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Exploring perceptions of neonatal airway management and learning preferences of Traditional Birth Attendants and midwives practicing in rural Uganda

By Marvesh Mendhi

A dissertation submitted to the faculty of the Medical University of South Carolina in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the College of Nursing

July 2017

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ABSTRACT

Purpose

Sub-Saharan Africa has the highest neonatal mortality rates in the world. The World Health Organization (WHO) recognizes disparities in care as a contributing factor to neonatal mortality in low-and middle-income countries (LMIC). The WHO has therefore incorporated maternal and newborn care educational programs for Maternal Child Health (MCH) providers. This dissertation includes research that will guide the development of future educational interventions regarding neonatal airway management, tailored to the learning needs of midwives and Traditional Birth Attendants (TBAs) in rural Uganda.

Problem

There is an urgent need to provide neonatal resuscitation education and to build clinical capacity in LMIC, where access to health care is poor, particularly in rural areas. The burden of neonatal mortality and long term impairment due to hypoxic brain damage can significantly affect the population.

Gap

The WHO has developed programs to address neonatal airway management, which are geared towards physicians, nurses and midwives. Although trained health care workers play an essential role in decreasing the neonatal mortality rate, the limited numbers of formally trained providers are unable to cover rural areas. Therefore, TBAs, who are not formally trained, are an integral part of the maternal-child- healthcare (MCH) and, remain the primary healthcare providers in the rural areas of LMIC.

To review the literature for effectiveness of the educational interventions for neonatal airway management in LMIC. To explore the perceptions of midwives and TBAs practicing in rural Uganda related to: (a) facilitators of and barriers to neonatal airway management and (b) their learning preferences to inform the development of a culturally appropriate neonatal airway management program for better adaptation in local context. Design/Findings

This dissertation consists of three manuscripts that address neonatal airway management in LMIC. The first manuscript reviewed 10 original studies of MCH care programs to identify effective components for, and the dissemination process of, educational interventions for neonatal resuscitation among TBAs. The second manuscript reviewed instruments that are available to measure provider self-efficacy for performing neonatal resuscitation. The third manuscript describes a study, using the focused ethnographic methodological approach and feminist perspective to explore factors affecting neonatal airway management by TBAs, and the need and preferences for educational resources to improve TBAs airway management practices. The findings of all three manuscripts informed the future development of culturally tailored educational intervention using "time honored" teaching methods according to the learning preferences of the TBAs. These educational interventions will be geared towards providing adequate competency and confidence for TBAs to perform neonatal airway management.

Key words

Neonatal resuscitation, low-and-middle-income countries, developing nations, midwifery, traditional birth attendants, focused ethnography, feminism, self-efficacy.

Aim

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INTRODUCTION

1. Overview of Dissertation

The overall objective of this dissertation was to investigate factors affecting neonatal resuscitation, by traditional birth attendants (TBAs), in low and middle income countries. First, a review the literature was conducted to evaluate the state of the science on neonatal resuscitation educational interventions, and instruments to measure selfefficacy as an outcome of neonatal resuscitation training efforts. The reviews' results informed the main study, which explored the perceptions of TBAs and midwives regarding factors affecting their practice of neonatal airway management in rural Uganda at Masindi-Kitara Medical Center (MKMC) and affiliated villages. The main study assessed factors that affect the provision of neonatal resuscitation by TBAs, such as cultural appropriateness, safety in practice, and the need for education resources. The study also assessed existing training resources, such as Helping Babies Breathe (HBB) guidelines, that could be tailored in a future study to midwives' and TBAs' learning needs and preferences for better adaptation in their local context. The results will be used to inform subsequent development and testing of a culturally tailored educational intervention to improve neonatal mortality in low and middle-income countries (LMIC).

Low and middle-income countries have the highest neonatal mortality rates (NNMR) in the world. According to World Bank 2015 data, NNMR for LMIC ranged from 21 to 47 deaths per 1,000 live births compared to 4 per 1,000 live births in the United States (Worldbank, 2015). Each year worldwide, up to 2.7 million neonatal deaths occur, and 25% of these deaths are caused by hypoxic events, also known as birth asphyxia (Lawn et al., 2011; Wang, Bhutta, Coates, Coggeshall, & Diallo, 2016; You et

al., 2015). The majority of deaths related to birth asphyxia occur in the rural areas of Sub-Saharan Africa (SSA) and East Asia (Lawn et al., 2011). Birth asphyxia is a critical event that signifies low oxygen as the newborn baby is unable to take its first breath. Without intervention within 60 seconds, hypoxia typically results in death or brain damage (Kliegman, Stanton, Geme, Schor, & Behrman, 2011). Urgent airway management is required for the neonate experiencing a hypoxic event during birth. According to the "golden minute" concept, implementation of proper airway management within the first minute of birth increases the chance of neonatal survival (Singhal et al., 2012).

The WHO and United Nations recognize the need to address the neonatal deaths due to birth asphyxia and developed programs such as HBB to educate the Maternal Child Health (MCH) providers (United Nations, 2013; Wall et al., 2010). These programs were geared towards formally trained health care providers, such as physicians, nurses and midwives who practice in the urban facility based institutions such as hospitals and clinics. In reality, home-based health care providers, such as TBAs, who are not formally trained, deliver approximately 40% or more of neonates in the rural areas (Lassi & Bhutta, 2015; Wilson et al., 2011). However, there is a lack of educational resources on prevention of birth asphyxia that are available and accessible to TBAs. To fill this gap in the evidence, this dissertation was carried out to investigate the 1) literature for effective educational interventions and instruments that measure MCH providers self-efficacy in neonatal resuscitation training programs, 2) facilitators and barriers affecting the provision of neonatal resuscitation by TBAs, and 3) access to educational resources for neonatal airway management that address 'TBAs learning preferences by using a focused ethnographic approach.

2 BACKGROUND AND PROBLEM STATEMENT

The NNMR in Uganda, one of the Sub-Saharan African (SSA) counties, is 22 per 1,000 births annually, as compared to 4 per 1,000 births in the US (Worldbank, 2012). The WHO and United Nations recognizes that disparities in care contribute to neonatal mortality in LMIC. Accordingly, in 1990, these organizations incorporated the *Essential Newborn Care* course as part of the educational programs for MCH providers in LMIC. Since 1990, neonatal mortality has been addressed as part of the Millennium Development Goal (MDG) #4 which aimed for a two-thirds reduction in deaths of children under five years of age by 2015 (WHO, 2013). To achieve the goals established in the MDG guidelines to improve neonatal mortality, the WHO focused initially on maternal care rather than neonatal care, which included the management of birth asphyxia (De Brouwere & Van Lerberghe, 2001). As the global decrease in the NNMR did not reach the targets established through MDG #4 by 2015 (You et al., 2015), revised targets have been established through Sustainable Development Goal #3 to reduce the NNMR in LMIC to 12 deaths per 1,000 births annually by 2030 (Wang et al., 2016).

In 2010 as a more specific modification, the educational program, HBB was developed by The American Academy of Pediatrics and supported by the United States Agency for International Development (USAID) (Kak, Johnson, Mcpherson, Keenan, & Schoen, 2015). *Helping Babies Breathe* focuses on formally trained health care professionals (physicians, nurses and midwives) in LMIC and currently functions in 77 countries. The program is primarily available to facility-based neonatal care providers, but is not easily accessible to the home-based neonatal care providers in rural areas, such as TBAs with low literacy levels (Kak et al., 2015).

3 GAPS IN KNOWLEDGE

Despite the overall improvement in the child mortality rate, neonatal deaths remained unchanged and the proportion of child mortality attributed to neonatal deaths has increased from 37 to 44 percent, according to United Nations Children's Fund (UNICEF) 2013 child mortality report, (UNICEF, WHO, World Bank, & UN-DESA Population Division, 2015). One of the reported gaps is lack of adequate skilled birth attendants to cover all urban and rural areas. It is estimated that only 47% of births occur in facility-based clinics of SSA (Chinkhumba, De Allegri, Muula, & Robberstad, 2014). Although, the work of skilled birth attendants decreases the neonatal mortality rate, their limited numbers are not able to cover all of the neonatal hypoxic events that occur in rural areas (Ali & Siddig, 2012; Bhutta, Darmstadt, Haws, Yakoob, & Lawn, 2009; Glenton et al., 2013; Singhal & Bhutta, 2008).

The low literacy of TBAs is an identified barrier inhibiting their access to educational resources for neonatal resuscitation. Studies related to TBA training, conducted in LMIC such as Sudan (Ali & Siddig, 2012), India (Satishchandra, Naik, Wantamutte, & Mallapur, 2009), and Nepal (Falle et al., 2009), reported that 74% to 96.4 % of the TBAs were illiterate. According to a Cochrane review of 53 qualitative studies of barriers and facilitators to implementing MCH by Lay Health Workers, lay providers (including TBAs) received insufficient, poor quality, and irrelevant training (Glenton et al., 2013). A current review by Reisman and colleagues, focusing on acquisition and retention of neonatal resuscitation skills, noted a decline in skills after the initial training (Reisman et al., 2016). Historically the TBAs, as primary MCH providers, learned mostly through apprenticeship.

In addition to low educational attainment, evidence indicates that other healthcare providers disrespect TBAs because of their limited training. Izugbara and colleagues noted the humiliation experienced by TBAs when taking their clients to the hospital for obstetrical emergencies; they are often referred to as "quacks" (Izugbara, Ezeh, & Fotso, 2009). This treatment leads to disrespect for TBAs' in the public sector.

Due to limited access to health care providers, resources, and poor infrastructure, infants born in rural areas of LMIC have a greater risk of hypoxia related morbidity and mortality, and there is further disparity in maternal health care access between residents of rural and urban areas of developing nations (Lee et al., 2011).

4 DESIGN AND METHOD

This study in Uganda, conducted as part of this dissertation, was designed to investigate the gaps noted in the integrative literature reviews. The information gathered from the integrative reviews provided a prelude to further explore a specific context for culturally appropriate educational interventions to teach neonatal airway management to TBAs with their learning preferences. In order to develop a sustainable educational process, the researcher engaged in a qualitative study using a focused ethnographic method.

Specific Aim 1: Literature review

To conduct integrative reviews of 1) educational interventions to improve traditional birth attendants' knowledge base and 2) instruments that measure self-efficacy in neonatal resuscitation training programs for providers in LMIC who have low literacy levels.

Specific Aim 2: Observations

To apply structured participant-observation using the qualitative focused ethnographic method to document the observed: a) physical environment and cultural practices that support (facilitators) or interfere with (barriers) neonatal airway management during the perinatal period in accordance to HBB guidelines; b) availability and usage of equipment for neonatal care; and, c) interpersonal communication among midwives and TBAs, when complicated home-based deliveries are brought to the health care facility, Masindi Kitara Medical Center (MKMC).

Specific Aim 3: Perceptions

To explore the perceptions of midwives and TBAs practicing at the MKMC and affiliated villages using semi-structured interviews and focus group discussion (FGD) to: a) determine their beliefs about the initiation and support of newborn respiration and knowledge of HBB guidelines; b) identify their perceptions of neonatal airway management training needs; and, c) preferences for learning, and access to educational resources.

Specific Aim 4: Integration

Integrate findings of the literature review (Specific Aim 1), observations (Specific Aim 2), and perceptions (Specific Aim 3) of midwives and TBAs to guide future adaptation of an airway management program tailored to their cultural and learning needs.

