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Making It Happen: Training health-care providers in emergency obstetric and newborn care

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An estimated 289,000 maternal deaths, 2.6 million stillbirths and 2.4 million newborn deaths occur globally each year, with the majority occurring around the time of childbirth. The medical and surgical interventions to prevent this loss of life are known, and most maternal and newborn deaths are in principle preventable. There is a need to build the capacity of health-care providers to recognize and manage complications during pregnancy, childbirth and the post-partum period. Skills-and-drills competency-based training in skilled birth attendance, emergency obstetric care and early newborn care (EmONC) is an approach that is successful in improving knowledge and skills. There is emerging evidence of this resulting in improved availability and quality of care. To evaluate the effectiveness of EmONC training, operational research using an adapted Kirkpatrick framework and a theory of change approach is needed. The Making It Happen programme is an example of this.

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Introduction

An estimated 289,000 *maternal deaths* occurred worldwide in 2013, most of which were in sub-Saharan Africa (SSA) (62%) and southern Asia (24%) [1,2]. About 73% of global maternal deaths are

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due to direct obstetric causes. *Direct obstetric deaths* are ‘those resulting from obstetric complications of the pregnancy state (pregnancy, labour and the puerperium), from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above’ [3]. The most common causes of maternal deaths are as follows: haemorrhage (27%), hypertensive disorders (14%) and pregnancy-related sepsis (11%) [4]. The medical and surgical interventions to manage these complications are known, and most maternal deaths are in principle preventable.

At least 46% (1.2 million) of the estimated 2.6 million stillbirths that occur globally each year are intra-partum deaths. In addition, there are an estimated 2.4 million neonatal deaths (death in the first 28 days of life) per year. The top three causes of neonatal death are birth asphyxia (27%), newborn sepsis (28%) and prematurity (29%) [5].

An estimated 75% of neonatal deaths occur in the first week of life, and the greatest risk of death is in the first day of life [5]. Maternal and newborn health are therefore inextricably linked [5].

World leaders gathered at the United Nations (UN) headquarters in New York in September 2000 to make major commitments by agreeing upon goals and to set targets to reduce world poverty, eliminate hunger and improve health. The key Millennium Development Goals (MDGs) and their respective targets, related to women and children, are the improvement of maternal health by reducing the maternal mortality ratio (MMR) by 75% (MDG 5) and the improvement of child mortality through under-five mortality reduction by two-thirds between 1990 and 2015 (MDG 4) [6,7].

Under-five mortality reduced by 35% from 97 to 63 deaths per 1000 live births between 1990 and 2013. The MMR decreased globally by 45% from 380/100,000 to 220/100,000 live births, and in SSA MMR decreased by 49% from 990/100,000 to 510/100,000 live births. However, the MMR in developing regions (230/100,000) remains 14 times higher than in developed regions (16/100,000) making this the health indicator with the greatest discrepancy across income and development levels [2,8,9].

Obstetric complications require prompt action by skilled health-care providers/birth attendants; any delay – including at the health facility level – can result in loss of life and/or poor maternal health outcomes [10]. Poor quality of maternal and newborn care (NC) is associated with poor implementation of evidence-based interventions, closely linked with lack of resources, leadership, skills as well as factors such as cultural, literacy, socio-economic status and nutrition.

Key intervention packages or ‘bundles of care’ that need to be in place to reduce maternal and newborn mortality and morbidity are as follows: skilled birth attendance (SBA), provision of emergency obstetric care (EmOC) and early NC and these need to be provided within a continuum of care that includes antenatal and postnatal care and family planning [11,12].

Skilled birth attendance

A *skilled birth attendant* ‘is an accredited health professional—such as a midwife, doctor or nurse—who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborn babies’ [13].

Skilled birth attendants need to be trained to have the required competencies and should be provided with an ‘enabling environment’ that includes drugs, supplies, appropriate policies and a functional referral system [14,15]. SBA is only available when a skilled birth attendant as well as the ‘enabling environment’ are in place.

Globally, 72% of births are now attended by a skilled birth attendant. This, however, varies according to income group (46% in low-income groups and 99% in high-income groups) and by geographical area (48% in the African region, 67% in Southeast Asia and 99% in Europe) [16].

There is a critical shortage of health-care providers in Africa; the World Health Organization (WHO) reported that 36 of the 57 countries facing chronic human resource shortages in the health sector are in SSA [21] and that only 2.6 and 12.0/10,000 of physicians and nursing/midwifery personnel, respectively, are in Africa compared to 33.1 physicians and 80.5 nurses/midwives per 10,000 people in the European region. This shortage of skilled birth attendants is even more severe in rural compared to urban areas [16].

