

Qualitative mid-term evaluation of a maternal and child health training and research capacity  
building program in Kenya

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**Abstract**

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Kenya has made gains to reduce their maternal mortality ratio of 400 per 100,000 live births and under 5 mortality rate of 71 per 1,000 live births. Human resources continue to be a challenge for the Kenyan Health System. As part of the Medical Education Partnership Initiative (MEPI), Maternal and Child Health (MNCH) Linked Award, the University of Nairobi (UON) has worked to improve human resources for MNCH by providing opportunities and support for postgraduate level research and for training healthcare professionals at eight Kenyan health centers. This is a secondary analysis of a rapid assessment of 28 key informant interviews and six focus group discussions at six of the MNCH sites with hospital administrators and clinical staff. From 2011 to 2013, there have been 71 research projects by postgraduates in obstetrics and gynecology and pediatrics at five of the eight health facilities around Kenya. Continuing medical education (CME) for healthcare professionals consists of PRONTO trainings in emergency obstetrics and newborn resuscitation simulation as well as in short course series in program management, implementation science, and MNCH policy and clinical management. Interviewees asked about both the research and CME activities reported that these interventions helped

improve work environment, policy, and practice and increased quality of care at their sites.

Postgraduate student presence helped reduce the patient to provider ratio and provided locally relevant implementation research to improve MNCH care. Sustainability of this program relies on continued support for research and adoption of materials from the short courses to ongoing site supported CME.

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## **Introduction:**

Kenya has a maternal mortality ratio of 400 per 100,000 live births and under-five mortality rate of 71 per 1,000 live births (WHO, 2012). The Kenya health system faces challenges in human resources, finances, and medical product supplies which contribute to a disparity in access and utilization of the health system. These issues have directly impacted Maternal and Child Health (MNCH) outcomes and indicators (Luoma *et al.*, 2010). In 2010, the country committed to creating 210 maternal and child health centers of excellence and increasing the number of healthcare workers in primary care by 20,000 in order to address these MNCH and health system challenges. However, there were only three large medical training centers in Kenya at that time - the University of Nairobi (UON), Moi University, and Kenyatta University - with limited capacity to increase enrollment to the levels necessary to meet this commitment.

The Medical Education Partnership Initiative (MEPI) was a \$130 million program funded by the United States President's Emergency Plan for AIDS Relief (PEPFAR) in partnership with the US National Institutes of Health (NIH) aimed at increasing the number and improving the training of health care workers by universities in sub-Saharan Africa (Talib *et al.*, 2013). In 2010, the UON formed a collaboration with the University of Washington and University of Maryland-Baltimore called PRIME-K (Partnerships for Innovative Medical Education- Kenya) which was one of 13 initial recipients of this award. PRIME-K had four key objectives: Improve the quality of medical education; extend the reach of medical training outside of Nairobi; increase retention of UON faculty by providing opportunities for faculty and postgraduates to pursue clinical or applied research; and support UON research structures (Osanjo *et al.*, 2016). A cross-cutting strategy aimed at achieving these objectives was to establish a decentralized

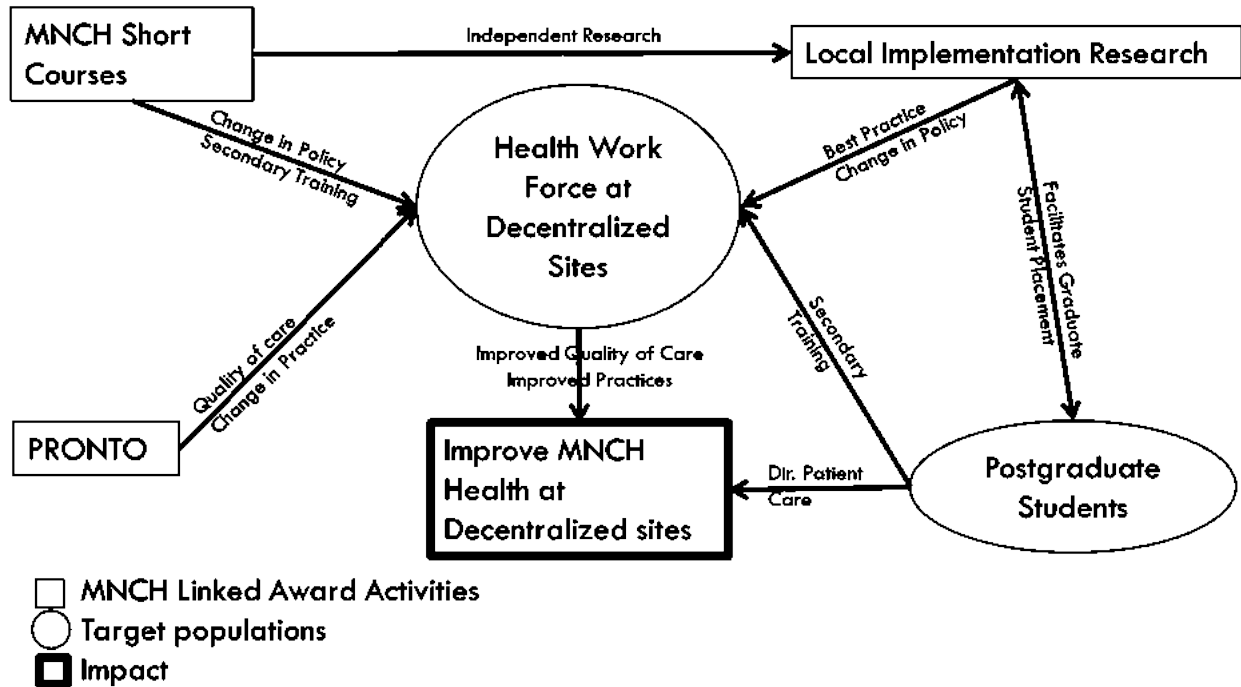
training program with 14 Ministry of Health (MOH) hospitals in several different regions in Kenya (Child *et al.*, 2014).