5 KEY CONCEPTS/TERMS AND DEFINITIONS

Several cadres of health care providers in SSA provide neonatal care. The WHO has defined two categories of birth attendants in developing nations:

(1) **Skilled birth attendants** are formally educated and trained to manage childbirth, including physicians, nurses, and formally trained midwives practicing in the facility based clinics.

(2) **Traditional Birth Attendants** do not have formal education but usually acquire skills through apprenticeship and have home-based practices in rural areas. They assist the mother with childbirth and specific roles within MCH care which may vary according to local culture and societal expectations. They are often respected for their experience and paid in–kind rather than with monetary compensation (De Brouwere, Tonglet, & Van Lerberghe, 1998; Wilson et al., 2011).

(3) Neonatal airway management. According to the HBB program, actions related to airway management that must occur during the first minute of birth referred to as the "Golden minute" includes: 1) Recognizing an infant not crying; 2) Positioning the head;
3) Clearing the airway; 4) Stimulating; 5) Recognizing breathing; and, 6) Initiating ventilation within one minute.

(4) Neonatal death

For the purpose of this dissertation, neonatal death refers to early neonatal deaths within the first 24 hours after birth (Pathirana et al., 2016).

6 THEORETICAL FRAMEWORK

This dissertation integrates three frameworks which include social cognitive theoretical framework, critical feminist theoretical framework, and focused ethnography as methodological framework. The Social Cognitive Theory (SCT) provides the theoretical framework that guides evaluation of educational interventions for training health care providers to perform neonatal resuscitation (Bandura, 1994; Plant, van

Schaik, Sliwka, Boscardin, & O'Sullivan, 2011). In SCT, Bandura addresses how cognitive human development uses sensory, motor and cerebral systems to achieve tasks and goals that give meaning, direction, and satisfaction in one's life (Bandura, 2001). These tasks and goals according to the SCT utilize three modes of agency: personal capability to achieve, proxy that relies on others for outcomes, and collective agency through interdependent effort (Bandura, 2001). Self-efficacy, part of SCT, is defined as the personal capability and predictor of performance of the targeted behavior (Murphy &Kraft, 1993). Behavior can be influenced positively or negatively by four factors contributing to self-efficacy (Jordan & Farley, 2008). These factors are mastering experiences, social modeling, social persuasion, and somatic/emotional state. Social Cognitive Theory (SCT) further emphasizes that an individual's perception of selfefficacy contributes to confidence in one's ability to attempt, successfully complete a task, and achieve the intended results (Bandura, 2001).

To provide effective neonatal care and resuscitation for airway management, TBAs and midwives need to feel confident to immediately assess and, properly revive a neonate. Such expertise includes a structured set of competencies that must be adapted according to the local cultural context within a low resource environment. In SCT according to Bandura, the confident aspect of the behavior is further emphasized to allows one to attempt and successfully complete the task (Chang & Crowe, 2011). Within the context of critical feminist theory the researcher explored the perception of the TBAs and midwives confidence level to perform neonatal resuscitation using the underpinnings of the SCT and self-efficacy

The feminist perspective stems from the critical feminist theory to provide a lens through which the researcher can view the overall challenges encountered by the TBAs to confidently provide neonatal airway management. The feminist perspective as implied by the critical feminist theory addresses factors contributing to the marginalization of women such as, social class, hierarchal systems, cultural practices, and a patriarchal society (Kirkham, Baumbusch, 2007; Racine). These factors reflect barriers experienced by TBAs to provide neonatal airway management and facilitators to adapt culturally appropriate educational resources for TBAs. The feminist perspective further explored the concept of power and knowledge, in which the increase in knowledge reflects the capacity of power to make decisions while assessing the neonate and revive as necessary(Fahy, 2002).

Data collection and analysis was guided by the feminist perspective based on critical feminist theory, which draws on postcolonial approaches (Schrock, 2013). The postcolonial feminist perspective focuses beyond the gender distinction and emphasizes issues of identity in social class, economic locality, and ability to function within an oppressive situation (Archer, 2009). Feminists advocate flexible and subjective thinking to represent women's experiences in a patriarchal society (Aune, 2008). The feminist perspective with unstructured style, (Duffy, 1985) guided the interviews and observations of this study. To create equal exchange and promote reciprocity and reflexivity advocated for in feminist research (Barnes, 1999; Roberts, 1981), a non-hierarchical approach to interviewing was adopted while interviewing through open-ended questions designed to promote participant constructed narratives. The feminist theoretical approach enabled the researcher to explore the midwives' and TBAs' perceptions about providing neonatal

care in a patriarchal society. These perceptions were identified as barriers and facilitators in the data collection using the focused ethnographic approach.

The focused ethnographic framework is a qualitative approach used in the main study of this dissertation. Ethnography is an approach to fieldwork research used originally by anthropologists Bronislaw Malinowksi and Franz Boas. ,This ethnographic approach utilized the holistic perspective in their study of cultural influences in human behavior (Lecompte & Schensul, 2010). This approach considers the contributions of ethnicity, nationality, gender, occupation, and other cultural components (Goodson & Vassar, 2011).

The focused ethnographic approach guided data collection methods and was implemented as follows: (1) structured observations in a natural setting with face to face interactions, (2) semi-structured interviews and focus group discussion, (3) data obtained concerning the perceptions and behavior of the midwives within a social and cultural specific context while performing neonatal airway management (Lecompte & Schensul, 2010). Through the lens of feminist perspective, the analysis is guided to confirm what additional training, resources, and supports are needed to build self-efficacy and confidence in airway management for TBAs and midwives. Figure 1 depicts the TBA's self-efficacy related to neonatal airway management influenced through the feminist lens.



Figure 1. Feminist perspective of what influences TBAs self-efficacy

The SCT and self-efficacy is the platform for the first and second integrative review manuscripts and informs the main study. The data analyzed in the main study, using the feminist perspective lens, to view how educational resources according to the learning preferences of TBAs in performing neonatal airway management can be utilized with adequate competency and confidence. The main study used the synthesis of feminist perspective and ethnographic approach to collect data and confirm the analysis to inform future adaptation of culturally appropriate teaching method for TBAs and midwives in rural Uganda regarding neonatal airway management.

Summary of the manuscripts

This dissertation consists of three manuscripts that address neonatal airway management in developing nations. The first manuscript is an integrative review of 10 original studies of MCH programs to identify effective components, and the dissemination process of educational interventions on neonatal resuscitation for TBAs. The second manuscript is an integrative review of instruments that are available to measure provider self-efficacy for performing neonatal resuscitation. The third manuscript is a report of a qualitative study that used the focused ethnographic approach and feminist perspective. The study explored the perceptions of barriers and facilitators for TBAs to provide neonatal airway management and the need to modify educational resources which are culturally appropriate.

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Manuscript 1

Educational interventions to increase neonatal resuscitation sell-efficacy for

traditional birth attendants: An integrative review

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Abstract

Background: Annually up to 2.7 million neonatal deaths occur worldwide, and 25% of these deaths are caused by birth asphyxia (hypoxic event). Infants born in rural areas of low-and-middle-income countries are often delivered by traditional birth attendants and have a greater risk of hypoxia related mortality.

Aim: The aim of this review is to: 1) evaluate the effectiveness of neonatal resuscitation educational interventions in improving traditional birth attendants' knowledge base, perceived self-efficacy, and infant mortality outcomes in LMIC, and 2) evaluate culturally appropriate educational strategies according to TBA learning preferences.

Methods: We conducted an integrative review to identify studies pertaining to neonatal resuscitation training of traditional birth attendants and midwives for home based births in low-and-middle-income countries. Ten studies met inclusion criteria.

Findings: Most interventions were based on the Neonatal Resuscitation Program, Safe Motherhood Guidelines and Life Saving Skills protocols. Three studies included only traditional birth attendants and utilized pictorial and oral form of teaching, consistent in addressing the somatic and emotional states described in social cognitive theory. These studies reported decreases in neonatal mortality rates ranging from 22% to 65%. Studies that utilized skill demonstration, role-play, pictorial charts showed increase in pre to post knowledge scores and high self-efficacy scores. A team approach in two studies, where either village health workers or lady health workers assisted traditional birth attendants, resulted in decrease in neonatal mortality rate (49 to 43 /1000births and 10.5 to 3.7/ 1000 births).

Conclusion: Three culturally appropriate methods, such as role-play, demonstration and pictorial charts can contribute to increase in knowledge and self-efficacy related to neonatal resuscitation. Training traditional birth attendants separately or with health care providers with similar literacy levels may provide a conducive learning environment. Team approach training where traditional birth attendants are assisted by village health workers during home-based childbirths may reduce neonatal mortality rates. *Keywords*: Low-middle-income countries Neonatal resuscitation, Training, Self-efficacy, Traditional Birth Attendants.

Statement of Significance

Problem

Traditional Birth Attendants, who attend more than 50% of home-based births in rural areas of low and middle-income countries, have limited educational resources to adequately manage neonatal hypoxic events.

What is already known?

Neonatal resuscitation training for formally trained birth attendants, such as nurses, midwives and physicians significantly reduces neonatal mortality.

What this paper adds

Effective neonatal resuscitation training, which is culturally appropriate and tailored to the traditional birth attendants' comprehension level, can increase their self-efficacy to manage neonatal hypoxic events.

1. Introduction

Neonatal mortality rates are substantially higher in low-and middle-income countries (LMIC) compared to high-income countries. According to World Bank data, neonatal mortality rates for LMIC ranged from 21 to 47 deaths per 1,000 live births in 2015, compared to 4 per 1,000 live births in the United States.¹ According to a 2015 report by the United Nations Inter-Agency Group for Child Mortality estimation, up to 2.7 million neonatal deaths occurred annually in LMIC, 25% of these deaths were caused by hypoxic events, also known as birth asphyxia.^{2,3} This critical event signifies low oxygen, as the newborn baby is unable to take the first breath. Without intervention, hypoxia typically results in brain damage or death within 60 seconds.⁴ Urgent airway management is required for the neonate experiencing a hypoxic event during birth. According to the "golden minute" concept, implementation of proper airway

management within the first minute of birth increases the chance of neonate survival.⁵ Due to limited access to health care providers, resources, and poor infrastructure, infants born in rural areas of LMIC have a greater risk of hypoxia related morbidity and mortality. There is a further disparity because pregnant women living in rural areas are often unable to travel to urban areas with modern facilities to deliver their babies and must rely on TBAs who have fewer resources.

In recognition that healthcare disparities contribute to neonatal mortality in LMIC, the World Health Organization and the United Nations established Millennium Development Goal # 4, calling for a two-thirds reduction in deaths of children under five years of age by 2015.⁶ However, according to the 2015 child mortality report of the United Nations Children's Fund, despite the overall improvement in the child mortality rate in LMIC, the rate of neonatal deaths remained unchanged. Moreover, the proportion of child mortality attributed to neonatal deaths increased from 37 to 44 percent.⁷ To focus more specifically on risk factors in the neonatal period, Sustainable Development Goal # 3 was established in 2015 to reduce neonatal mortality to 12 deaths per 1,000 births by 2030.^{3,8}

Estimates indicate that traditional birth attendants (TBAs) in LMIC deliver more than 50% of births in rural areas, ⁹ making them often the primary maternal child healthcare providers in these regions. Within the healthcare structure of many LMIC, TBAs and midwives serve in rural areas,¹⁰ and their roles differ in health facility or home based practice.¹¹ Travel from village to city for immediate healthcare needs is usually impossible for pregnant women due to lack of adequate transportation.¹² Thus, while the World Health Organization originally advocated that all births be attended by

professional healthcare workers, since 2015 they have focused on ensuring referral linkages between the TBAs and the health facilities in order to meet the healthcare needs of rural patients.¹³⁻¹⁵ TBAs are provided with training on prenatal care and encouraged to refer the mothers to give birth at a health-care facility.