Approaches used to improve coverage of SBA include increasing the number of SBAs trained (pre-service) and increasing the skills and knowledge of existing cadres of staff to be able to provide SBA and

emergency obstetric and early NC including via task shifting [17–20]. In addition, research has shown that a large variety of cadres of health-care providers are expected to provide SBA in SSA and Asia. However, not all are trained to the required standard and/or supported and legislated to carry out all tasks required of a SBA according to the international definition [21,22].

Emergency obstetric care

An estimated 15% of pregnant women will develop a complication during pregnancy, childbirth or the puerperium, which will require EmOC [23]. The collective minimum set of medical interventions (or bundle of care) required to prevent or manage the main obstetric complications (haemorrhage, pre-eclampsia or eclampsia, sepsis, complications of obstructed labour or abortion) is known as *emergency obstetric care (EmOC)*. [24] These were first described and internationally agreed upon in 1997, and they consist of key interventions (or signal functions) that must be available at health-care facilities designated to provide either comprehensive (nine signal functions) or basic (seven signal functions) EmOC (Table 1). An additional signal function was introduced in 2009 for performing basic neonatal resuscitation with a bag and mask (emergency obstetric care and early newborn care, *EmONC*). A new indicator to assess progress was also introduced at this time, ‘intra-partum and very early neonatal death rate’.

More recently, new signal functions to measure the ability of health facilities to provide routine care and emergency obstetric and newborn care have been described, one general and three for obstetric and newborn care. These are as follows: (a) general requirements for health-care facilities such as 24/7 service availability, sufficient numbers of SBAs, functional referral systems and infrastructure; (b) routine care for all mothers and babies; (c) basic EmONC for mothers and babies with complications; and (d) comprehensive EmONC to include blood transfusion and caesarean section at the secondary level [25].

The availability of EmONC with a minimum acceptable level of five health-care facilities per 500,000 people (one of which should be a comprehensive EmONC health-care facility) providing all EmONC signal functions in the 3 months preceding the assessment is one of the eight indicators for monitoring the availability and utilization of EmOC [23]. The other indicators are presented in Table 2.

A number of surveys have shown that the majority of health-care facilities in low- and middle-income settings, although designated to provide either basic or comprehensive EmONC, may be unable to do so [26,27]. In many cases, structures are in place, and equipment and consumables were noted to be available, but the staff reported that they lacked competency and skills and were therefore unable to provide all the signal functions of EmONC and essential NC [21,22,26]. In other instances, the lack of knowledge and skills to provide EmONC is compounded by non-utilization of simple but proven health technologies and equipment [28,29].

Training health-care providers in emergency obstetric and early newborn care

Health-care providers are expected to provide a quality of care that minimizes the risk of adverse maternal and newborn outcomes by providing prompt evidence-based actions at the point of contact

Table 1

Signal functions of basic and comprehensive emergency obstetric and newborn care (BEmONC and CEmONC) [23].

Basic EmONC	Comprehensive EmONC
1. Administer parenteral antibiotics	Perform signal functions 1–7, plus
2. Administer uterotonic drugs	8. Perform surgery (e.g., caesarean section)
3. Administer parenteral anticonvulsants for pre-eclampsia and eclampsia (magnesium sulphate)	9. Provide blood transfusion
4. Manual removal of retained placenta	
5. Removal of retained products of conception (e.g., manual vacuum aspiration)	
6. Assisted vaginal delivery (vacuum extraction)	
7. Neonatal resuscitation (with bag and mask)	

Table 2

Indicators and acceptable levels for monitoring the availability and utilization of EmONC [20].

Indicator	Acceptable level
1. Availability of emergency obstetric care: basic and comprehensive care	There are at least five emergency obstetric care facilities (including at least one comprehensive facility) for every 500,000 people
2. Geographical distribution of facilities providing EmONC	All subnational areas have at least five facilities providing EmONC (including at least one providing Comprehensive EmONC) for every 500,000 people
3. Proportion of all births in facilities providing EmONC	(Minimum acceptable level to be set locally)
4. Met need for EmONC: proportion of women with major direct obstetric complications who are treated in health-care facilities able to provide EmONC	100% of women estimated to have major direct obstetric complications are treated in health-care facilities providing EmONC
5. Caesarean sections as a proportion of all births	The estimated proportion of births by caesarean section in the population is not less than 5% or more than 15%
6. Direct obstetric case fatality rate	The case fatality rate among women with direct obstetric complications in health-care facilities providing EmONC is <1%
7. Intra-partum and very early neonatal death rate	Standard to be determined
8. Proportion of maternal deaths due to indirect causes in emergency obstetric care facilities	No standard can be set

with pregnant or recently pregnant women. Maternal and perinatal death audits or review show that in many cases health-care providers failed to recognize and manage complications in a timely and effective manner, and this is one of the contributors to poor-quality or substandard care [30,31].