In 2011, NIH made an additional award to UON specifically aimed at improving MNCH training, care, and research. This MNCH Linked Award focused on developing capacity at eight MOH sites around the country. The activities conducted at these sites centered around strengthening MNCH training, improving policy and patient care through local IS research, and strengthening capacity at MNCH training sites in emergency obstetrics.

A review of 48 health workforce-strengthening papers in low and middle-income countries found that combining continuing education with participatory trainings can improve health workers' performance. The authors identified that just doing short trainings as a single intervention had short term benefits, but additional interventions addressing health systems and community issues were needed to sustain effectiveness (Dieleman *et al.*, 2009). Bates *et al.* analyzed four case studies in Africa in 2009 and proposed three distinct stages of capacity building for health research: awareness and experiential stage, expansion stage, and consolidation stage. They also suggested that it takes over five years for interventions to go through all three stages to develop sustainable and locally supported research.

The combined strategies of the PRIME-K and MNCH linked award were intended to increase medical training capacity and retention of health workers to improve MNCH service delivery through expanding continuing medical education (CME) and local implementation science (IS) research at sites. The IS and research projects focus was intended to train health professionals in research skills while increasing awareness of health service strengths and gaps, which in turn would lead to improvements in health service delivery. This strategy is consistent with successful health workforce-strengthening strategies used in other countries (Dieleman *et*

al., 2009). Figure 1 describes how these activities were intended to increase the capacity of the health work force and the MNCH services at the decentralized sites (Fig. 1).



**Figure 1:** Conceptual map of MNCH-Linked Award activities to improve maternal and child health at MOH sites.

From 2011 to 2013, the MNCH Linked Award supported 71 research projects by highly skilled postgraduate trainees/students specializing in obstetrics/gynecology (Obs/Gyn) and pediatrics at decentralized sites and eight short course trainings in program management (PM), IS, and MNCH clinical management (Table 1). In addition, five simulation trainings in emergency obstetrics and newborn resuscitation, developed by PRONTO™ International (PRONTO), were carried out with participants from eight MOH sites. PRONTO trainings are low-cost simulation trainings that have been shown to increase knowledge, confidence, communication, and team work with clinical providers during clinical emergency obstetric interventions leading to facility-based change (Walker *et al.*, 2014). Each of these activities

focused on improving systems, research, and use of evidence-based practices to improve overall delivery of care in MNCH.

Site	Ministry of Health Sites	Research Projects				Participants in trainings			
		2011	2012	2013	Total	PRONTO	IS	PM	MNCH
1	Naivasha District Hospital	14		4	18	2	3	2	0
2	Pumwani Maternity Hospital		4	7	11	20	4	2	1
3	Mbagathi District Hospital	9	5	4	18	23	2	2	3
4	Mama Lucy Kibaki Hospital				0	4	0	0	0
5	Kenyatta National Hospital				0	21	3	4	4
6	Kisii District Hospital		4	5	9	0	4	2	2
7	Kitui District Hospital			4	4	0	3	1	1
8	Garissa District Hospital	11			11	0	2	2	4
	Total	34	13	24	71	70	21	15	15