In a recent systematic review, the authors focused on acquisition and retention of neonatal resuscitation knowledge and skills provided during the training of health care providers in LMIC.¹⁶ One of the review findings suggested involving and educating the community members during the training of health care providers. This combined effort had more impact on decreasing neonatal mortality rate compared to programs solely focused on provider education. One of the training programs, the Neonatal Resuscitation Program (NRP), was initiated by the American Academy of Pediatrics in 2000¹⁷ and adapted by the WHO in 2004 to provide neonatal resuscitation training guidelines for LMIC. However, there is lack of clarity on how best to tailor and disseminate NRP knowledge, training, and guidelines to TBAs. Furthermore, there is uncertainty about the effectiveness of current training programs to increase TBA self-efficacy for neonatal resuscitation performance. In 2004, the WHO removed TBAs from the category of "skilled birth attendant,"¹⁴ which reflects the inconsistency of TBA training across LMIC and the lack of a standardized approach to maternal-infant healthcare in rural areas of LMIC nations.

TBAs have received inconsistent training for the past decade, but continue to attend more than 50% of the births in rural areas of the LMIC. Given these inconsistence in the training process, the purpose of this integrative review is to synthesize the evidence on the effectiveness of neonatal resuscitation educational interventions in improving
traditional birth attendants' knowledge base and perceived self-efficacy, and infant mortality outcomes in LMIC. An additional purpose is to identify the most effective methods to educate the TBAs that are culturally appropriate and tailored to their educational attainment. This integrative review is guided by a theoretical view of factors contributing to self-efficacy in the context of Bandura's Social Cognitive Theory (SCT).¹⁸

2. Theoretical Framework

2.1 Social Cognitive Theory

Albert Bandura's SCT provides a theoretical framework for assessing the training of healthcare providers to perform neonatal resuscitation.¹⁸ SCT addresses cognitive human development using sensory, motor, and cerebral systems to achieve tasks and goals that give meaning, direction, and satisfaction in one's life.¹⁹ These tasks and goals according to the SCT utilize three modes of agency: personal capability to achieve, proxy that relies on others for outcomes, and collective agency through interdependent effort.¹⁹ Self-efficacy is defined as the personal capability to perform an action according to the needed outcome.²⁰ Self-efficacy further emphasizes confidence in performing the behavior that allows one to attempt and successfully complete the task.²¹ Bandura described four factors that influence and promote self-efficacy:²² (1) Mastering experiences, which allow individuals to achieve mastery through practicing skills or tasks. For the purposes of this integrative review, this expectation includes the practice of mask and bag ventilation technique; (2) Social modeling of skills, as applied to the current study, includes the demonstration of clinical skills by healthcare providers with similar educational background. For example, if a physician models a resuscitation skill, a TBA with less education may feel incapable of achieving the same skill. However, if a

peer such as a TBA or midwife demonstrates the skill, the new learner may feel it is achievable; (3) Social persuasion, which results from encouragement by peers and mentors related to performing the task; and (4) Somatic and emotional state to perform and master the skill. For example, if the training processes cause the TBAs to experience anxiety, self-doubts, and inferiority, the self-efficacy of those TBAs to perform the targeted skill may be affected.

During a resuscitation situation, self-efficacy is needed to perform skills confidently and to instruct others about how to perform skills successfully.¹⁷ Thus, selfefficacy is an important factor in skill acquisition and performance and when training others to perform these skills. Neonatal resuscitation requires immediate recognition and action to rescue the newborn within the first minute of life.⁵ Education can improve selfefficacy of health care providers for effective resuscitation.²³ To provide neonatal resuscitation, TBAs need to feel confident to assess and, if necessary, immediately and properly revive a neonate. Such expertise includes a structured set of competencies that must be adapted to a low resource environment. The SCT provides a strong theoretical basis on which to analyze existing studies that evaluate the effectiveness of educational interventions designed to improve TBAs self-efficacy and ability to implement neonatal resuscitation.

2.2 Cultural appropriateness strategies

Cultural appropriateness of a training program requires a pre assessment (not assumption) of the LMIC's culture.²⁴ Culturally appropriate training considers the healthcare beliefs and value system, usual practice, spoken language, respect of their base knowledge and community infrastructure leadership of the target audience. Kreuter

described five strategies for health educators to consider before planning a training program: 1) Socio-cultural strategy to learn study participants' cultural values and beliefs; 2) Constituent-involving strategy to incorporate community members who can assist with recruiting target participants in the program; 3) Linguistic strategy to provide materials in the participants' native language and/or in pictorial form for greater comprehension; 4) Evidential strategy to seek whether the healthcare issue will make an impact and is relevant to participants; and 5) Peripheral strategy to develop materials that are appealing to target participants.²⁴

3. Methods

3.1 Integrative review

For this integrative review, methods described by Whittemore and Knafl²⁵ were used to review and synthesize published literature on training programs that teach neonatal resuscitation to TBAs with low literacy levels. Training interventions reported in the studies were reviewed and analyzed for inclusion of strategies to promote selfefficacy as defined by SCT, and for cultural appropriateness as defined by Kreuter. According to Whittemore and Knafl, quality appraisal is not essential in an integrative review. Thus, all manuscripts that met the inclusion criteria regardless of methodological quality were retained in order to examine published interventions for disseminating educational programs that teach neonatal resuscitation to TBAs with low reading literacy.²⁵ The findings from the 10 original studies were reviewed to identify effective components for, and the dissemination process of, educational interventions on neonatal resuscitation for TBAs practicing in LMIC. Table 1 contains a brief description of the studies that were reviewed. The reviewed studies were ranked using the 2011 Oxford Center for Evidence Based Medicine, Levels of Evidence. The categories of ranking highest to lowest are as follows: 1. Systematic Review, 2. Randomized trial, 3. Nonrandomized studies or cohort studies, 4. Case series case-control studies, or historically controlled studies, 5. Empirical reasoning.²⁶

3.2 Search Methods

Overview of search strategy

This review utilized a three-phase search strategy to find relevant manuscripts. In the first phase, the investigators identified keywords relating to neonatal resuscitation education interventions in LMIC. The MeSH terms "newborns", "resuscitation", "midwifery", " interventions", "self-efficacy", "developing countries" and the additional key words "traditional birth attendant" were used to search the following electronic databases: PubMed, Cumulative Index to Nursing and Allied Health Literature, Clinical Key, and Scopus. The second phase entailed placing all keywords in combination such as developing nations AND neonatal resuscitation, midwives AND traditional birth attendants, and self-efficacy AND training program. Altogether, the search identified 1,145 manuscripts published from 1980 to 2017. The manuscripts included primary qualitative and quantitative studies and systematic reviews.

The third phase of the search applied the following inclusion criteria to review the titles of the articles: neonatal resuscitation, training programs in LMIC and addressing home based births. After removing duplicates and applying the exclusion criteria of hospital based resuscitation training, HIV and maternal resuscitation, 55 publications were retained for abstract review. From the 55 publications, 34 were removed according to the exclusion criteria mentioned above and 21 publications were retained for full text review. The focus of the review was to examine training interventions for maternal child

health care home-based providers in rural areas of LMIC, because many of these births are attended by traditional birth attendants and community based midwives, who typically have minimal formal training. Thus, studies with an exclusive focus on physicians, nurses, and formally trained midwives were excluded in the review. However, studies that included TBAs as part of mixed healthcare cadres who received an educational intervention were included in the current analysis. This review also included studies of community-based midwives with various training, ranging from 3-12 months, who were involved in home-based maternal child health care. Based on full text review of these 21 publications, 10 original studies met the criteria for inclusion in this integrative review. Figure 1 depicts the search strategy, along with the number of publications initially retained at each stage of the search according to the inclusion and exclusion criteria.

4. Results

4.1 Overview of Studies

Ten studies were included for review, representing the LMIC nations of Argentina, Congo, Guatemala, India, Indonesia Pakistan, Kenya, Zambia and Ethiopia. Table 1 lists the level of evidence for respective studies; 50% of the studies in this review were cluster randomized trials ranked at Center for Evidence Based Medicine level #2.^{9,27-30} The other 50% of the studies were ranked at Center for Evidence Based Medicine level # 3, which consisted of non-randomized comparisons of before and after interventions and one retrospective cohort analysis.^{5,10,13,31,32}

4.1.1Participants

Participants included in these studies varied by educational levels. Two studies, Gill²⁸ and Miller³⁰, exclusively targeted TBAs who did not have formal training. Four

studies explored a team approach with other health care providers who also did not have formal training. Daga and colleagues implemented a team approach by training Lady Health Visitor (LHV) as assistants to TBAs.³¹ Sibley conducted a similar study in a rural area of Ethiopia where TBAs and family members were taught basic newborn care, including simple respiratory assessment.¹⁰ Bang¹³ added Visiting Health Workers (VHW) to assist the TBAs with newborn care, and Bhutta²⁷ studied team work of TBAs and Lady Health Workers (LHW). Olson studied only community based midwives whose formal training varied about one year.³² Three studies by Carlo⁹, Matendo²⁹ and Singhal⁵ included mixed cadre of health care providers such as, physicians, nurses, formally trained midwives, LHWs and TBAs.

4.1.2 Training intervention

Four out of 10 studies utilized the NRP protocol. Gill and colleagues conducted a study with TBAs in Zambia's Lufwanyama Neonatal Survival project using the simplified version of the NRP protocol.²⁸ The simplified version deleted administration of emergency drugs, oxygen supplements and use of endotracheal intubation.²⁸ Carlo and Matendo also utilized the NRP protocol in addition to the standard Essential Newborn Care (ENC) intervention as part of the cluster randomization study.^{5,9,29} Singhal and colleagues used a modified version of NRP called Helping Babies Breathe.⁵ The HBB program is currently used in 77 LMIC. Miller used the Safe Motherhood guidelines³⁰ and Sibley used the Life Saving Skills protocol.¹⁰ Table 1 describes the study components inclusive of interventions and outcomes.

4.2. Training Strategies to promote TBA Self-Efficacy in Neonatal Resuscitation

The widely researched concept of self-efficacy has been shown to predict behavior change, particularly in the context of challenging tasks. For example, selfefficacy can predict one's ability to master competency in medical education.³² Table 2 summarizes the application of the four components of the SCT, namely mastering experiences, social modeling/vicarious experiences, social persuasion and emotional state in the training interventions.¹⁹

4.2.1 Mastering experiences

A strong sense of self-efficacy is achieved by sustained effort to succeed and demonstrate mastery in a skill.¹⁹ All training interventions utilized a range of teaching methods that promoted skill mastery, including skill demonstrations, practice sessions, and re-demonstrations using mannequins, dolls, and ventilation devices with mask and bag. Daga and colleagues primarily used the demonstration form of teaching with oral questions to the participants.³¹ Neonatal resuscitation skills included mouth to mouth breathing, but details of teaching materials were not discussed. Sibley utilized skill demonstrations, practice, and checklists to promote TBAs' mastery of the resuscitation skills.¹⁰ Bang and associates taught the neonatal resuscitation technique with a 17-step protocol to promote bag and mask ventilation skills using a doll, with follow up practice every 2 months to maintain the skills.¹³ Gill and colleagues emphasized mastering resuscitation skills by practicing with bag and mask ventilation devices; additional training was continued until the whole group was able to demonstrate and pass the skill assessment.²⁸ In two studies, researchers also taught the resuscitation skills of bag and mask ventilation by hands-on-demonstrations with reinforcement of training every

month.^{9,29} Miller and colleagues taught and assessed resuscitation skills using demonstrations with mannequins; however, details regarding practice sessions for the skill were not described.³⁰ Olson taught resuscitation skills by hands-on-practice with neonatal mannequins and ventilation devices.³² Singhal and colleagues also demonstrated resuscitation skills by utilizing the simulator manikin with bag and mask device, and participants practiced in pairs to master the skill.⁵

Another component of mastering experience is the length of time allocated to learn a new skill. In the evaluation portion of the HBB program, participants commented that time to practice was limited; the whole course was taught in 1.5 days, and formally trained healthcare providers were not able to master the skill with 1 to 1.5 days of training.⁵ Yet studies with training duration ranging from 3 to 8 days demonstrated a decrease in mortality rate. In studies by Bang, who conducted the training in three days and Gill, who provided a five day training, deaths related to birth asphyxia were reduced 65% and 63%, respectively.^{13,28} Miller conducted 8-day training and reported an overall reduction of 22% in the neonatal mortality rate.³⁰ The longer training sessions provided positive outcomes.