The lack of knowledge and skills of health-care providers who are expected to provide EmONC suggests deficiencies in pre-service training content or/and training methodology. Building the capacity of health-care providers to ensure they have the necessary skills, knowledge and competence to manage obstetric and newborn complications through 'in-service' or 'on-the-job' training has become a common approach [32]. In addition, regular in-service training and reorientation is recommended and is in some cases mandatory, to ensure health-care providers can continue to be accredited by their respective professional associations [21,22].

However, in-service EmONC training has been criticized as delivery has often been fragmented, a variety of training packages and teaching methodology is used and the content of available training packages is often not described in much detail [27–29].

How is in-service EmONC training best delivered?

In-service EmONC training programmes should utilize evidence-based learning methods including a 'skills-and-drills' approach; have sufficient content to improve the health-care providers' competency in evidence-based, effective and woman- and baby-friendly care; and be of short duration and as close to the working environment as possible [34].

Simulation-based medical education (SBME) with deliberate practice has been shown to be superior to traditional clinical and didactic education. Deliberate practice embodies strong and consistent educational interventions grounded in information processing and behavioural theories of skill acquisition and maintenance [35,36].

There is some evidence that short competency-based EmONC training programmes based on adult learning methodology are more effective in improving professional practice than longer didactic-based training. Several short in-service training programmes with 'skills-and-drills' components have been

developed for well-resourced settings, and they have in some cases been modified for implementation in lower-resource settings [37].

One of the earliest EmONC in-service training packages was developed by the American College of Nurse-Midwives (ACNM), and it was designed to be primarily competency based (emphasis on acquiring skills through repetition in hands-on practice) [38]. The duration of the training ranged from 10 days to 4 weeks depending on the cadre of the health-care provider being trained. More recently, shorter competency-based and multidisciplinary courses, usually 1–5 days in duration, have been developed. In addition to the generic Centre for Maternal and Newborn Health at the Liverpool School of Tropical Medicine (CMNH-LSTM) EmONC 3-5 package developed in 2006, these include the following: the Advanced Life Support in Obstetrics course (ALSO – 1990), Managing Obstetric Emergencies and Trauma (MOET – 1998), Advances in Labour and Risk Management (ALARM – 2003), Essential Surgical Skills with Emphasis on Emergency Maternal and Newborn Health (ESS-EMNH – 2007), Essential Steps in Managing Obstetric Emergencies (ESMOE – 2008) (adapted from CMNH-LSTM EmONC package), Practical Obstetric Multi-Professional Training (PROMPT – 2009), PRONTO (2009), Essential Newborn Care Course (ENCC – 2010), Helping Babies Breathe (HBB – 2011) and Helping Mothers Survive Bleeding after Childbirth (HMS-BAC – 2013).

EmONC in-service training such as ALARM, ALSO, MOET and PROMPT are mandatory for health-care providers working in well-resourced countries, all delivered off-site except for PROMPT [39]. PROMPT has the additional advantage of training multidisciplinary maternity care teams together within their local setting. Such courses are usually tailored around the predominant causes of maternal deaths in those settings, which may be different from those in low- and middle-income countries (LMICs) [40]. The quality of pre-service training, clinical practice and patient caseload in these settings will also vary from that in LMICs. Some of these training programmes have had varying degrees of adaptation for delivery in LMICs (MOET, ALSO and PROMPT) [39–44], but they have not been fully evaluated at all levels based on the adapted Kirkpatrick framework.

EmONC training courses designed specifically for a low-resource country setting include the CMNH-LSTM EmONC training course [23,45,46,61], ESMOE [47], PRONTO [48], ESS-EMNH [44], the Pacific Emergency Obstetric Course (PEOC), HBB and HMS-BAC. However, only few of these training packages have content that covers all the emergency obstetric and newborn care signal functions.

Evaluation of the effectiveness of EmONC training

It is important to determine the effectiveness of in-service EmONC training so as to make continuous improvements to the training programme, provide evidence to sustain the intervention and ensure limited resources are well spent.

In-service training programmes are often delivered as one component of a larger maternal health intervention programme. Therefore, it may be difficult to specifically attribute a change in outcomes to EmONC training per se even if comprehensive monitoring and evaluation of the whole programme is carried out. Where EmONC training programmes have been evaluated, this has been mainly to assess health-care provider competency before and/or after training. Very few studies have evaluated the effect on change in practice and/or health outcomes [33,49]. In addition, many of the available reports and studies evaluating training programmes in low- and middle-income settings have poor study designs and generally make limited use of qualitative methodology.

