Danish INGO PlanBørnefonden, working in refugee camps for south-Sudanese refugees in Gambella in western Ethiopia. Key program activities included support to health workers at the clinics through capacity building in safer childbirth and newborn care. The project in Gambella also became a project site to test the integration of the App as a support tool for simulation-based training as part of mentorship. Midwives from Maternity Foundation's work in West Wollega came to Gambella to learn about - and receive training on - this new implementation model and bring it to West Wollega. In our work in Gimbie from 2018 onwards, the Safe Delivery App was used to support on-site mentorship of midwives as a result of the development of this implementation model from central level.

In 2018, the Ethiopian FMoH launched a new approach to mentorship called *hospital catchment-based mentorship*, whereby a referral or district hospital is required to coach, communicate and create networks with its catchment health centres. Each health centre has its catchment referral or district hospital, where they send referrals for higher level of treatment or health care. In late 2018, Maternity Foundation met with the FMoH and ministry-appointed team of catchment-based mentorship to share experiences on simulation-based mentorship.

In 2018, Maternity Foundation partnered with UNFPA to contribute to the sexual and reproductive health needs of the Somali region through capacity building and simulation-based mentorship. Maternity Foundation and UNFPA agreed to strengthen the catchment-based mentorship program with the App. Three hospitals in the Somali region have been addressed with catchment and simulation-based mentorship.

In January 2019, the FMoH called for a workshop to finalize the catchment-based mentorship guidelines with Maternity Foundation as one of the core implementing partners and staff from Addis and Gambella in attendance. During the workshop, Maternity Foundation shared its experience and benefits of the simulation-based drills to improve the quality of the catchment-based mentorship. The simulation drills, developed by Maternity Foundation, contain case-based scenarios for each module of the Safe Delivery App, which helps health workers practice using simulation dolls.

Following the successful integration of the simulation drills in the national catchment-based mentorship training manuals, FMoH has organized the catchment-based mentoring training with Maternity Foundation in May, June, and July of 2019.
These trainings consisted of:

- An introduction and discussion of RMNCAH care service indicators in Ethiopia

- An introduction to mentoring and approach of catchment-based mentoring

- How to build a relationship in mentoring process, including effective communication and feedback

- Theories of learning, adult learning principles, and application to mentorship

- An introduction to using the App during mentorship with an interactive presentation and exercises such as "*who is the fastest*"

- A practical session (demonstration and re-demonstration) where trainees work on each module in groups to practice the cases using simulation dolls.

Participants of these trainings reported to find the App interesting and using the App in mentorship helpful to simulate care. Participants also reported that the activities enabled them to clearly know how to use the App and MamaNatalie doll in mentoring. For the future, trainers agreed to do introduction to the App and role play on how to use the App in mentoring. The simulation cases are included in the facilitators' guide, and trainers can choose scenarios of their discipline when doing trainings.

Transitioning to Low Dose High Frequency training approach to BEmONC in Ethiopia

Building on experiences with using the App in both in-service BEmONC training and in-service mentorship- Maternity Foundation in 2019, in collaboration with the Ethiopian Midwives Association and ICM, implemented a Laerdal Global Health Foundation funded research project focusing on testing the integration of the App into the global training concept called 50,000 Happy Birthdays, which uses the Helping Mothers Survive (HMS) and Helping babies Survive (HBS) training packages developed by JHPIEGO and APP respectively, using the Laerdal Global Health training equipment.

The 50,000 Happy Birthdays is a low-dose-high-frequency training program focused on capacitating midwives on responding to post-partum hemorrhage, pre-eclampsia and birth asphyxia through the Helping Mothers Survive and Helping Babies Breath training, which are short off-site trainings with subsequent on-site peer-to-peer mentoring. Maternity Foundation developed an addendum to the off-site training packages that integrated the use of the App when delivering the trainings and equipped the trained health workers with the App as a job-aid when returning to their facilities. The research explores retention of knowledge and skills post-training as well as qualitative user acceptance of the App both for trainers and trainees.

Box 1. Results from the 50,000 Happy Birthdays Research

Study aim: To assess the effectiveness and demonstrate the feasibility of including the Safe Delivery App in HMS-HBS training modules under 50,000 Happy Birthdays.

Study population: 54 midwives from 10 health facilities in and around Addis Ababa were included in the study based on full response at all 3 time points, 23 lost to follow-up.