4.2.2 Social modeling/vicarious experiences

Social modeling occurred when a peer healthcare provider demonstrated the skill to a new learner. As trainees observed the successful sustained effort of a peer, they gained the confidence to achieve the designated skill level.²² In five of ten studies, trained midwives and nurses demonstrated neonatal skills to TBAs.^{9,10,28,30,32} In one study, with mixed healthcare providers as participants the physicians and nurses demonstrated the resuscitation skills.⁵ Matendo and Carlo most often utilized medical doctors as trainers to

demonstrate skills; yet follow up training was provided by a nurse.^{29,33} Miller and colleagues did not specify who initially demonstrated the skills, but follow up training was conducted by nurses. Daga and associates also did not specify who demonstrated the initial skills, but follow up training was conducted by medical officers, LVHs, and a health supervisor.³¹ Olson used community midwives as peer instructors and Gill also used midwives and group sessions by TBAs as peer instructors to demonstrate skills and reinforce the social modeling concept.^{28,32} Role play by peer educators was included by Gill during scenarios to reinforce the social modeling concept.²⁸ Sibley, Bang, and Bhutta utilized midwives to demonstrate the skills to the TBAs.^{10,13,27}

4.2.3 Social persuasion

Social persuasion is an influencing thought process that occurred by receiving encouragement from peers, e.g., during skill demonstration.²² Only three interventions included elements of social persuasion during group discussion in which the program trainers provided encouragement to the learners about their ability to master the resuscitation skills and to understand the rationale for learning them.^{10,28,32} Sibley's training approach consisted of three layers of training, including midwives training TBAs, and TBAs teaching pregnant women and family members.¹⁰ This approach is similar to train-the-trainer models that encourage and empower TBAs to feel respected and trustworthy as they teach pregnant women and family members. The respect gained and the feeling of trustworthiness promoted TBA confidence. Olson provided corrective feedback from peers and trainer midwives as social persuasion during demonstration of skills.²⁶

4.2.4. Somatic and emotional state

A balanced emotional state was achieved by providing a stress-free environment at the training venue. To reinforce knowledge acquisition, Gill and Sibley described informal discussions and a comfortable setting to ask questions. Although four studies¹³, ^{27,30,31,} did not hold informal discussions, the training was exclusively for TBAs, and the researchers provided a comfortable environment to ask questions. Additionally, strategies to minimize stress in the learning environment were implemented, such as using teaching materials that were appropriate to participants' literacy level, not requiring participants to read and write in order to learn a clinical skill. Training interventions conducted exclusively for TBAs or community based midwives, utilized training materials which matched the learners' baseline reading and skill level.^{28,30-32} Pictorial "Take Action" cards illustrated the skill steps of resuscitation for TBAs and served as resources for future reference.¹⁰ Pictorial flash cards and hand drawings on a cardboard are time honored teaching methods used historically in resource poor nations.³⁴ Another time honored method is a traditional teaching method of "call and response" to impart knowledge regarding concepts of neonatal resuscitation.²⁸ Using local resources that were familiar to the participants, one intervention included a "soda bottle" with a simple manometer to measure ventilation pressure during resuscitation demonstrations.²⁶ Miller and colleagues added resuscitation content to the Safe Motherhood Applied Research Training method as part of usual obstetric/newborn care.³⁰ Miller and team used hands on training with demonstrations, verbal questions, and answer sessions.³⁰ Matendo separated the TBAs and used drawings in lieu of text. Carlo modified content for "illiterate" participants, but did not describe how the content was modified to meet the learners' needs.⁹ Singhal

utilized the HBB program, which includes pictorial flip charts and a neonatal simulator for demonstrations.⁵

4.3 Cultural Appropriateness

All 10 studies took place in LMIC, where the neonatal resuscitation will be practiced and involved community leaders and participants. To address cultural appropriateness, one of the studies, marked the timeframe of using the Ramadan calendar, thus reflecting a socio-cultural strategy.³² Another study also respectful of religious traditions began the educational program with prayer to emphasize the importance of the event; thus, elevated the purpose of the training and aligned it with the community's cultural belief.²⁸ Carlo⁹ and Gill²⁸ involved the Zambian midwives to train the TBAs, while Sibley¹⁰ also used the train-the-trainer model using local nurse midwives. Two studies that involved family members to facilitate newborn care and resuscitation at home; thus reflecting constituent-involving strategy.^{10,31} The teaching material used by all ten studies was appropriate according to the linguistic strategy because it used pictorial format, except for the English written test given by the HBB program. Consistent with a peripheral strategy of cultural appropriateness described by Krueter, researchers developed pictorial flash cards and learner workbooks that participants were allowed to keep.^{5,10} Table 2 presents a summary of the application of Kreuter's five culturally appropriate strategies in the interventions. Call-and-response is another time honored traditional method of teaching. Call-and-response teaching method is defined as interaction between the speaker and the listener with emphasis on expression to communicate information.^{35,36} The communication can be expressed by

linguistic art, musical, verbal, non-verbal and through dance.³⁷ Gill and colleagues utilized the verbal call-and-response method to teach TBAs.²⁸

4.4 Evaluation of TBA training outcomes

Evaluation of effectiveness is one of the most important components of any training intervention to ensure its sustainability. The reviewed studies evaluated the training programs in three ways. Of the ten studies, three evaluated training participants' knowledge and self-efficacy by assessing pre-and post-training scores,^{5,10,32} five evaluated infant mortality rates,^{9,13,27-29} and two studies assessed both mortality rates and training scores.^{30,31} Tables 3 and 4 show teaching methods and training outcomes for each study.

4.4.1Knowledge and Skills Competency

To evaluate knowledge and skills competency for health care providers with low educational attainment can be challenging, as written questions may not be understood completely. Verbal responses to questions are alternative resource to evaluate knowledge.²⁸ Daga and colleagues evaluated teaching content by verbal response to 13 questions regarding the neonatal resuscitation and, 45 out of 46 TBAs answered the questions correctly.³¹ Sibley noted a 78% (p < 0.001) increase in knowledge from pre- to post-training performance scores in the "first action" category, which pertains to neonatal resuscitation.¹⁰ In addition, Sibley evaluated the TBAs' knowledge and performance by surveys and interviewing mothers who received their maternal child health care exclusively from the TBAs. The objective of the interview was to gather information about maternal and newborn care provided to the mothers by the TBAs. The interviews were conducted over one year. The trained TBAs who had attended educational sessions

received higher scores of 89% versus 32% for the TBAs who had not received any education. Singhal and colleagues evaluated the training program in two ways, using multiple choices and clinical skill performance. Of the multiple choice questions (in English), 54% of the trainees passed with a score of 80 or higher; while only 20% of the trainees passed the Objective Structured Clinical Examination that included scenarios needing bag and mask ventilation skill. Olson assessed knowledge competency using three multiple choice questions with verbal responses and the Objective Structured Clinical Examination cohort scored 31% (p < 0.001) higher than the control cohort. Miller reported approximately 50% higher knowledge competency scores for the intervention group cohort compared to the control group.³⁰

4.4.2 Neonatal Mortality

Two studies evaluated their respective training program by reporting reductions in neonatal mortality rates due to hypoxic events pre- and post-intervention. Bang and colleagues reported a 65% (p<0.02) reduction in the neonatal mortality rate specific to hypoxia over seven years by using a team approach of TBAs and VHW.¹³ The VHWs were taught only to take care of the newborn, while the TBAs were taught to take care of the mother.¹³ Gill and associates reported a 63% reduction in the neonatal mortality rate related to hypoxic events over two years after a training that used the time honored teaching methods of "call and response."²⁸

Four studies reported overall neonatal mortality rate. Miller reported a 22% reduction in mortality rate (p<0.05) over 19 months using the Safe Motherhood Applied Research Training. This eight-day training program which included neonatal resuscitation

has the longest duration compared to the other nine studies in the review.³⁰ Carlo conducted the Essential Newborn Care program with a simplified version of the NRP and reported a decrease in stillbirths (RR 0.69; 95% CI, 0.54 to 0.88; P < 0.003). However, no significant difference in perinatal death was noted (RR 0.99; 95% CI 0.81 to 1.22).⁹ Matendo also conducted the Essential Newborn Care program with a simplified version of NRP and noted a reduction of the neonatal mortality rate from 27 to 17 per 1000 live births over one year.²⁹ Bhutta and colleagues noted a reduction of the neonatal mortality rate from 49 to 43 per 1000 live births over two years also using a team approach with TBAs and VHWs.²⁷

4.4.3 Self-Efficacy

Self-efficacy is an important concept to evaluate in interventions where participants must learn complicated tasks requiring confidence to perform the steps in emergency situations. A widely researched concept, self- efficacy has been demonstrated to predict behavior change for various challenging tasks and to predict mastering competency in medical education.³² This review found only 3 studies that measured participants' self-efficacy or confidence level. Using a 5-point Likert scale, Olson measured self-efficacy by asking questions on the post-training survey about confidence in treating neonatal asphyxia and attempting resuscitation using the mask. Compared to controls, Olson's intervention group scored higher on self-efficacy (4.15 vs. 2.86, p <0.001). The path analysis demonstrated a positive correlation between knowledge-based results and self-efficacy; training accounted for 27% of the variance for self-efficacy scores, and 30% variance for knowledge scores.²⁶ Singhal also addressed two selfefficacy statements using a 5 point Likert scale: 1) I can use the action plan; 2) I can help

a baby breathe. These statements were embedded within 19 questions for course evaluation. The average self-efficacy scores of all participants were 4 or above on a 5-point Likert scale.⁵ Sibley did not use a self-efficacy scale questionnaire, but reported that in qualitative interviews, training participants "emphatically expressed confidence" in their knowledge and ability to apply their new skills in teaching pregnant women.¹⁰

5. Discussion

Historically, the focus of training for TBAs has waxed and waned over time. Currently, the trend is to integrate the work of TBAs with the healthcare system via linkage with facility based care and to encourage referral for neonatal complications.^{27,38} Current neonatal training practices emphasize the need to educate professionally trained health care providers. The limited numbers of healthcare professionals that are available to cover rural areas where 98% of neonatal deaths related to hypoxic events occur amplify the need to attend to a neonate in respiratory distress. This review identified 10 studies that focused on neonatal resuscitation skills training geared toward TBAs who practice in rural home-based areas. Three of the studies demonstrated a decrease in neonatal mortality rates, ranging from 22% to 65% respectively, after implementation of training for TBAs.^{13,28,30} The key components across these three studies included educational sessions that included only TBAs and knowledge content that was delivered according to their literacy level using pictorial and oral forms of teaching that were consistent in addressing the somatic and emotional states described in SCT.^{13,28,30} Two studies which utilized demonstration and pictorial form of teaching also reported decrease in neonatal mortality rate from 57 to 33³¹ and 27 to 17²⁹ per 1,000 live births. Although most TBAs have a low literacy level, they are not unintelligent; teaching

methods can be adapted to their comprehension levels using multiple visual and oral forms of presentation.²⁸

Neonatal resuscitation training currently in LMIC is based on guidelines developed by the American Academy of Pediatrics and International Liaison Committee on Resuscitation. After several reviews by the WHO³⁹ reporting persistently high neonatal mortality rates, further interventional studies were conducted using the NRP protocol modified from the above guidelines by focusing on the basic resuscitation rather than advanced skills of intubation and administration of emergency drugs.³⁸ The majority of training interventions reviewed used established programs that included Home-Based Life Saving Skills, the Safe Motherhood Applied Research and Training method, the simplified NRP from the American Academy of Pediatrics as part of the Essential Newborn Care, and Helping Babies Breathe in collaboration with American Academy of Pediatrics. Other packaged interventions included neonatal resuscitation as part of the usual essential obstetric and newborn care. These interventions provided a range of resuscitation methods from simple newborn stimulation to using mask and bag devices. Teaching methods and materials included pictorial format, group discussion, demonstration, simulation with mannequins, and traditional "call and response" teaching and learning in local languages. Because LMIC have limited resources, teaching materials must match the availability of resources in the local area. For example, slide presentations may not work because availability of electricity is limited.