Although it can be argued that regular in-service training is required to ensure that maternity care providers remain confident and competent in providing EmONC and that therefore demonstrating a change in knowledge and skills is important, evidence is also required to convince policymakers regarding what the best EmONC training approach is. Policymakers are likely to be influenced by evaluation conducted within 'real-life' settings using information generated within the health system. Key evidence required to facilitate change in policy includes information regarding the acceptance of the training by health-care providers and affirmation that they consider the training as useful; demonstrable improvement in knowledge, skills, confidence and practice; and finally improvement in maternal and newborn health outcomes.

New approaches to the evaluation of effectiveness of implementation programmes in real-life settings include *operational research* (or implementation research) [50–53].

Operational research provides the opportunity to ask questions about the effectiveness of programmes or health systems. Operational research has been described as the use of systematic research techniques for programme decision-making to achieve a specific outcome [50,52,53]. Operational research provides policymakers as well as managers with evidence that they can use to improve programme operations. Operational research is often less expensive compared to prospective or controlled trials, it is less threatening to local staff who readily appreciate its relevance to the health system and it often relies on routinely collected data.

A framework for evaluating EmONC training

Evaluation is the ‘determination of the effectiveness of a training programme’ [54]. The most commonly used EmONC training evaluation framework found in the literature is that developed by Kirkpatrick [54,55]. Kirkpatrick suggests that training evaluation itself should be considered the last of ten steps that are required for successful implementation of training programmes (Box 1).

Level 1 – Reaction: The first level determines how well participants like the programme. It can be a measure of the acceptability of the training programme. A positive reaction to training is indicative of interest and enthusiasm, both being prerequisites to maximum learning.

Level 2 – Learning: Trainees may accept a training programme, but this may not be translated into improvement in their knowledge and skills. Evaluation at Level 2 is to determine what knowledge and skills were learned as a result of the training.

Level 3 – Behaviour: An improvement in knowledge and skills immediately after training does not guarantee a change in behaviour after attending training. Evaluation at Level 3 is to determine what job changes resulted from the training.

Level 4 – Results: Job changes following training may not lead to quantifiable or ‘tangible’ results. These results depend on the objectives of the training programme and the expectations of the stakeholders (who commission the training or are administratively responsible for the staff being trained). These stakeholders consider evaluation at Level 4 the most important. Kirkpatrick stated that evaluation at Level 4 is to determine the tangible costs of the training in terms of reduced cost, improved quality, improved customer satisfaction, improved quantity and productivity, etc.

The Making it Happen programme

The Making **it** Happen (MiH) programme is a multi-country programme aimed at improving the quality and availability of EmONC. It has been successfully implemented in 11 countries to date in two

Box 1

Kirkpatrick’s 10 steps for effective training programmes.

Kirkpatrick described four levels of evaluation:

1. Determining ideas
2. Setting objectives
3. Determining subject content
4. Selecting participants
5. Determining the best schedule
6. Selecting appropriate facilities
7. Selecting appropriate instructors
8. Selecting and preparing audio visuals
9. Coordinating the programme
10. Evaluating the programme

phases: The Phase 1 programme was implemented in (2009–2011) Bangladesh, India, Kenya, Sierra Leone and Zimbabwe, and in Phase 2 (2012–2015), implementation was expanded to Ghana, Malawi, Nigeria, Republic of South Africa, Sierra Leone and Tanzania (Fig. 1).

The key interventions under the MiH programme are as follows: (1) in-service training of health-care providers working in maternity areas, (2) quality improvement (QI) using audit methodology and (3) improved monitoring and evaluation (Fig. 2).

CMNH-LSTM emergency obstetric and newborn care training package

The CMNH-LSTM EmONC training package is a competency-based ‘skills-and-drills’ training package developed specifically for low- and middle-income settings [45]. It was developed in 2006 at the request of the World Health Organization (WHO), and the initial workshop package was developed by a group of experts including those from the Royal College of Obstetricians and Gynaecologists (RCOG) and WHO and representatives with clinical expertise of working in LMICs. It was piloted in Somaliland and Swaziland in 2007, and it was delivered in Africa and South Asia in 2015 [34,47,56,57].

In each country, the generic package is reviewed and adapted if necessary through consultation with the in-country professional associations (obstetrics and gynaecology, nursing and midwifery paediatrics, anaesthetists, clinical officers or other mid-level staff) and the Ministry of Health (MoH) of the respective country.