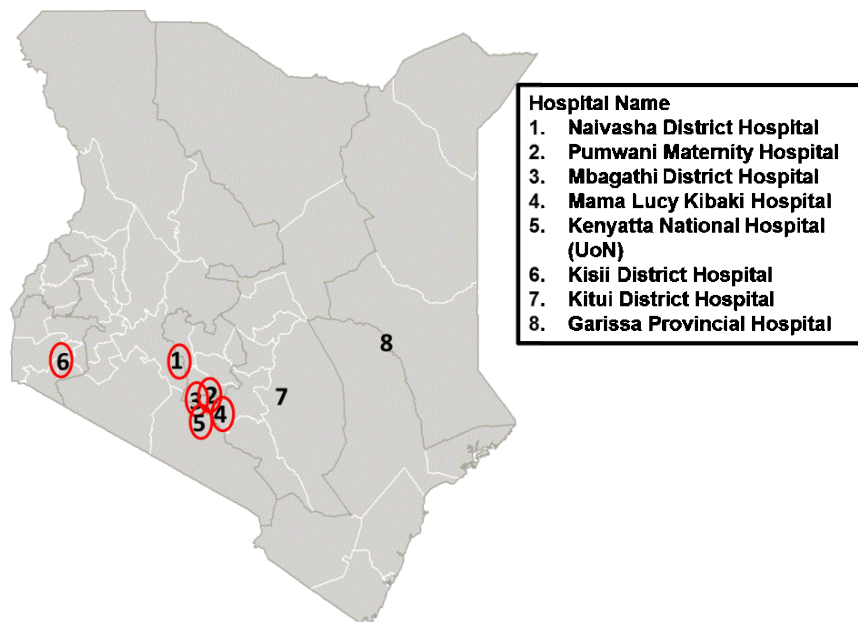
	PRONTO	IS	PM	MNCH
Total Trainings:	5	3	2	3
Total Participants:	125	116	81	123

**Table 1:** Summary of local implementation research projects, trainings, and participants at each of the decentralized sites from 2011-2013. Short courses included implementation science (IS), program management (PM), and maternal and child health (MNCH).

In 2014, the PRIME-K M&E team conducted a rapid qualitative mid-term evaluation of the perceived impact of the four main activities of the award (postgraduate training, postgraduate research, short-course trainings, and PRONTO simulation training) on MOH sites. A preliminary analysis of the data was conducted by the M&E team in order to provide immediate feedback to UON faculty managing the program for use in on-going program planning. This thesis provides a more in-depth analysis of clinical and administrative staff perceptions of the MNCH Linked Awards impact on MNCH at their sites.

**Methods:**

In June 2014, in-depth key informant interviewes and focus group discussions (FGDs) were conducted by the UON and UW monitoring and evaluation (M&E) team with clinical and administrative staff at six of the eight sites where MEPI-Linked activities took place, and included: Naivasha District Hospital, Pumwani Maternity Hospital, Mbagathi District Hospital, Mama Lucy Kibaki Hospital, Kisii District Hospital, and Kenyatta National Hospital. Garissa was not included in this evaluation due to safety concerns for staff and time constraints. Kitui was also not included because no research projects had been completed and PRONTO was not conducted there (Fig. 2).



**Figure 2:** Distribution of Decentralized sites where MNCH-Linked award activities took place.

Twenty-eight semi-structured key informant interviews were conducted (1-8 per site) with hospital administrators (n= 8), physicians (n=10), nurses (n=8), clinical officers (n=2) to evaluate the impact of postgraduate placement, local implementation research, short course trainings, and PRONTO trainings. The interviewers selected participants from the trainings.

Once at the sites the interviewers used the snowball method to identify and interview clinical officers and nurses who had not participated in the trainings but who worked at the clinics to get a broader perspective on impacts that may have resulted from MNCH activities. Six FGDs were also conducted with nurses (n=16) and physicians (n=3) who received PRONTO trainings at five of the facilities. In addition to questions about the MNCH Linked award activities, the interview and focus group topic guides (Appendix 1 & 2) included questions about MNCH challenges. The interviews were transcribed and de-identified to remove personal and site information.

### *Analysis:*

All interviews and FGDs were de-identified in data analysis. An initial codebook was developed based on the conceptual framework (Figure 1) and the objectives of the MEPI-linked MNCH award. Additional codes were added through an inductive process during multiple reviews of the transcripts. Initial coding was done for three transcripts by two members of the UW/M&E team independently, and then compared for consistency. Once consensus was achieved, the author coded the rest of the transcripts. Codes were then organized into themes relating to the perceived impact of MNCH-Linked activities on the health workforce and patient care and compared across subjects and sites.