Utilizing interventions that are designed to promote confidence and self-efficacy among trainees may help to enhance program effectiveness. Two studies utilized peer healthcare educators to conduct demonstrations of resuscitation skills, and time was

allotted for learners to practice new skills, which fulfilled the mastering and vicarious experience component of the SCT.^{28,32} Additionally, to complement the training program, family and community members were integrated in a team approach.¹⁰ Bang¹³ and Bhutta²⁷ also utilized the team approach with positive results; they noted a decrease in neonatal mortality rates, as indicated in Table 4. However, having two health care providers attend each home-based birth may not be sustainable; for example, in the study based in Pakistan only 24% of the births were attended by the LHWs who helped the TBAs.²⁷ As an alternative, Sibley trained family members to assist the TBAs in Ethiopia, which may be more sustainable because family members are part of the household and are regularly available.¹⁰ Sibley also asked the family members questions which evaluated the performances of TBAs. This unique evaluation approach to triangulate information across multiple data sources can be duplicated in future training programs.

Knowledge-based competencies were evaluated mostly by re-demonstrations, structured interviews, discussions, and observations through checklists, except for one study that used multiple choice questions in English. The high self-efficacy scores in this study did not match the low knowledge-based multiple choice scores (only 55% of the participants passed with a total score of greater than 80%).⁵ Limited English language was noted to be a barrier to knowledge attainment. Although Olson reported a match between self-efficacy and knowledge retention in her study, she pointed out that self-efficacy did not match with resuscitation skills when using mannequins, as occurred in prior studies by Carlo and Singhal. In a systematic review of resuscitation training in LMIC, Meaney also confirmed the notion that a mismatch between self-efficacy and knowledge retently.⁴⁰ Notably, measurement of confidence and

self-efficacy were addressed in only three of ten studies, suggesting that future programs implementing neonatal resuscitation training for TBAs with low literacy may want to consider including self-efficacy as part of the evaluation.

Learning the new concept of assessing newborn breathing as a priority, and learning the skills to assist with bag and mask ventilation, require time to practice and feel comfortable. Thus, an important intervention component is the length of the training program to teach the new intervention and to ensure knowledge transfer. The time allocated to learn is particularly important to an audience with low literacy levels; thus for this target audience, repetition is especially necessary to achieve skill mastery.

Several weaknesses were noted in the studies reviewed. None of the studies discussed the cost of the training which is an important component in an economically limited area such as the LMIC. Sustainability of the training and retention of skills by planning for refresher courses was also not addressed in the future implementation process. In LMIC, there are limited formally trained MCH care providers, however only one study involved the family members as part of the training to assist the TBAs and included the community members to facilitate the training.

Another weakness noted in one of the studies was the process of data collection. In the study conducted by Gill and colleagues, researchers were unable to observe the delivers directly and the data was collected by the birth attendants who participated in the study as trained providers. This data collection on how the neonatal resuscitation protocol was being implemented could have resulted as bias reporting. In addition the cause of the neonatal death was also recorded by the birth attendants participating in the study, which could have resulted in also as biased data.

6. Future Directions

There is a great need to increase self-efficacy to perform neonatal resuscitation by TBAs in order to decrease the gap in neonatal mortality rates in LMIC and, thus, help attain the Sustainable Development Goal #3. Addressing the immediate need to accurately perform resuscitation skills with confidence holds promise for decreasing neonatal mortality. The information presented in this integrative review on neonatal resuscitation training programs associated with an effective reduction of mortality can inform future training programs for TBAs. Based on the findings from this review, one strategy for enhancing intervention effectiveness may be to integrate the current HBB curriculum, translated into the appropriate local language, with pictorial displays⁵, traditional time honored methods 10,28 , and demonstrations by peers 10,32 , with the goal of including neonatal resuscitation skills as part of maternal and newborn care training. The self-efficacy scale utilized by Olson ³² could also be included to evaluate TBAs' confidence level for mastering resuscitation skills. Providing adequate time to practice a new skill during training may also increase confidence in performing neonatal resuscitation. In addition, to promote program effectiveness and sustainability, it may be beneficial to engage family and village members to assist the TBAs, as Sibley and colleagues included in their study.¹⁰

Future studies could expand on evaluating self-efficacy for neonatal resuscitation skills with appropriate use of local language and evidence based self-efficacy scales with established psychometrics. Cultural appropriateness could be addressed by initially "listening to the voices" of TBAs and exploring the knowledge base of neonatal assessment important to them as a priority. In particular, researchers might explore

interventions using: (a) teaching methods that TBAs prefer such as time honored "call and response"²⁸ to encourage learning and to sustain the acquisition of new knowledge; and (b) methods such as peer demonstrations used by trainers or mentors to assist TBAs with their self-efficacy and confidence to help newborns take their first breath

7. Limitation of the review

The key words used to search the databases did not include all the terms used for health care provider in LMIC. The focus of the review was geared towards traditional birth attendants, although, keywords such as village health worker, community health worker and community midwives may have expanded the search further.

8. Conclusion

Providing TBAs with tailored training in neonatal resuscitation skills with respect to their low literacy, accompanied by a supportive process to maintain their competency and increase self-efficacy, may be a useful strategy for effective service to neonates born in rural areas LMIC. Further research is needed to enhance the interventions that demonstrated the greatest effectiveness evident in this integrative review, with a focus on adding training strategies that may help to optimize intervention effect and evaluating long term sustainability of these interventions.

Conflict of interest

No conflict of interest to declare.

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Figure 1 Search strategy

Author Setting	Study design Participants	Level Of Evidence cebm.net	Intervention method	Intervention outcomes by teaching content or mortality rate	Culturally appropriate addressed	Self efficacy and competency measured	Gaps identified
Daga (1997) India	Comparison trial of before and after intervention in 3rural regions	3	TBA, LHV and family members were trained on mouth to mouth resuscitation as part of the newborn care package	Teaching content: 45 of the 46 TBAs correctly answered the two questions related to NR during 2 year follow up	Trained by local area LHV Family members	SE questions not addressed. competency questions (13)	Length of training not noted.
	TBAs (n=46)		Reorientation once a month	(Cochran Q test 3 regions 22.6, 51.8, 141.2 p = 0.05)	included in newborn care		
	Follow up after 2years						
Bang (2005)	Comparison trial of before and after intervention	3	1993 -1995 TBA alone performing mouth to mouth.	5 Mild birth asphyxia Study SE questions reduced by 60% conducted not addressed (p<0.0001) utilizing the current health care providers	SE questions not addressed.	Infrequent use of the equipment can decrease the skill level.	
India	Author focused on newborns (n=5033) delivered within		1995 – 1996 VHW observing only	asphyxia-specific mortality rate reduced by 65% (p<0.02)	as TBAs and training the village members as health workers to assist with respiratory		Presence of two people attending the birth may not be

Table 1. Neonatal resuscitation training: study design and method

Author Setting	Study design Participants	Level Of Evidence cebm.net	Intervention method	Intervention outcomes by teaching content or mortality rate	Culturally appropriate addressed	Self efficacy and competency measured	Gaps identified
	39 villages.		1996 – 2003		management if needed.		sustainable in rural areas after the study.
	Number of TBAs or VHW not noted.		TBA plus intervention trained VHW to use mask ventilation		Community consents obtained from 39 Villages leaders		Although choosing a village member may increase the accessibility of future trained workers
Sibley (2006)	Comparing women who were assisted by trained TBAs verses untrained TBAs	3	HBLSS program guided by American College of Nurse – Midwives	78% increase in knowledge from pre to post training performance scores in "first action" category (p < 0.001)	Included family members in training sessions	Confidence in knowledge and ability assessed by responses from structured	Midwives from ACNM are the trainers so the sustainability to provide initial trainers may be lacking.
Ethiopia	Trained TBAs (n=297)		education 1. HBLSS trainers 2. HBLSS guides (TBAs) 3. Pregnant women and family members		Sessions were integrated in community meetings	interview and demonstration of their teaching skills to the mother and family members	

Author Setting	Study design Participants	Level Of Evidence cebm.net	Intervention method	Intervention outcomes by teaching content or mortality rate	Culturally appropriate addressed	Self efficacy and competency measured	Gaps identified
Carlo (2010)	Comparison trial of before and after intervention Cluster randomization for	2	3 day Basic ENC training for 88 clusters in five countries. Data collected over 2 years includes 62,366 infants	Decrease in stillbirth (RR0.69; 95% CI, 0.54 to 0.88; P < 0.003)	Rural areas setting Content modified for "illiterate"	SE not addressed	Does not mention if TBAs were separated for training
Argentina,	additional NRP training of		Followed by	No significant	participants		Number of trainee participants not
Guatemala Congo	TBAs Midwives		additional NRP training	difference in neonatal or perinatal death			given
India, Pakistan	Nurses Physicians			(RR 0.99; 95% CI 0.81 to 1.22)			Re-enforcement training not provided over 2 years
Matendo (2011) Congo	Cluster randomized trial secondary analysis. Before and after ENC intervention with NRP	2	Phase 1. Neonatal mortality rate recorded before and after ENC intervention training Phase 2. Cluster randomized	Following ENC training. Decline in neonatal mortality from 27 to 17 per 1000 live births. RR 0.60, 95% CI 0.39- 0.93	Rural area setting included in the setting at hospitals, health clinics, and homes.	SE questions not addressed	The birth attendants who implemented the intervention collected data. Although under close supervision of community
Congo			Cluster randomized trial by adding NRP				community