Content of training package

The course is designed to cover the essential knowledge and skills required of skilled birth attendants to prevent or manage the major causes of maternal death (haemorrhage, sepsis, eclampsia,

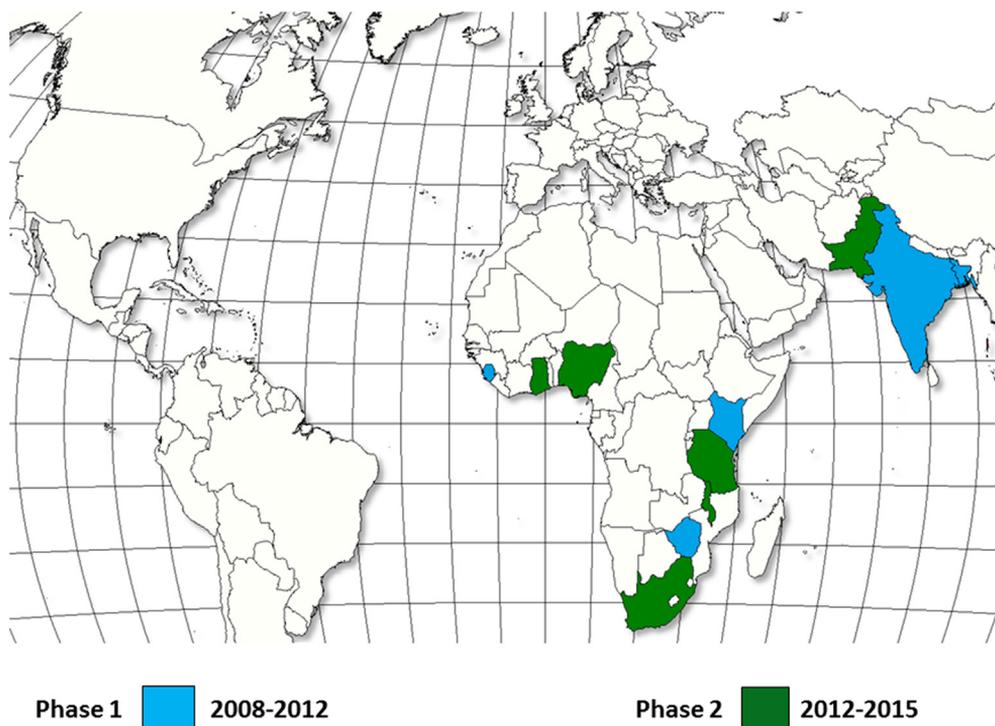


Fig. 1. Making it Happen Phase 1 and 2 countries.

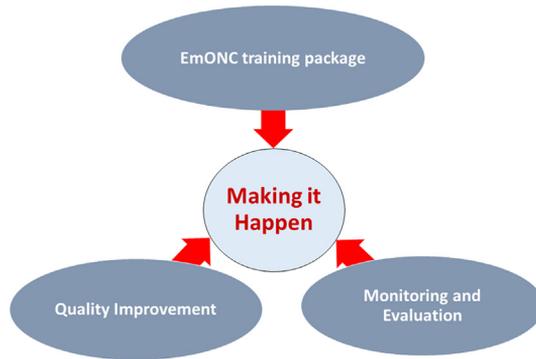


Fig. 2. Key interventions in the MiH programme.

complications of obstructed labour and abortion) and causes of newborn death (asphyxia, hypoglycaemia, hypothermia and sepsis), and it includes all signal functions of EmOC (Box 2). The training package includes a section on surgical skills and on normal delivery (SBA). A cross-cutting theme throughout the training is *effective communication and teamwork*.

Training delivery approach

The training is based on the key principles of adult learning, and it uses interactive learning sessions comprising short lectures (15%), simulation and hands-on sessions using low-fidelity obstetric, newborn and resuscitation manikins including interactive workshops (70%), mentoring (5%) and in-course monitoring and evaluation (10%). To ensure effective learning, there is a low trainer to trainee ratio (1:4). This allows for adequate hands-on training within the allocated time (between 3 and 4 days depending on the setting).

A *multidisciplinary* training approach is used, where midwives, medical doctors and clinical officers are trained together by (similarly multidisciplinary) teams of experienced specialist obstetricians, midwives and anaesthetists (UK-based volunteers and in-country volunteers). The training is delivered as close as possible to the workplace of the health-care providers.

Box 2

Content of CMNH-LSTM EmONC training course.

- Normal vaginal delivery
- Early newborn care (prematurity, sepsis, hypoglycaemia and hypothermia)
- Communication, triage and referral
- Maternal and newborn resuscitation
- Management of shock and the unconscious patient
- Management of severe pre-eclampsia and eclampsia
- Prevention and treatment of obstetric haemorrhage
- Manual removal of a retained placenta
- Prevention of obstructed labour, use of the partograph
- Diagnosis and treatment of pregnancy-related sepsis and HIV
- Breech delivery, cord prolapse and twin delivery
- Shoulder dystocia
- Assisted vaginal delivery-vacuum extraction
- Repair of episiotomy and perineal tears
- Diagnosis and treatment of complications of abortion including manual vacuum aspiration
- Caesarean section

Participants

All maternity care providers including medical doctors (and interns), medical officers, specialist obstetricians, nurses or midwives, non-physician clinicians and mid-level health-care providers expected to be able to provide SBA, early newborn care and EmOC can attend the CMNH-LSTM EmONC training workshops.