## **Results and Discussion:**

### *Overall findings*

The administration and clinical staff at all six health centers felt that many of the interventions were successful in improving patient care at their clinical site. Several facility administrators felt that an important aspect of the program was the relationship that their clinics had established with the University of Nairobi. Though several of the interviewees were unaware

of the connection between the trainings they received and UON, many of the staff members who were aware of the partnership with UON commented on an increase in interest to do research or to make changes based on locally relevant research. Health providers felt that the presence of postgraduates conducting temporary research improved quality of care and catalyzed change in clinical practices and policy and improved the work environment. Short term trainings led to change in participant's attitude and ability. The focus group discussions showed that participants believed the PRONTO trainings built confidence and increased quality of care at the sites through improvements in hard skills, attitude, communication, and teamwork.

### *Postgraduate Training*

Postgraduates were present at four of the five MOH sites. These sites reported the presence of these clinicians had the largest tangible impact out of all of the interventions. Staff at one of the hospitals attributed a reduction in pediatric mortality from 11% down to approximately 6-7% as a direct result of having UON consultants and skilled postgraduate students in Obs/Gyn and pediatrics on hand to provide care to patients and support for existing staff.

*“We used to have mortalities as high as 20-30%. We, at times, have gone to single digits in terms of mortality rate in pediatrics, and one of the contributing factors is the partnership.”*

At the most basic level, the presence of postgraduate students increased the health care worker to patient ratio:

*“The presence of students has improved quality of care, to some extent they work, they fill in the shortage of staff.”*

*“The presence of students relieved the workload.”*

The presence of postgraduate students was also reported to help identify priorities and create a more focused work environment. One clinician stated:

*“They (the postgraduates) participate in patient management, as they come in they interact with our medical officers, that raises our sense of direction on what we need to take care.”*

An additional effect of having postgraduate presence at the sites was an “updating knowledge of the staff.” Some staff found that interacting with postgraduate trainees increased their desire to be up to date on the science and that it challenged them to learn new things. As one physician noted:

*“The greatest impact is actually that it tends to improve the quality of care. That’s the truth ‘cause when you have the students, you really have to be on top of things... At least that makes you to go back, read, research, so that the kind of information you are giving the students is up to date and I think that also translates to better care of the patient because you ensure that what you are giving is actually the current management, so that is what is actually improves the quality (of care) of the patients.”*

One of the administrators mentioned that postgraduates helped point out ways for the site to improve processes. Because the site was receptive to incorporating these suggestions, they succeeded in reducing wait times in their pharmacy and dental clinic. In this instance, trainees helped to change policy and practice to improve patient experience.

This hospital administrator also stated that while their site was more rural, the opportunity to be associated with UON helped their staff to feel “more professional pride” and increased their perception of their value. They stated that they also felt it helped them retain

workers at their site because of the increased perception by clinicians that they could further their career while there. Retaining experienced health workers in underserved areas is an important aspect of improving quality of care that was a focus of the wider MEPI implementation (Talib *et al.*, 2013).

One of the interviewees who had been a postgraduate trainee stated that conducting research out at those remote sites increased their interest to return and work there. They also mentioned that within their cadre of postgraduate trainees many had applied to return to rural sites after completing their training. Recruiting and retaining experienced and high-quality health care workers was one of the main overarching goals of MEPI.

Only a few interviewees mentioned negative feedback about post-graduates training at their sites. They quoted the staff as saying, “Not all of us are meant to teach, I am here to work.” This shows that a few of the healthcare workers were not interested in training and saw the responsibility as an erosion of their primary professional purpose. This administrator followed up that statement by clarifying that very few staff at their site spoke negatively about teaching and felt that overall, their work environment was improved because of it. Another interviewee mentioned that supplies were being used at a higher rate because of the increased staff, but the benefit of having the extra hands outweighed the increased cost for the ward.

#### *Local Postgraduate Implementation Research*

Staff at some facilities stated that postgraduate research at the sites helped to give them immediate feedback on important issues and helped to change practice. One of the interviewed hospital administrators commented on their strong appreciation of the studies conducted and how they used this research as an opportunity to help their staff learn. It was reported by one

administrator that although some of the staff worried that the research reflected negatively on them, the purpose of the study was reframed as a learning opportunity rather than to generate punitive feedback for the staff. Clinic leaders reported being able to move their staff from a defensive position to one where they identified problems and changed practices to improve health.

One example of a research project that catalyzed a rapid shift in the know-do gap was a postgraduate's study of community practices of child birth prior to hospital admittance. A hospital staff person reported that before the trainee presented their research, hospital clinicians hadn't known that there was a community practice of rubbing cow dung on the umbilical cord after giving birth. The hospital had noticed high rates of sepsis in mothers who had non-hospital births, but overloaded clinicians had been unable to determine the cause. Once the postgraduate interviewed members of the community and disseminated the information learned from them, the care center started a community education effort to prevent infections and educate the community on post-partum care in hopes of minimizing the risk of infection and reducing the burden of disease. Other examples of the types of research participants reported as catalyzing change in policy or practice included post-partum contraceptive services, system and gap analysis of the hospital, hand sanitation research, anemia, and malnutrition.