Author Setting	Study design Participants	Level Of Evidence cebm.net	Intervention method	Intervention outcomes by teaching content or mortality rate	Culturally appropriate addressed	Self efficacy and competency measured	Gaps identified
	TBAs (n=152)		training with ENC	No difference noted	Medical		coordinators.
	Nurse midwives and nurses (n=18)			with additional NRP training	doctors trained the TBAs in separate		
	× ,				workshops		
Bhutta	Cluster	2	Control: TBA	Reduced neonatal	Rural	SE questions	It is not clear if
(2011)	randomized trial		received basic	mortality rate from 49	community	not addressed	the LHW
(2011)			newborn care	to 43 per 1000 live	based		actually
			training with their	births	program.		delivered the
	16 cluster		delivery				just present to
	villages in each group of control and intervention		Intervention: LHW received basic newborn care training plus mouth		All material provided in local language.		provide newborn care while the TBAs delivered the
Pakistan	Intervention:		to mouth		Local		noted I HW
	LHW		resuscitation skills. Other intervention		community and public		noted LHW were able to attend only 24%
	(n=437)		package included prenatal care and		sector		of newborns within the
	Control:		post natal visits.		the		assigned cluster
	TBAs only				intervention		villages.
	(n = not available)				package dissemination		40 % of the delivers were facility based in

Author Setting	Study design Participants	Level Of Evidence cebm.net	Intervention method	Intervention outcomes by teaching content or mortality rate	Culturally appropriate addressed	Self efficacy and competency measured	Gaps identified
							both group village clusters
							Complete home-based delivery assessment is not available.
Gill (2012)	Prospective, cluster randomized	2	Control –using basic standard care with delivery kits	Reduction of neonatal mortality from 19.9 to 7.8/1000 births with intervention	Based in rural community	Self efficacy was evaluated during role	Checklist performance of NR skills to
Zambia	TBAs (n=127)		Intervention: training modified version of NRP, with facility referral for signs of maternal sepsis	Birth asphyxia related deaths reduced by 63%.	Study started with local public community ceremony.	scenarios	post training may have provided quantitative data.
			Over two years		Consent in local language		Pre and post Self efficacy verbal questions or interviews
					Training started with		would have increased the strength of the

Author Setting	Study design Participants	Level Of Evidence cebm.net	Intervention method	Intervention outcomes by teaching content or mortality rate	Culturally appropriate addressed	Self efficacy and competency measured	Gaps identified									
					prayers and greeting ceremony with traditional song and dances.		study.									
Miller (2012)	Cluster randomized	2	Safe Motherhood Applied Research and Training (SMART.) Dai	Perinatal mortality at interventions site reduced by 22% (p<0.05)	Based in rural communities	Skills competency was derived	The data collectors who interviewed the all the TBAs									
	TBAs trained (SMART) Dat method	method	() (000).	Local LHV	response to	with knowledge										
Pakistan	(n=277)		Control: Untrained TBAs	Mean post test scores for 19 item	trained to conduct interviews.	and demonstration	and demonstration	and demonstration	and demonstration	and demonstration	and demonstration	and demonstration	and demonstration	and demonstration	and demonstration	test were not blinded.
	Untrained TBAs		Intervention: TBAs trained with SMART	knowledge base, were higher for trained		Self efficacy was not										
	(n=257)		prog	program.	TBAs15.7 compared to 9.4. (p<0.01)	The material taught in the	was not conducted using scale; however									
			Study over 19 months		language	TBAs were noted to be										
				Perinatal mortality decrease by 22% (p<0.05) in		more responsive to birth asphyxia signs and										

Author Setting	Study design Participants	Level Of Evidence cebm.net	Intervention method	Intervention outcomes by teaching content or mortality rate	Culturally appropriate addressed	Self efficacy and competency measured	Gaps identified
				community based-		referred the	
				intervention areas		patient to a facility.	
Singhal	Pilot comparison		Helping Babies	Trainee scores	All training in	22 item	TBAs included
(2012)	study.	3	Breathe (HBB)	improved.	English	program evaluation	with the formally trained
Learners trai (n=102) Kenya and Pakistan Physicians			Program developed	Passing scores pre 2% to post 54%.	All education	survey. Self- efficacy	health care providers. Although their literacy level is low.
	Learners trained (n=102)		Program developed according to NRP guidelines from AAP.	(p< 0.001).	level participants received the	questions embedded within. Scale	
	Physicians		Train the trainer	Overall low information Bag/mask checklist together.	information together.	item from 1-5	
	Nurses		model	performance	From		One day
	Midwives				LHV	self-efficacy	too short to
	CBA					response	acquire a new
	LHW		Knowledge tested with and skill			between	SKIII.
			assessments tested with pre and post test			4.6 to 4.7	
	Facilitators		····· ··· ··· · · ··· · · · ···				
	trained (n=31)					High Self- efficacy	
						results did not match the low	

Author Setting	Study design Participants	Level Of Evidence cebm.net	Intervention method	Intervention outcomes by teaching content or mortality rate	Culturally appropriate addressed	Self efficacy and competency measured	Gaps identified
						skills performance test.	
Olson (2015)	Retrospective cohort analysis Community based midwives	3	Control : CBM with usual education Intervention: received additional training with PPV devices	Path analysis The intervention cohort showed greater level of SE (0.52) and knowledge	Based in rural communities. 84% of the delivers	SE measured using 5 point Likert scale	Clear education background of CBM not noted.
Indonesia	(n=348)		(Bag/ Mask or Mask/tube device)	SE rated 4.15 for intervention cohort and 2.86 for control cohort.	occurred at home. Teaching material respecting low		
				Knowledge score 31% higher for interventional (p<0.001) No significant relationship between knowledge and PPV attempts	Religious reference of 10-12 months Ramadan to Ramadan utilized to mark the time		

Author Setting	Study design Participants	Level Of Evidence cebm.net	Intervention method	Intervention outcomes by teaching content or mortality rate	Culturally appropriate addressed	Self efficacy and competency measured	Gaps identified
					frame		

Abbreviations:

CHW- Community Health workers

ENC – Essential Newborn Care

HBLSS – Home based Life Saving Skills

LHW – Lady Health Workers

NRP – Neonatal Resuscitation Program

TBA- Traditional Birth Attendant

VHW – Village Health Worker

Table 2. Implied self-efficacy and culturally appropriate components

Key: $1000000000000000000000000000000000000$	ed in the st	tudy.	ND Not des	cribed in the stu	udy					
Intervention components	Daga (1997) India	Bang (2005) India	Sibley (2006) Ethiopia	Carlo (2010) Argentina, Guatemala Congo, India, Pakistan	Matendo (2011) Congo	Bhutta (2011) Pakistan	Gill (2012) Zambia	Miller (2012) Pakistan	Singhal (2012) Kenya Pakistan	Olson (2015) Indonesia
Self- efficacy components										
Mastering experiences	V	V	V	V	٧	V	V	V	V	V
Social model	٧	V	٧	٧	V	V	٧	٧	٧	٧
Social persuasion	ND	٧	V	ND	ND	V	V	V	V	V
somatic and emotional state	ND	٧	V	V	V	V	V	V	ND	V
Cultural appropriateness										
Socio-cultural	٧	V	V	V	V	٧	٧	V	V	V

Intervention components	Daga (1997) India	Bang (2005) India	Sibley (2006) Ethiopia	Carlo (2010) Argentina, Guatemala Congo, India,	Matendo (2011) Congo	Bhutta (2011) Pakistan	Gill (2012) Zambia	Miller (2012) Pakistan	Singhal (2012) Kenya Pakistan	Olson (2015) Indonesia
Constituent - involving		V	V	Pakistan √	ND	V	V	V	ND	ND
Linguistic		٧	٧	V	٧	٧	V	٧	ND	v
Evidential		ND	ND	V	ND	ND	ND	ND	ND	ND
Peripheral		٧	٧	V	V	V	V	٧	V	٧

Table 3. Teaching and evaluation methods

	Daga	Bang	Sibley	Carlo	Matendo	Bhutta	Gill	Miller	Singhal	Olson
		(2005)		(2010)			(2012)			(2015)
	(1997) India	India	(2006)	Argentina,	(2011)	(2011)	Zambia	(2012)	(2012)	Indonesia
	muia		Ethiopia	Guatemala	Congo	Pakistan		Pakistan	Kenya Pakistan	
				Congo					i ukistun	
				India, Pakistan						
Teaching methods										
Demonstration										
Mannequins or dolls	ND		V	\checkmark	V		V	V	\checkmark	
Hands on practice	ND			\checkmark	V				\checkmark	\checkmark
Pictures	ND	ND		ND	\checkmark	ND		λ		
	Daga	Bang	Sibley	Carlo	Matendo	Bhutta	Gill	Miller	Singhal	Olson
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		(2005)		(2010)			(2012)			(2015)
	(1997)	India	(2006)	Argentina,	(2011)	(2011)	Zambia	(2012)	(2012)	Indonesia
	India		Ethiopia	Guatemala	Congo	Pakistan		Pakistan	Kenya	
				Congo					Pakistan	
				India, Pakistan						
Verbal answer and question						\checkmark		\checkmark		
Written material	ND	ND	ND	ND	ND	ND	ND			ND
Competency evaluation										
Written test	ND	ND	ND	ND	ND	ND	ND			ND
				1						
Verbal response to questions			V	N	N	V		N	\mathcal{N}	\mathcal{N}
Re-demonstration										

Author Setting Study duration	Categories of health care providers. Trainers and participants Training duration	Teaching methods and materials	Evaluation method	Outcomes
Daga	Trainers	Teaching Methods	Knowledge	Knowledge
(1997)	Medical officers	Demonstrations with oral questions. Mouth to mouth resuscitation taught as part of	Knowledge base verbal questions Re-demonstrations	45 of the 46 TBAs correctly answered the two
India	Participants	newborn care. Re-orientation Once a month	Re-evaluation after 2 years.	questions related to NR during 2 year follow up
	TBAs – no formal			duning 2 year tonow up
	training	<u>Teaching Materials</u>	<u>Mortality</u>	
2 years	(n=46)	Photograph album used to show "do's and don'ts	Medical officers and LHV maintained all the delivery and	Mortality Rate Decrease from 57.1 to
	<u>Duration</u> Length of training		newborn records.	33.6/ per 1000 live births
	not described		<u>Self-Efficacy</u> Implied in teaching methods	
Bang	Trainers	Teaching Methods	Knowledge	Knowledge
(2005)	Not described	Team approach of TBAs and VHWs. VHW took care of the newborn while the TBAs	Not described.	Not described
	Participants	took care of the mother.	Mortality	Mortality Rate
India	TBAs	TBAs were taught mouth to mouth	VHWs recorded all the home-based	Mild birth asphyxia
	VHWs	resuscitation for newborns in addition to safe hygienic deliver.	pregnancy, delivery and newborn care.	reduced by 60% (p<0.0001)
	<u>Training duration</u> 3 days	VHW were taught only newborn care with mask ventilation technique in addition to data collection of pregnant women (pre-during –post	All the records were reviewed and data entered by neonatologist.	asphyxia-specific mortality rate reduced by 65%
8 years		delivery).	<u>Self-Efficacy</u>	(p<0.02)
	Authors did not provide numbers of	Re-orientation every 2 months.	Implied in teaching methods	
	participants but	Teaching Material		
	focused on 39	A 17 step of assessment and management of		
	villages attended.	birth asphyxia.		
	-	Dummy dolls were used to practice bag and mask ventilation.		