Adaptations of the general CMNH-LSTM EmONC package

The generic CMNH-LSTM EmONC training package has been modified to suit the specific settings in which it is delivered to ensure it is fit for this purpose.

Kenya: Adaptations included restricting the content of the assisted vaginal delivery (AVD) module to vacuum extraction only (teaching obstetric forceps was excluded), and the WHO modified partograph (no latent phase, partograph is opened from 4-cm cervical dilation) was taught instead of the WHO composite partograph (latent phase and partograph opened from 3-cm cervical dilation). The WHO composite partograph was used in health-care facilities prior to the MiH programme in Kenya. In 2012, further adaptation resulted in an expansion of the content to include antenatal and postnatal care, HIV in pregnancy and an increase in breast-feeding and training time from 3 to 5 days.

Tanzania: This included training for three and a half days, allowing more time for practical training. The MoH and the professional medical and nursing associations requested that the WHO composite partograph be used rather than the modified WHO partograph.

Zimbabwe: This included training for three and a half days, allowing more time for practical training, and it included additional content such as malaria in pregnancy, HIV in pregnancy and medical ethics.

Republic of South Africa: The CMNH-LSTM EmONC training package was adapted to include a substantial module on the management of HIV [47] and intubation as part of the resuscitation module. In RSA, the training package is known as Essential Steps in Managing Obstetric Emergencies (ESMOE), and it is compulsory for medical interns based on assessments of its effectiveness in improving knowledge and skills in this group.

Improving quality of care using audit, including maternal and perinatal death audit and standards-based audit

A Cochrane systematic review on audit and feedback concluded that audit can improve professional practice [58,59]. What is also clear is that audit is a method of evaluating and documenting what is so often lacking in the health system or 'enabling environment' with regard to personnel, skills, equipment or drugs to be able to provide at least the minimum acceptable level of care.

If health-care providers themselves are able to evaluate the care they are giving and are willing and able to give praise where this is due as well as make amendments where needed, then this should lead to improved motivation, ownership and sense of responsibility for delivering good-quality care.

There are essentially three main types of audit: maternal and perinatal death audit; audit of care given in the case of severe complications where there was no death, which has variously been called 'near-miss audit' or review of cases of 'severe acute maternal morbidity' (SAMM); and thirdly 'criterion-' or 'standards-based audit'. All three essentially ask the following questions: What was done well, what was not done well and how can care be improved in future? [60].

The CMNH-LSTM QI package focuses on the following:

- Introduction to QI: An examination of what 'quality' is for the patient/client, health-care provider and manager is carried out, and QI teams are developed.
- Maternal death audit is conducted, and the new maternal death cause classification (WHO-MM-ICD10) is applied [3].
- Perinatal death audit is carried out, with an emphasis on stillbirths.
- A standards-based audit is conducted by developing standards and facilitating clinical audit.

Improved monitoring and evaluation

Among health-care providers, particularly in busy facilities, data collection is often an additional and unwelcome chore. Health-care providers may not appreciate the importance of data and/or lack the ability to properly record and subsequently use the information generated through their work.

Without good-quality data, however, it is difficult or even impossible to understand the situation in the facility. By analysing facility data, health-care facility performance, needs and future developments can be captured and used to improve the facility as a workplace and a place where health-care services are delivered. It is therefore vital to help those working in health-care facilities appreciate and engage with data better.

The CMNH-LSTM 'Making it Happen with Data' is a 1-day workshop that has been developed to increase the awareness of the importance of good-quality data collected at the health-care facility level, and to improve the skills of health-care providers to manage and use the data collected.

The workshop aims to help participants to:

- Understand which indicators are used to monitor progress in maternal and newborn health globally and at the national level.
- Understand the reasons and benefits of keeping accurate and reliable records.
- Understand the key concepts of monitoring and evaluation.
- Extract and summarize findings from registers and other data that are routinely collected at their health facilities.
- Develop new skills on how to present data for maternal and newborn health.
- Be able to use data on maternal and newborn health to inform their day-to-day practice.