One hospital administrator stated "students (trainee) have used the research to look at their systems and they have come up with interventions to address the gaps." This statement was echoed at several sites and participants shared that postgraduate research led to changes in practice and policy, by incorporating the reporting of trainee projects into their ongoing CME seminars. Many participants stated that the postgraduate presence increased their interest in research. This engagement of health care workers acts as secondary training where the

postgraduate students are able to share new evidence based practices and implementation at the sites.

Interviewees also highlighted common limitations to the benefits of research. One factor was that research was not commonly spread outside of the research site. Some of the providers who were not involved in the research were not aware that it had happened. One physician suggested that disseminating findings and involving the staff in research could increase health outcomes and job satisfaction. This is essential in making this type of intervention sustainable. One recommendation would be to disseminate locally relevant research to sites via publications and CME's. Having trainees present their research and encouraging replication of that research at sites with similar issues. Without systematic collection, analysis, and dissemination of evidence, it is difficult to make the necessary changes to improve health. An environment of research can help translate generalizable findings to be applied locally (Damschroder *et al.*, 2009).

Another common challenge for study participants in conducting effective research was the shortage of supplies and pharmaceuticals. One of the interviewees discussed how a policy had been implemented based off of a postgraduate research project to offer post-partum contraceptive to patients after childbirth, but the pharmacy was having consistent stockouts of contraceptives. This chronic issue disrupts a provider's ability to turn research into practice. This is an indicator that the program is still very much in the 'awareness and experiential stage' of a research capacity building program. This demonstrates strategies for influencing policies and engagement of stakeholders, but indicators of the 'expansion stage' of a program are not fully evident; improved resources and institutionalization of activities (Bates *et al.*, 2009).

### *Program Management Short Course at UON*

Participants reported a wide range of benefits and new practices resulting from the program management short course. One interviewee stated that prior to participating in the program management short course, they had challenges with tracking grants, timely ethical review, and financial closeouts due to research not being completed within the financial year. Three management course participants stated that they immediately utilized the skills gained from the course and brainstormed with their department to implement several changes. One ensuing policy change supported researchers to apply for an ethical review prior to receiving an award. This meant that researchers could start their work as soon as they received funds, eliminating wasted months waiting for an ethical review.

Another interviewee stated that the program management short course was especially valuable for budgeting and grants management and that course material led directly to the development of a Grants Management Center at their site that monitors and evaluates the research happening from an administrative perspective.

*“What we have done in the research and programs, as I said, we do facilitate, so now we have a process of monitoring all the research in (health center), so now (with) donors coming in, all the research is registered in (health center).”*

This study participant explained that M&E indicators help them track all the grants and research going through their health center and are closely linked with tracking indirect costs. They identified that having an organized way of tracking and reporting research at their site made them more competitive for research grants in the future, allowing them to help researchers bring more resources into their center. This improved support and institutional adoption of

policies may not directly improve health care workers delivery of care, but it strengthens and helps build sustainability for independent research.

### *Implementation Science Short Course at UON*

Participants reported several skills and benefits from the short course on IS. A clinical officer stated that the biggest benefit they received from the IS course stemmed from their new understanding of how to use data to inform practice:

*“The most important thing we learned, and I was able to teach my people, was about how now we can translate our research findings into policy, to help many other people that way. Because usually we collect a lot of data, but sometimes implementation is not proportional to the data we collect.”*

This clinical officer went on to say the course helped them to use interpreted data to understand gaps in delivery of care and to look for solutions to present to independent political leaders in order to enact beneficial policies for their patients. For example, by analyzing the results of a patient satisfaction survey, they identified unmet needs and translated those findings towards implementing change: they provided more space for their patients to wait; hired additional part-time staff to help cover clinician shortages a stop-gap measure to provide sufficient patient care, and shifted from a first come first serve practice to a triage and “a meeting of most urgent need first” policy.

A ward supervisor from a different site called out the influence reported that prior to the IS course her facility was faced with “several issues” that didn’t seem to have good solutions.