Table 4. Intervention components influencing dissemination of neonatal resuscitation skills and outcomes

Author Setting Study duration	Categories of health care providers. Trainers and participants Training duration	Teaching methods and materials	Evaluation method	Outcomes
Sibley	Trainers	Teaching Methods	Knowledge	Knowledge
(2006)	-Midwives from	HBLSS program developed by ACNM.	Evaluation of TBAs by using re-	78% increase in knowledge
	American College	Consisted of three priority topics for MCH care	demonstrations, observations and	from pre to post training
	of Nurse-Midwives.	"First action "topic included newborn stimulation	skills checklist for each priority	performance scores in
Ethionia	-Mildwives from Ethiopian Ministry	for breathing. Role play, demonstrations and discussions	topics.	(p < 0.001)
Eunopia	of Health	TBAs were trained for MCH using the HBLSS	post training	0.001).
	- Nurses from local	program.	Mothers were interviewed to see	Mortality Rate
3 years	hospitals.	TBAs relayed the knowledge to the pregnant	how the TBAs performed during the	Not described
		women and their families with one-to-one session	delivery and newborn care.	
	Participants	and general community meetings using pictorial		
	TBAs (n=297)	cards.	<u>Self-Efficacy</u>	<u>Self-Efficacy</u>
		Team approach between TBAs and family	Interviews conducted – expressing	Not statistically described.
		members Teaching Materials	teach mothers and hold community	
		Pictorial "Take Action" cards	teaching session	
Carlo	Trainers	Teaching Methods	Knowledge	Knowledge
(2010)	Physicians	ENC program training followed by additional	Participants' knowledge evaluation	Not described
× ,	Nurses	NRP training to intervention cohort.	after training was not described.	
Argentina,		In-depth hands-on training in basic knowledge		
Guatemala	Participants	and skills of resuscitation, including initial	<u>Mortality</u>	<u>Mortality</u>
Congo	Physicians	steps in resuscitation and bag-and-mask	Master trainers (Physicians and	Decrease in stillbirth
India,	Nurses	ventilation	nurses) were trained in data	(RR0.69; 95% CI, 0.54 to
Pakistan	Midwives	Mandhla asiafa an ant tasiain a	collections to differentiate between	0.88;
	IBAS (number of	Monthly reinforcement training	sumption and early neonatal deaths	P < 0.003)
	narticipants not	Teaching Material	rates and Angar scores) to classify	No significant difference in
	given)	Bag and Mask ventilation demonstration	mortality rates.	neonatal or perinatal death
	<i>o</i> · · · · · · · · · · · · · · · · · · ·		· · ··································	(RR 0.99;
			<u>Self-Efficacy</u>	95% CI 0.81 to 1.22)
2 years	3 day training		Implied in teaching methods	

Author Setting Study duration	Categories of health care providers. Trainers and participants Training duration	Teaching methods and materials	Evaluation method	Outcomes
Matendo (2011)	<u>Trainers</u> Physicians Nurses	<u>Teaching Methods</u> ENC program training followed by additional NRP training to intervention cohort. In-depth hands-on training in basic knowledge	Knowledge Participants knowledge evaluation after training was not described	<u>Knowledge</u> Not described <u>Mortality</u> Following ENC training,
Congo	Participants TBAs (n= 152) Nurses and midwives (n=18)	and skills of resuscitation, including initial steps in resuscitation and bag-and-mask ventilation. Monthly reinforcement training	<u>Mortality</u> Master trainers (Physicians and nurses) were trained in data collections to differentiate between stillbirth and early peopatal deaths	decline in perinatal mortality (50 to 40 per 1000 births. RR 0.8, 95% CI 0.66- 0.97 No difference noted with additional NRP training
2 years	3 day workshop	<u>Teaching Material</u> Separate workshop was conducted for TBAs using drawings in lieu of text. Practical hands on skills were taught with mannequins for bag and mask ventilation.	and clinical assessments (fetal heart rates and Apgar scores) to classify mortality rates.	
Rhutto	Trainars	Teaching Matheda	Knowledge	Knowledge
(2011)	Physicians Nurses	Team approach of TBAs and LHWs. TBAs received basic newborn care. LHWs received training for prenatal care and	Participants' knowledge evaluation after training was not described.	Not described
Pakistan	<u>Participants</u> LHW (n=437) TBAs	newborn mouth to mouth resuscitation.	Mortality 13 independent teams trained to collect data regarding births,	Mortality Reduced neonatal mortality rate from 49 to 43 per 1000
2 years		<u>Teaching Materials</u> Specific teaching materials for neonatal resuscitation training not described.	newborn referrals, and verbal autopsy of neonatal deaths.	live births. RR 0.85, 95% CI (0.76- 0.96)
			Implied in teaching methods	
Gill	Trainers	Teaching Methods	Knowledge	<u>Mortality</u>
(2012)	Physician	NRP program simplified from 14 to 4 steps	Re-demonstration of skills	Reduction of neonatal
Zambia	Zambian Midwives	eliminating the advanced skills of using oxygen and resuscitation drugs.	Mortality	mortality from 19.9 to 7.8/1000 births with
	Participants TBAs (n=127)	I raditional teaching method "call and response" with question and answer in unison.	16 data collectors were trained to follow all TBAs and record the	intervention. Birth asphyxia related

Author Setting Study duration	Categories of health care providers. Trainers and participants Training duration	Teaching methods and materials	Evaluation method	Outcomes
2 years	5 days workshop.	 TBAs given opportunity to stand and explain a given concept. Role play of taking infant to the facility. Refresher 2 day training provided every 3-4 months <u>Teaching Materials</u> Use of pictorial laminated cards in local language Practice skills using mannequins, bulb syringes, and masks for ventilation. 	births by visiting the mothers. The delivery records and verbal autopsy reviewed by neonatologist for data entry <u>Self-Efficacy</u> Implied in teaching methods	deaths reduced by 63%.
Miller (2012)	<u>Trainers</u> Nurses <u>Participants</u>	<u>Teaching Methods</u> SMART program includes care during prenatal, delivery, postpartum and neonate plus referral process.	<u>Knowledge</u> Structured questionnaire by interviews after recent delivery Correct verbal response on each	Knowledge Mean post test scores for 19 item knowledge base, were higher for trained
Pakistan	TBAs (n=545) 8 day training	Demonstrations of mouth to mouth resuscitation 19 item knowledge base questions administered verbally using interviews before and immediate after training and follow up after 19 months. Structured	skill. 19 item knowledge base questions administered verbally using interviews before and immediate after training and follow up after 19	TBAs15.7 compared to 9.4. (p<0.01) untrained TBAs
3 years		<u>Teaching Materials</u> Neonatal mannequins	months. <u>Mortality</u> Not described <u>Self-Efficacy</u> Implied in teaching methods	Mortality Perinatal mortality decrease by 22% (p<0.05) intervention areas
Singhal	Trainers	Teaching Methods	Knowledge	Knowledge
(2012)	Physicians Nurses	HBB program focuses on "The Golden Minute" for neonatal respiratory care Uses train the trainer model.	16 item written /verbal multiple choice questions with pre and post test.	54% passed the knowledge based questions. 15% passed the Bag and
Kenya and	Participants		Skills for bag and mask tested with	mask skill test
Pakistan	Physicians	Teaching Materials	12 step checklist.	

Author Setting Study duration	Categories of health care providers. Trainers and participants Training duration	Teaching methods and materials	Evaluation method	Outcomes
Kenya 1.5 days training Pakistan 1.day training	Nurses Midwives Community Birth Attendants Lady Health Volunteers	Pictorial chart of resuscitation algorithm Learner workbook for training and future use. Pictorial flip charts. Neonatal simulator Bag /mask for ventilation and bulb suction	Scenario based assessment by objective structured clinical examination OSCE A for newborn assessment OSCE B for bag/mask ventilation	<u>Self-Efficacy</u> 100% response range high between 4.6 to 4.7
uannig			Mortality Not described	
			<u>Self-Efficacy</u> Focus group semi-structured interviews to evaluate the program perception, structure, content, material and assessment tools with 22 item questions 5 point Likert scale	
Olson (2015)	<u>Trainers</u> Midwives	<u>Teaching Methods</u> Interactive lectures	<u>Knowledge</u> Evaluation by 44 survey questions	Knowledge score 31%
Indonesia	Participants Community based midwives	Observation learning by repeated modeling of resuscitation steps Hands on practice with mannequins and PPV Resuscitation scenario with corrective feedback Observed structured clinical exam	and verbal in locallanguages, 12 months after training.3 knowledge base questions	(p<0.001)
	3 hour training	Simulation pressure breaths with "soda bottle" water manometers	Survey included personal education, training, resuscitation attempts using PPV	between knowledge and PPV attempts.
1 year		<u>Teaching Materials</u> Pictures and graphic described methods for neonatal resuscitation Mannequins Bag and mask	Mortality Not described	
		Simulation pressure breaths with "soda bottle"	<u>Self-Efficacy</u>	<u>Self-Efficacy</u>

Author Setting Study duration	Categories of health care providers. Trainers and participants Training duration	Teaching methods and materials	Evaluation method	Outcomes
		water manometers	Confidence in treating birth asphyxia with 5 point Likert scale	SE rated 4.15 for intervention cohort and 2.86 for control cohort.
			Survey included personal education, training, resuscitation attempts using PPV.	

Abbreviations:

- CHW- Community Health workers
- ENC Essential Newborn Care

HBLSS – Home based Life Saving Skills

LHW – Lady Health Workers

LHV - Lady Health Visitors

NRP – Neonatal Resuscitation Program

TBA- Traditional Birth Attendant

VHW – Village Health Worker

Manuscript 2

Self-efficacy measurement instrument for neonatal resuscitation training: An integrative review

Authors

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Abstract

Objectives: Resuscitation self-efficacy refers to neonatal health care providers' perceptions of their capability to implement resuscitation steps correctly, with confidence, and in a timely manner during an emergency situation. This integrative review aims to synthesize the literature and critique the current state of evidence in order to guide appraisal and adaptation of instruments that measure self-efficacy in neonatal resuscitation training programs for providers in low-and middle-income countries who have low literacy levels.

Design: Integrative literature review guided by the methods of Whittemore and Knafl. **Data Sources**: The following electronic databases were searched for relevant studies from 1980 to 2016: PubMed, CINAHL, SCOPUS, PyscINFO, and ERIC. Respective reference lists of relevant publications were also examined.

Review Methods: The search revealed 216 publications of which seven met the inclusion criteria as they (a) addressed pediatric and neonatal resuscitation training, (b) included instrument that measured self-efficacy related to resuscitation skills and (c)reported validity and reliability of the self-efficacy instrument, and . One of the seven publications included two instruments; altogether, eight instruments measuring self-efficacy for performing neonatal resuscitation were included in the current analysis. Data extracted from individual studies included theoretical framework, study location by country, instrument description and scoring, reliability and validity, and self-efficacy measurement outcomes. The methodological quality of the studies was assessed using the 2011 Oxford Center for Evidence Based Medicine Levels. The data analysis consisted of

synthesizing findings to guide recommendations on the suitability of existing instruments for low-and middle-income countries.

Results: Six of eight self-efficacy instruments reported utilizing Bandura's Social Cognitive Theory and the self-efficacy constructs, while two of the eight instruments implied the use of self-efficacy. Most of the instruments reported acceptable internal consistency as Cronbach's alpha values that ranged from 0.74 to 0.98 for reliability. Five out of eight instruments were used in low- and middle-income countries.

Conclusion: A valid and reliable self-efficacy instrument is a necessary antecedent to evaluating the effectiveness of a neonatal resuscitation training program. The two self-efficacy instruments using Visual Analog Scale can be considered for community-based midwives and traditional birth attendants in low- and middle-income countries due to the ease of implementing the simple visual instrument.