Study design: Quasi-experimental design: pre- and post-test with intervention and control. HMS-HBS assessment tools were used at three time points: pre-training, post-training, and a three-month follow up. The intervention group used the App during training and during their clinical practice in the three-

month post-training period. The App was used as an "App-on[5]" to the three modules: HBB, BABC, PEE. The control group received the standard HMS-HBS training. Outcome data on knowledge, skills, and confidence, and semi-structured interviews with trainees and trainers were collected.

Results: Skills retention declined in both groups at three months follow up, but a higher proportion of the intervention group performed to standard in all OSCEs after three months. Factors influencing performance varied depending on the topic.

The results suggest that using the Safe Delivery App in HMS/HBS training is feasible and effective, but further research with a larger sample size is required. The results are relevant for global HMS/HBS training to understand how trainings can have a lasting effect on participants to ensure that knowledge and skills are retained over time. More research is needed on what influences retention after training. Qualitative findings show a strong user acceptability and experience of value-add of integrating the Safe Delivery App into the HMS/HBS training both from Master Trainers and from end-users. *(For more detailed findings please see contact us for a separate report)*

Challenges:
- ⮕ Skilled birth attendants on leave: some of the health workers who were set to be trained were on leave, making it difficult to perform the mentorship with a small number of midwives to cover routine health centre activities.

- ⮕ Convincing all stakeholders: some of the team members in the workshop were not convinced about the use of the App as part of mentorship. Most of them agreed on the case scenarios/simulation drills - as it is paper based.

- ⮕ Clear demonstration is key: it is important to show learners how to use the App in mentoring. It is advisable to work on App-integrated role play, and to clearly demonstrate how to use the App together with use of MamaNatalie and NeoNatalie manikins.

- ⮕ Mentor participants explained that they themselves may have knowledge and skills gaps and that the ministry should deal with this issue. Before the initiation of mentoring, assessment should be done on the hospital and on the mentor using facility readiness, knowledge and skills assessment formats.

- ⮕ The 50,000 HBD training was reported to be hectic and very time constrained so it felt that *"sometimes it [the App] is not well integrated."*

Successes:
- ⮕ Simulation-based mentoring emerged as a best approach to achieve the objectives of developing knowledge, skills, and confidence. The material used for simulation-based mentoring should be revised and updated to continue this approach and keep it current, and the use of Ministry documents such as facility readiness assessment and mentoring checklists is encouraged.

- ⮕ App in mentorship model tested and developed

- ⮕ Evidence + strong presence on the ground + partnership with Ministry of Health = it is possible to convince other team members and implementing partners.

- ⮕ Case made for further partnership with 50,000 HBD consortia of partners as App demonstrated a clear value-add.

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[5] "App-on" – the App was used by trainers as a teaching aid in addition to the routine training outline of HMS/HBS and thus introduced to the intervention participants as a job aid that they could bring home from the training.

Maternity Foundation developed the implementation model for integration of the App into pre-service education as a learning tool for students and a teaching aid for teachers. Thus far this model has been piloted in six universities to test the model, iterate and eventually scale up.

When: 2018- present

Summary: In July 2018, Maternity Foundation held a four-day workshop attended by 36 midwifery instructors and five deans from 19 teaching institutions from across Ethiopia. It focused on integration of the Safe Delivery App into the pre-service midwifery diploma program (completed at a health science college in three years) and degree program (completed at a university in four years). Participants discussed how and when midwifery instructors will use the App in classroom instruction, simulation rooms and actual practice in teaching hospitals. Using the latest pre-service curricula, participants drafted formats and concrete suggestions for integrating the App into the curricula.

We learned that the Safe Delivery App can be more complicated to integrate into pre-service training compared to in-service refresher training in the sense that it covers a very specific part of the overall pre-service curriculum and requires that students have prior knowledge of overall medicine and MNCH. Maternity Foundation staff shared the following quote from a participant: "*The App is more easy to use for in-service than the pre-service as it requires less time to teach a topic and due to prior knowledge of trainees than the students.*"

As of 2019, there is active implementation of the Safe Delivery App at midwifery teaching institutions, where both instructors and students are using the App. In six of these universities we have piloted the App as a pre-service teaching and learning aid, where it is being more deeply integrated into curricula.

The format for most of the pre-service pilot trainings has included:
- ➡ Key faculty from the department of midwifery attends a 2-day workshop.