*“After the course I realized I needed to do research in my ward... like we have started a research group. I found myself giving research topics on infection prevention and emergency preparedness.”*

The ward supervisor talked about how with their previous training in research combined with their new learnings from the short course in IS, they felt able to do small independent research projects to benefit their ward. The short course helped them to connect their experience in research to their work in their pediatric ward and improve their practice. This nurse also stated:

*“I think the best impact is like now I can be a research nurse with all the confidence, I know what to do, I know where to go. And I think the biggest impact that I know with my, with my position as one of the in-charges in the ward, I can guide people what you can do to do to make the working better, to make the ward better.”*

A significant theme of participant empowerment was found across the IS short course experiences; every interviewee that took the IS short course reported some manner of empowerment. One clinical officer stated:

*“We have many areas to research in but there is nobody to lead. It (the training) has changed me... Even now the administrators understand. I went to them and I told them I want to do research here and he said ‘Why not, do it,’ but there before, you could be told pay first, that has even enlightened them.”*

This individual’s change in attitude had a trickle up effect on management. This clinician used data to advocate for resources and improvements to their ward, driving change in policy and practice.

### *Maternal and Child Health Short Course at UON*

There were few interviewees who participated in the MNCH short course. But those that did stated that it helped to increase their general content knowledge and tangible skills in MNCH clinical management. When asked by the interviewers for examples, they listed several topic areas that were components of the training. The biggest takeaway from one of the nurses was the importance of community outreach by community health workers. This provider stated that visiting a slum and understanding the importance of community linkages helped them to have a better grasp of the role of CHW's in identifying pregnant mothers in the community and encouraging them to seek care before an emergency occurred.

### *On-Site Interdisciplinary PRONTO Trainings*

There was a consensus at each of the focus group discussions that the PRONTO simulation trainings gave the nurses hard skills and increased their sense of efficacy. Participants shared that these effects translated into knowing what to do in emergencies and having the confidence to act. The participants, primarily nurses and clinical officers, felt that they were more able to intervene directly rather than “waiting for a doctor to come. For example, several nurses stated that prior to the training, all resuscitations were done by the doctor and that several babies died when doctors were not quickly accessible. One nurse stated:

*“So when you have a flat baby, people used to wait for them to get pediatricians coming from the newborn unit on the first floor. That means, the golden minutes, the three golden minutes are gone. So if you have to wait for them to come and resuscitate your flat baby here, it was a big mess.”*

After the simulation, clinicians felt more comfortable with resuscitation and it helped to shift responsibility away from outside pediatricians to the nurses and clinical officers immediately present. Many nurses reported direct impact in lowering newborn mortality rates as a result of utilizing the resuscitation techniques learned from the simulation.

PRONTO participants also reported that their ability to manage post-partum hemorrhaging improved after the training. One nurse from an urban site stated that:

*“Previously we used to have mortalities because of PPH... but currently with the trainings, in fact, we don’t list PPH as a killer, as such, per se, because most mothers who come with this or develop PPH, they’re well managed and if you look at our mortality, rarely will you find a mother dying of PPH.”*

Although many of the participants linked PRONTO to reducing maternal and newborn mortality directly, one interviewee at an urban site still ranked PPH as one of the largest reasons for maternal mortality. She stated that they felt better prepared, but a single three-day course was too short and that more staff needed training on PPH as well as preeclampsia. She also wanted PRONTO at least every six months and to cover a wider range of emergency obstetric scenarios. The request for more simulation trainings was echoed across the majority of the sites.

At sites where turnover of staff was low, PRONTO participants felt that their communication was steadily improving and outcomes were reported to be getting better. A supervisor who received the PRONTO training with their team saw a direct link from the training to their improved collaboration:

*“Teamwork, it has improved. We coordinate well as a team. When something comes, when an emergency comes... we all come together and help each other. We don’t leave the task to one person... you know somebody can suggest, let’s do this, let’s do this. We*

*listen to someone, we don't just wait for the consultant so even when the consultant comes, they listen to us. We work as a team."*

Many of the participants across the sites stated that they felt increased confidence, and they knew what to do to communicate more efficiently. Participants at two sites identified that calling out for help when one of their patients is having an emergency was a simple communication tool that they had underutilized prior to the PRONTO training. Participants also stated that having confidence and skills empowered them to be better health care providers, advocates, and communicators.

Several clinicians stated that the training helped change attitudes and improve their communication with not only their team but also their administrations and other departments. One clinician highlighted a shift from highly punitive communication from their administration, after poor patient outcomes, to a more "appreciative inquiry" that allowed clinicians to better reflect on how patient care could be improved instead of feeling very defensive and fearful. Another group of participants shared that they were in the process of advocating for a hospital wide policy change around communication and access to limited resources. They felt the PRONTO training had given them a way of thinking about how to improve their department through advocacy. They attributed these changes in attitude to PRONTO and felt that these changes in attitude and communication helped improve their work environment.