Evaluation of the MiH programme

Under the MiH programme, interventions are introduced after the initial baseline assessments have been carried out. Interventions are introduced in a controlled and phased manner allowing for a before-and-after comparison over time. All countries receive the in-service training in EmONC and monitoring and evaluation workshops. Four countries also receive the QI package (Kenya, Malawi, Sierra Leone and Zimbabwe). In the Republic of South Africa, EmONC 'fire drills' are additionally introduced alongside EmONC training, following a stepped wedge design for evaluation. Health-care providers are asked to complete a structured questionnaire assessing reaction, which additionally has space for open comments. Knowledge and skills are assessed using multiple-choice questions (MCQs) and standard skills assessments on mannequins (OSCI) before and also directly after training in EmONC. Qualitative research methods (focus group discussions and key informant interviews) are used to assess change in behaviour, and this is also assessed by quantitative assessments of procedures (e.g., EmONC signal functions) performed by health-care providers over time. A sub-study will explore retention of knowledge and skills over time (12 months) at the health-care facility level; the availability of signal functions as well as maternal and newborn health (MNH) outcomes are assessed at 3, 6, 9 and 12 months following interventions. Under the MiH programme, Kirkpatrick's levels were adapted to include the availability of EmONC signal functions and MNH outcomes to include direct obstetric maternal case fatality rate and stillbirth rate (Table 3).

The MiH programme is thus an important example of a 'real-life' implementation programme and research. Monitoring and evaluation is embedded in the MiH programme design using largely routinely collected health-care facility data to assess the effectiveness of the interventions implemented under the programme.

Theory of change underpinning the MiH programme

In addition to the adapted Kirkpatrick model for evaluation, the design of the MiH programme has taken into account the complexity of bringing about improvements in MNH and developed a theory

Table 3

Adapted Kirkpatrick evaluation framework used in the Making it Happen programme to evaluate EmONC training.

Kirkpatrick's four levels	Adapted evaluation framework
Level 1: Reaction	Participants' reaction to training
Level 2: Learning	Change in knowledge and skills
Level 3: Behaviour	Change in behaviour and practice
Level 4: Results	Availability of EmONC signal functions Change in maternal case fatality rate Change in stillbirth rate

of change (the description of a sequence of events that is expected to lead to a particular desired outcome) (Fig. 3) [61,62]. The theory of change is also used to develop and assess (over time) those indicators that are reflective of each component. For example, the number of women who are documented to have received EmONC will depend on an increased demand for and uptake of EmONC

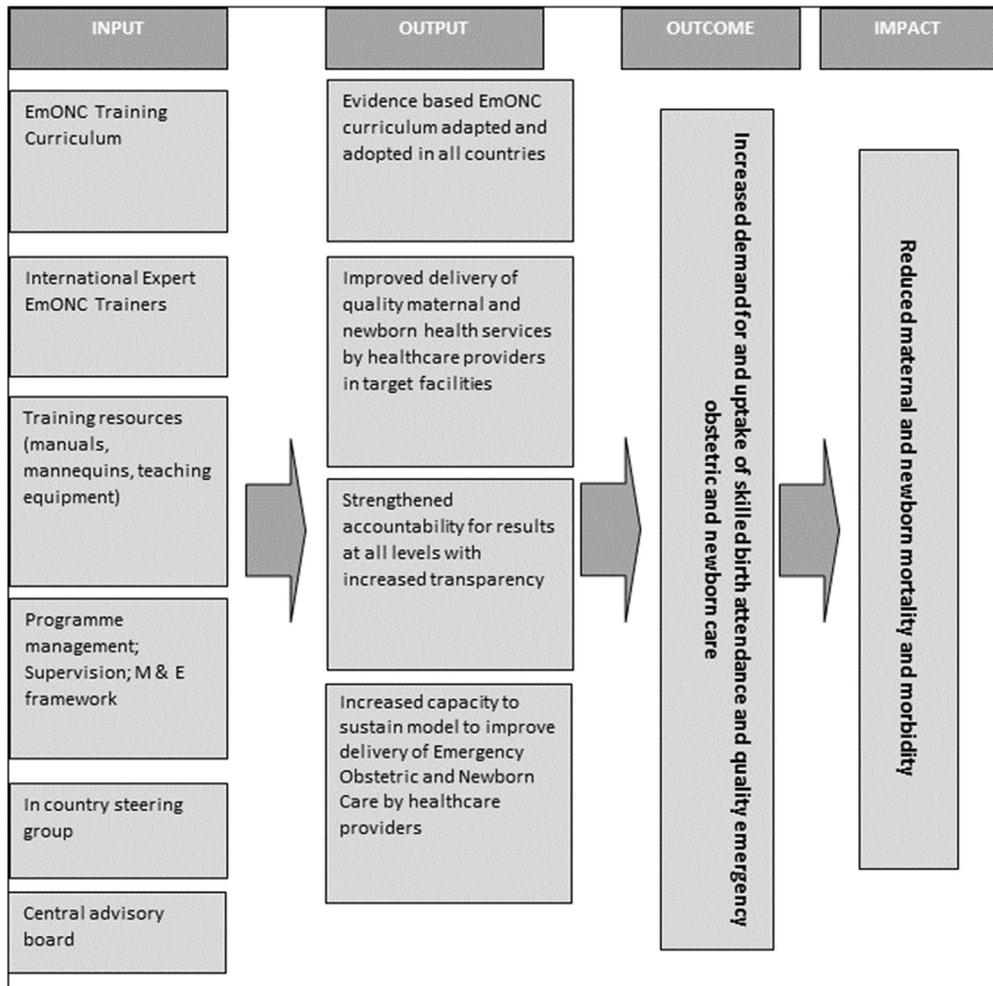


Fig. 3. Theory of change for MiH programme.

as well as improved recognition and recording by health-care providers of women with obstetric complications.