- ➡ All the instructors install the App and receive an intro training on how to teach with the App in practical, theoretical and skills areas.

- ➡ Instructors and skills lab assistants, together with the rest of the midwifery department, detail out the areas where the App can fit into the curriculum and discuss how to integrate and cascade it.

- ➡ Orientation of midwifery students (generally 2nd year) on the App with a focus on general use and MyLearning.

- ➡ Instructors who participate disseminate the information to the rest of faculty and start using the App-integrated curriculum.

"It is a good application for both students and teachers as it makes the learning process easy."
- Student from Arba Minch University, Ethiopia

"We very clearly observe that using the Safe Delivery App improves the performance of the students. Definitely. There is an improvement in skills and in quality. And the students are eager to use the app. Next year, when we will have the CoC (Certificate of Competency) exam, we expect better result outcomes than before."
- Head of Maternal and Child Health department, Debre Birhan University, Ethiopia

- Responsible instructors develop plans to give an App orientation to 2nd, 3rd and 4th year midwifery students.

- The instructors document challenges and achievements and share their findings with Maternity Foundation via the department head.

Box 2. Example of pilot integration from Debre Birihan University

The Safe Delivery App was integrated into *Maternal Health I,* a four-credit course taught to second year students. In the course, the App was taught in the subjects of safe delivery practice, active management of third stage of labour and immediate newborn care. Before the class started, the students were informed to install the App and to practice using it, while the instructor prepared a lesson plan with the App integrated. Various teaching methodologies with the App were used including group work, "*who is the fastest",* watching videos within the App and think-pair-share in each topic area.

We plan to scale up to this pre-service model based on learning from the pilot phase.

Challenges:
- It was difficult to get a high number of deans to attend due to end of fiscal year and long travel distances. Other workshop implementers should take these considerations into account beforehand to make sure more leadership could attend.

- The difficulty of downloading the Safe Delivery App on day one resulted in a loss of energy and momentum of the workshop. It is highly advised to have all participants come with the App already downloaded.

- If guidelines in the App version differ from the country where it is proposed to integrate into curricula, make sure presenters/facilitators are well prepared to answer questions and justify differences. Our staff was able to do just that, which is key to getting buy-in.

- Poor timing of pilot introductions: instructors in some of the institutions said that they were not working on their lesson plans.

Successes:
- Model for self-driven integration into curriculum and self-driven replication back at institutions created. Maternity Foundation facilitates the process and then they integrate the App into curricula, do the training and introduction at the institution.

- The model of the App as a teaching aid integrated with teaching various methods and pedagogies was developed and anecdotally found to be effective and add value.

- The model of the App as a self-assessment, learning and study tool for the students was developed and anecdotally found to be effective and add value.

- FMoH interest and support for App integration and use at national level during curricula revision, and invitation to be part of the technical working group under pre-service.

Conclusion

We created the Safe Delivery App to help improve quality of maternal and newborn healthcare at the time of birth and post-partum in health service delivery at frontlines in LMICs. It was after deeply understanding the problem that we designed a technology uniquely suited to solve it and subsequently achieved proof of concept through an RCT. We continue to iterate on this human-centred, need-driven design and approach.

In the past five years, we have learned that it is essential that *both* the digital content and full functionality of the Safe Delivery App is integrated into the pedagogy of the training – into group exercises, class room lectures, skills practices and drills. When time is taken to deeply integrate *all* elements of the App methodologically into the BEmONC training, the use of the App can change the way teachers teach. App integration made the training more engaging and the practical attachment sessions more successful, which enabled participants to practice their BEmONC skills.

The outcome was a considerable change in how the App was perceived and used by midwives. As such, we are highly prioritizing studying and documenting best practices on how to integrate the Safe Delivery App with different training programs both pre-service and in-service. It is only when the App is deeply integrated into teaching, training and learning pedagogy that we see the full benefits of the App in these contexts.

Maternity Foundation's work in Ethiopia illustrates how scaling up the App and related trainings take time, perseverance and is not always a linear process. Flexibility and adaptability of our organization modus operandi and strategy to both contextual factors and partner requests have been crucial to our success. Finally, we are currently working to pursue sustainability through a strategy of government adoption, whereby the Safe Delivery App is integrated into state or national health systems supported largely by the public sector.

It is our hope that our work to date — the successes, challenges, and questions we document here — further support others working in the field of digital health to achieve scale, impact and sustainability.