Similar improvements in communication and teamwork were not reported at hospitals with high staff turnover between wards. However, several of these sites reported incorporating some of the training content into their weekly CME to help mitigate the shifting of staff. One head nurse stated that they hold internal demonstrations and maintained at least two of the PRONTO trained nurses in the labor and delivery wards:

*“And then I find that at least we have been able to extend the knowledge that we have gained. For example there are people who have not even attended the training, but at least we tell them this is how we resuscitate, yeah, this is how, the one that we knew before, it’s the old fashioned, this is how we resuscitate... On the job training.”*

One of the clinical supervisors at this site who did not participate in PRONTO but who worked with several of the clinicians who did, stated that they felt a general improvement to the quality of care and could see the benefits in patient outcomes and work environment. This supervisor placed an emphasis on PRONTO peer-to-peer training with new clinicians in their ward.

Several facilities reported significant changes in daily practice and preparation for emergency obstetric care resulting from PRONTO trainings. One group shared that they have an emergency tray toolkit ready with all of their needed drugs and tools in one place, whereas before the course, their supplies for emergency obstetrics were scattered across multiple areas. Another facility stated that they forecast out how many Ambu bags and manual resuscitators they need for the month and order them to have them ready, which was not happening before the training.

Several participants shared that the simulation helped them to retain the content and address their gaps in knowledge and practice to improve their practice. One nurse stated:

*“I think I love the simulation bit of it, because, you see, most of the simulations that are done, like the current... training, they don’t do the ward thing. Again, simulation you’re not handling a real case, it’s just an assumption that this is a case on the ground, and you are able to, you know the advantage of a simulation is that you are able to evaluate and see where the gaps were, and correct them.”*

Several of the clinicians who participated as a patient during the simulation also shared that it helped them to understand the point of view of the mothers that they are working with. One participant stated that after experiencing being a scared mother it increased their compassion for the patient. They now go out of their way to make pregnant mothers feel more comfortable and at ease.

Most of the interviewees made recommendations to increase the frequency and duration of PRONTO trainings at each of the sites. Several of the sites were already incorporating simulations in resuscitation and PPH into their CME trainings. Several of the physicians and nurses who did not participate in the PRONTO trainings were able to discuss their perceived benefits of the trainings on their colleagues and that their wards quality of care had substantially increased because of PRONTO. They had seen the benefit of having increased communication and skills through second hand dissemination of the simulation training.

These results are consistent with results that Walker *et al.* found in 2014 when they evaluated 450 professionals who were trained in Pronto. Increases in knowledge, confidence, and team work were consistent themes among the participants interviewed. Examples of changes in practice and policy within the maternal wards is consistent with improving quality of facility-based care for mothers and newborns.

### **Study Challenges and Limitations:**

There was limited participation in the three short courses on MNCH, IS, and program management; only a few staff at the sites received this training. Many of the trained individuals were moved to other sites, diluting the impact of the trainings on the sites overall. However, even with this dilution, some interviewees in each of the short course areas expressed changes in

practice, and all but those who took the MNCH short course saw changes in policy at the site level and attributed that change to these short courses. Of the individuals we interviewed, all stated that the trainings influenced them professionally and personally.

Some interviewees mentioned partnerships with other organizations and training centers in Kenya that were not part of the MEPI MNCH Linked Award. It is important to note that one of the interventions of the larger PRIME-K MEPI program with UON, was the presence of undergraduate students studying medicine, dentistry, nursing, and pharmacy at these sites. There were also other medical and nursing schools who sent students to work at these sites as well. The interviewers attempted to clarify the difference between teaching and research for postgraduate students and undergraduate students, but in some of the transcripts, it is unclear if the interviewees knew which students were coming from which institutions to their sites.

### **Conclusion:**

Positive changes in quality of care and improved practices in MNCH were perceived by administrators and clinicians at each site. The presence of postgraduate trainees and short courses, especially the experiential PRONTO trainings, at each of the sites were reported to contribute to a decrease in maternal and child mortality through decreasing the patient to provider ratio and improving quality of care respectively. While reducing the patient to provider ratio was stated as having the largest tangible impact at the site level by participants, it is challenging to draw the conclusion that it was the most impactful intervention. This study was unable to examine the direct impact between interventions and health indicators due to limitations in time and access to site level data over time.

Sites that had postgraduate research reported being able to make changes to policy and practice as a result of that work. Participants of the short course trainings perceived improvements in personal and professional development. While structural barriers mitigated some of the potential impact of the interventions, overall this complex program was perceived as providing administrators and clinicians with knowledge, skills, and confidence to improve their work environment and improve MNCH health outcomes for their patients. It also helped these sites recruit highly trained providers in MNCH disciplines. This further demonstrates the effectiveness of combining CME programs with local participatory interventions like local implementation research (Dieleman *et al.*, 2009). Future evaluations should include process improvement indicators at the site level as well as health quality indicators in order to examine the links between magnitude of impact and interventions on site level outcomes.