A country-specific steering group chaired by the MoH, with membership from professional medical and nursing associations, and regulatory bodies receive monitoring and evaluation reports regularly and advise the programme in each participating country. This facilitates the ownership and sustainability of interventions. The model also develops the capacity of trained health-care providers to sustain the interventions through the training of master trainers (or facilitators), provision of training equipment and setting up of skills training rooms or skills labs.

Mechanisms for effective country-specific dissemination of evidence generated, in particular drawing on the expertise and reach of national and international advisory boards, ensure that lessons learned influence policymaking at national and global levels beyond the immediate reach of the programme.

Research agenda

In-service training is usually part of a number of interventions required and implemented to improve maternal and newborn health. Evaluation of the effectiveness of training needs to go beyond Kirkpatrick's Level 1 and 2 consistently. The multiple training interventions implemented by several partners in the same group of health-care providers makes it difficult to evaluate training effectiveness in some settings. Moreover, experimental study designs or study designs involving direct observation of practice may be expensive and underpowered. Therefore, robust indicators of change in practice and change in health outcomes after training are required.

The additional benefit (or not) of supportive supervision (including the type of supervision – internal or external or a combination) also needs to be determined. The frequency of EmONC in-service training required to maintain knowledge and skills may also vary from one setting to another, for different cadres of health-care providers and years of clinical experience. The research questions related to in-service training that need to be answered are presented in the research points at the end of this chapter.

The use of innovative and robust research designs, indicators and tools to measure the impact of EmONC training on management of obstetric complications and maternal and newborn mortality and morbidity should be explored.

Summary

Based on successful implementation of the MiH programme in settings with the greatest burden of maternal and newborn deaths, it can be recommended that EmONC in-service and pre-service training should be implemented using evidence-based approaches, ensuring country-specific adaptation and routine but comprehensive evaluation of effectiveness. Engagement with stakeholders to ensure proper selection of trainees (health-care providers who provide maternity care) will ensure that a critical mass of health-care providers is trained. It is important to take into account the local patterns of staff rotation and, where needed, ensure policy is in place to make sure that not all trained maternity staff are rotated out to other wards at the same time. Participating health-care facilities should be selected taking into account the referral patterns, for example, health-care providers working at the basic EmONC level trained at the same time as those at comprehensive EmONC health-care facilities that serve as referral hospitals.

There is an identified need for more rigorous evaluation of the effectiveness of skills-and-drills EmONC training, how this is best scaled up and whether this results in improved outcomes for mothers and babies. An approach using operational research methods is most likely to be successful.

Conflict of interest statement

The authors have no conflicts of interest.

Practice points

- Innovative processes to ensure effectiveness, ownership, accountability and sustainability.
- The generic emergency obstetric and newborn care (EmONC) training package developed by CMNH-LSTM in partnership with the WHO and RCOG can be adapted to fit a variety of low- and middle-income settings.
- In-service skills-and-drills' training of 3–5 days is sufficient to cover most of the context of EmONC, skilled birth attendance and early newborn care.
- Master trainers are based within supported facilities as much as possible, so they can provide ongoing support to health-care providers.
- Comprehensive monitoring and evaluation frameworks are required to evaluate the effectiveness of EmONC training.
- The Making it Happen programme is an example of a multi-country operation and research programme to evaluate the effectiveness of EmONC training in different settings.

Research points

- What is the change in knowledge, skills and practice post EmONC training by different cadres of staff?
- For how long do health-care providers retain knowledge and skills after EmONC training?
- What is the effect of experience and workload on the uptake and retention of knowledge and skills after EmONC training?
- What is the best mechanism of providing on-the-job support to enhance change in practice after EmONC training?
- What is the minimum proportion of maternity staff that need to be trained for optimal impact?
- What is the effect of staff rotation and redeployment?
- What is the effectiveness of complete EmONC training versus monthly modular continuous medical education EmONC training sessions?
- What is the effectiveness of regular EmONC training of a maternity team compared to conducting regular EmONC fire drills'?
- Does EmONC training result in improved availability and quality of EmONC at the health-care facility level?
- Is there a measurable decrease in the maternal case fatality rate and/or stillbirth rates at the health-care facility level following EmONC training?
- Is the Kirkpatrick model for evaluating EmONC training the most appropriate model or are there additional measures of effectiveness (or not) required to evaluate EmONC training?

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