In applying these findings to improving health centers, an optimal intervention with resources would advocate for the continuation of all of these activities. However, given limited resources, setting these facilities up for long-term sustainability should focus on continued postgraduate training and research along with regular site sponsored CME's utilizing knowledge and skills gained from the short course trainings and research. Funding these core activities and allowing the health centers to manage CME's with ongoing support would demonstrate that capacity was built sustainably (Bates *et al.* 2009). The influx of resources through the presence of postgraduates has long term potential for improving patient care through addressing some human resource needs as well as providing improvement to policy and practice through evidence-based interventions.

**Ethics Approval:**

Data collection for this secondary analysis of the mid-term evaluation was conducted under the umbrella of the MEPI wide ERC approval for Monitoring and Evaluation for the University of Nairobi. Approval of exemption from IRB at UW was granted.

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## Appendix 1: Key Informant Interview Topic Guide

Date:

Interviewer:

Site Name:

# of Research Projects:

Department:

# of IST Participants: PRONTO:

IS:

PM:

MNCH:

# research proposals:

Key informant #:

### Millennium Development Goals

1. What are some of your biggest challenges in maternal and child health?
2. Does or has your partnership with UON help you to address some of these challenges?

If yes, how?

If no, how could they?

### Medical services impact of MNCH students at these decentralized sites

3. What are some of the main positives and negatives to having these post graduate students at your facilities?
  - a. effect on staff
  - b. effect on patients
  - c. effect on services that were offered?
4. Please describe any changes made in the day to day operations of your health facility to accommodate the students (if any)?
  - a. Impact of changes (if any)

### Impact of Research projects on facilities

5. In general, how do you think student research projects have impacted your facility?
6. Were there any research projects that you believe were especially helpful?
  - a. If yes, why?
7. What were the results from the research?
8. Did the results inform or catalyze any change in policy or practice at the hospital? If so, how?
9. How did the research the students did affect the staff?
10. Have you learned about research that was conducted at other sites by the MNCH team?

11. Do you think research done at facilities results in changes in policy or practice at the MOH or at other facilities?

a. If yes, please provide examples, if no, why not?

### **Short course trainings**

12. Several of your staff have participated in the short courses taught on Implementation Science, Program Management, and MNCH, have you been able to see any changes in how these staff work after these trainings? Can you give us specific examples.

a. If no application, why not (e.g. trainings not relevant or institutional barriers)?

### **Pronto trainings**

13. Your staffs have gone through Pronto trainings, what impacts have you seen from these trainings?

- Clinical practices
- Work environment
- Teamwork

14. What specific goals were identified by your staff to improve obstetric and neonatal emergencies?

- a. Have any of these goals been achieved?  
b. If so, which ones?

15. How has communication between staff that participated in these trainings changed?

- a. Can you give an example of what communication techniques have changed?  
b. Can you list any of the communication techniques that were taught?

16. Do you think that the quality of care or the health outcomes have changed since the training?

- a. If so, how? If not, why not?

17. Do you think the simulation components of the training added value?

### **Summary**

18. Thinking about all of the things we have just talked about, what would you say was the biggest impact that MNCH linked award has made at your facility?

19. Have the trainings linked to MNCH improved the facilities?

20. Have the opportunities in MNCH noticeably affected the retention of healthcare workers?

21. Where there positive or negative outcomes that you did not anticipate from having the research at your site?

## Appendix 2: Focus Group Discussion Guide

Date:

Facilitator

Site Name:

# of Research Projects:

Department:

PRONTO:

Key informant #:

### Millennium Development Goals

- 1) What are some of your biggest struggles in maternal and child health?

### Pronto trainings

- 1) You have all gone through Pronto trainings. What impacts have you seen from these trainings in your facility?
  - Clinical practices
  - Work environment
  - Teamwork
- 2) What specific goals did you identify to improve obstetric and neonatal emergencies?
  - a) Have any of these goals been achieved?
  - b) If so, which ones?
- 3) How has communication between staff that participated in these trainings changed?
  - a) Can you give an example of what communication techniques have changed?
  - b) Can you list any of the **communication techniques** that were taught?
- 4) Do you think the **simulation components** of the training added value?
- 5) Do you think that the quality of care or the health outcomes have changed since the training?
  - a) If so, how? If not, why not?

### Summary

Thinking about all of the things we have just talked about, what would you say was the biggest impact that the PRONTO training has made at your facility?