Keywords: neonatal, pediatric resuscitation, self-efficacy, low- and middle-income countries

1. Introduction

Globally, approximately 25% of the 2.6 million neonatal deaths per year are caused by a hypoxic event at the time of birth.^{1,2} A hypoxic event requires immediate neonatal resuscitation, within one minute of birth, to save the newborn's life and prevent long term complications associated with low oxygen levels.³ The neonatal mortality rate (NNMR) in low- and middle-income countries (LMIC) ranges from 27 to 47 deaths per 1000 births, while in USA the rate is 4 per 1,000 births. Because the global decrease in NNMR reported in 2015 did not reach the targets established through Millennium Development Goal (MDG) #4,⁴⁻⁶ new targets have been established through Sustainable Development Goal #3 to decrease the NNMR in developing nations to 12 deaths per 1,000 births by 2030.^{17,8}

The World Health Organization (WHO), in partnership with the American Academy of Pediatrics, developed guidelines with simple procedures such as stimulating the newborn or assisting the neonate to breathe using a mask and bag device that can revive the newborn.⁹ These basic neonatal resuscitation guidelines are included in the Neonatal Resuscitation Program (NRP).¹⁰ A program called Helping Babies Breathe (HBB) has developed teaching curricula for low resource countries based on the NRP and WHO guidelines.¹¹ However, the neonatal mortality rate in LMIC remains high despite the initiation of programs to improve the delivery of neonatal resuscitation.

Although neonatal resuscitation skills can be simple to perform, the knowledge base and critical thinking to recognize and initiate the procedure can be challenging for health care providers in LMIC, in particular, community-based midwives and traditional birth attendants with limited formal education. Self-efficacy is a widely researched

concept that reflects behavior change in learning new knowledge and predictor of willingness to perform a task.¹² Validated instruments to assess self-efficacy in performing neonatal resuscitation skills have been used in studies of training programs for physicians and nurses. However, few studies to date have included community-based midwives and traditional birth attendants, who have limited formal education and often provide most of the rural maternal-child care in LMIC. Thus, a significant research gap exists. A better understanding of existing validated instruments that measure self-efficacy related to neonatal resuscitation is however needed, before researchers can assess and evaluate neonatal training programs for community-based midwives and traditional birth attendants in LMIC.

2. Aim

The aim of this review is to examine, critique, and synthesize the literature on instruments to measure healthcare providers' self-efficacy in neonatal resuscitation training programs in LMIC. The results of this review may serve as the basis for using or adapting an existing validated scale for new programs to train community-based midwives and traditional birth attendants in LMIC.

3. Theoretical Framework

Bandura's Social Cognitive Theory (SCT) provides the theoretical framework for assessing strategies and outcomes related to promotion of self-efficacy in neonatal resuscitation training programs.¹³ Figure 1 illustrates the four components of self-efficacy related to neonatal resuscitation. The SCT focuses on how individuals acquire thoughts and behaviors that are appropriate to their social context and circumstances.¹⁴ According to SCT, self-efficacy is the personal capability to perform an action that leads to a necessary outcome.¹³ Increased self-efficacy can reduce learner anxiety and promote skill

mastery, versus avoiding the instructional situation entirely.¹⁵ Self-efficacy is an important factor in skill learning, performance, and transmission. For the purposes of this integrative review, self-efficacy during neonatal resuscitation refers to, a provider's ability to learn, and confidently initiate and perform essential resuscitation skills efficiently and correctly, as well as the ability to direct others to perform those skills successfully if necessary.¹⁶ Neonatal resuscitation requires immediate recognition and action to rescue the newborn within the first minute of life.³ Therefore, self-efficacy influences the health care provider's ability to initiate and perform the resuscitation in timely manner.¹⁷

4. Design and Method

This integrative review, guided by the five stages of Whittemore and Knafl method, includes: 1) problem identification, 2) literature search, 3) data evaluation, 4) data analysis and 5) presentation.¹⁸ This method enabled the researchers to examine, critique, and synthesize selected research literature.

4.1. Literature search

We searched the literature for publications from 1980 to 2016 and broadly included any study that reported psychometric properties of instruments measuring selfefficacy for performing neonatal or pediatric resuscitation conducted in low-and middleincome to high-income countries. A three-phased search strategy was employed. In the first phase, the investigators searched the following electronic data bases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), ERIC PubMed, PsycINFO, and SCOPUS using keywords such as resuscitation, self-efficacy, and measurement instruments. The second phase was refined by Boolean search to combine keywords such as resuscitation training AND self-efficacy, resuscitation education AND healthcare provider.

4.2. Inclusion and exclusion criteria

The inclusion criteria for this integrative review were as follows: original studies about resuscitation programs for neonatal or pediatric care that included a self-efficacy instrument as well as information about the instrument's validity and reliability. Publications that focused on training for adult resuscitation, trauma resuscitation, or advanced pediatric lifesaving were excluded.

4.3. Search results

A total of 212 publications were retrieved after removing duplicates. Figure 2 depicts the search strategy, along with the number of publications initially retrieved and retained at each stage of the search. Titles and abstracts were examined and after application of exclusion and inclusion criteria, 12 publications were retained for full text review. Four additional publications were added from the reference list of publications retained for review. Of these 16 publications, nine were excluded after full text review as they were not original studies that reported validity and reliability information for the self-efficacy instrument. Seven publications were retained that reported reliability and validity for neonatal and pediatric resuscitation training programs. Of those seven publications, one reported findings on two self-efficacy instruments. Thus, a total of eight self-efficacy instruments and their application in the seven selected studies were evaluated in this review.

4.4 Analysis and assessment of methodological quality

Table 1 provides details about the characteristics of the eight instruments used in the seven studies selected for the review. Each study and the associated instruments were assessed for the following elements: application of theoretical framework in the selfefficacy instrument, sample and setting including health care providers of interest and their practice site, study location, description and scoring of self-efficacy instrument, reliability and validity of self-efficacy instrument, designated outcomes, and level of evidence.

To evaluate the level of evidence of the reviewed studies, we applied the 2011 Oxford Center for Evidence Based Medicine (CEBM) Levels of Evidence (LOE) criteria.¹⁹ The CEBM LOE range from 1-5 based on whether the study was a systematic review, randomized controlled trial, cohort study, case study, or other forms of empirical reasoning respectively. All manuscripts that met the inclusion criteria regardless of methodological quality were retained in order to examine existing instruments that measure self-efficacy for performing neonatal resuscitation and the context in which they were used.¹⁸

5. Findings

5.1. Brief description of instruments and application

Of the eight self-efficacy instruments, described below, three instruments were used in high-income countries (USA and the Netherlands),^{15,20,21} the other five were used in the LMIC of Ghana, Indonesia, Kenya, Pakistan, and Zambia respectively.^{3,17,22,23} These instruments were administered in training programs in nations with diverse economic resources. Each instrument is presented as part of a study conducting neonatal resuscitation training and utilizing the self-efficacy instrument pre and post training

sessions to evaluate effectiveness of program. Singhal and colleagues did not break down health care providers into categories, such as nurses, physicians' midwives, lady health workers and community birth attendants for their 102 participants.³ Across all studies, except for one by Singhal and colleagues, which did not report participant numbers by categories of providers, the sample of 1,143 healthcare workers participated. The participant categories included nurses (11%) midwives (11%), paramedics (19%), community based midwives (30%), and physicians (15%); thus, instruments used in a diverse range of health professionals established the basis for assessing the eight instruments.

1. Pediatric Skill Survey (PSS)

The Pediatric Skill Survey (PSS) self-efficacy instrument, a 24-item Likert scale instrument, was utilized to measure perceived self-efficacy of paramedics (N=212). Youngquist and colleagues used this instrument in the USA based study.¹⁵ This instrument was previously validated by Craven and Froman for pediatric nurses' selfefficacy related to airway management.²⁴ Reliability was reported with Cronbach's alpha of 0.98.²⁴

2. Crisis Response Management (CRM)

The Crisis Response Management (CRM) self-efficacy instrument, a 24-item Likert scale instrument, was used to measure the self-efficacy of pediatric residents, fellows, and faculty (N= 125). ²⁰ Plant and colleagues adapted instruments previously used to assess aviation Crisis Resource Management (CRM) skills in American pilots by adding a self-efficacy component to assess pediatric resuscitation skills.²⁰ The factor

analysis of four domains include situation awareness, team management, environment management and decision making, the Cronbach's alpha ranged from 0.77 to 0.91.²⁰

3. Visual Analog Scale (VAS)

The Visual Analog Scale (VAS) self-efficacy instrument, with 61 items and 4 domains for comprehensive resuscitation training, was used to assess the self-efficacy of physicians, nurses, and medical students (N=115). A robust construct validity was provided by reporting a multi–trait, multi-method matrix (MTMM) of correlations between self-efficacy survey data for resuscitation skills and data from the Visual Analog Scale. This instrument was used to study the outcome of the training interventions in Netherlands by Turner and colleagues.²¹ The Cronbach's alpha for each domain was as follows: Overall resuscitation 0.77, Cardiac massage 0.95, Bag/mask ventilation 0.98, and Intra-osseous device 0.98.

4. Self-Efficacy in Pediatric Resuscitation Overall Questionnaire-Revised (SEPRQ-R)

The Self-Efficacy in Pediatric Resuscitation Overall Questionnaire-Revised (SEPRQ-R) instrument, a 7-item VAS was used to assess overall pediatric resuscitation self-efficacy for nurses (N=41). A panel of experts in pediatric resuscitation validated the content.²² This instrument was revised from Turner's study and adapted for LMIC in Ghana. Cronbach's alpha reported was 0.77.²²

5. Self-Efficacy in Bag and Mask Ventilation Questionnaire-Revised (SEBMVQ-R)

The Self-Efficacy in Bag and Mask Ventilation Questionnaire-Revised (SEBMVQ-R) instrument, a 12-item VAS was used to assess bag/mask/ventilation selfefficacy for nurses (N=41). The content was validated by a panel of experts in pediatric resuscitation.²² This instrument was revised from Turner's study and adapted for LMIC in Ghana. Cronbach's alpha reported was 0.93.²²

6. Neonatal Resuscitation Program (NRP)

The Neonatal Resuscitation Program (NRP) self-efficacy instrument, a 14-item Likert scale was used to measure perceived self-efficacy in neonatal airway management training of nurse midwives (N= 127). This instrument was validated by a panel of experts from the American Academy of Pediatrics for use in Zambia, a LMIC. Internal consistence Cronbach's alpha reported self-efficacy as pre training = 0.90, post training = 0.84, and six months post training = 0.8.²³

7. Helping Babies Breathe (HBB)

The Helping Babies Breathe (HBB) self-efficacy instrument, with 2 self-efficacy questions embedded in a 22-item evaluation, was used to assess the neonatal resuscitation self-efficacy of physicians, nurses, midwives, and community health workers (N=102). This instrument was validated by a Delphi panel of experts from the American Academy of Pediatrics. This instrument was studied in two LMIC, Pakistan and Kenya. Reliability was not reported.³

8. Positive Pressure Ventilation (PPV)

The Positive Pressure Ventilation (PPV) self-efficacy instrument, used 1 item to assess the attempts to use the device by community based midwives (N=348). The validity of the instrument was not reported, although the training program was based on the modified NRP guidelines by American Academy of Pediatrics. This instrument was studied in Indonesia, a LMIC. ¹⁷

5.2. Use/Application of Theory

Self-efficacy is a core concept of SCT¹⁴ and a well-researched concept to show predictor of future behavior that is valuable in performing neonatal resuscitation.¹⁷ Self-efficacy influences confidence in one's ability to initiate resuscitation as well as preparedness to teach others to perform skills and behaviors successfully, thus it is important to measure as an outcome of training.¹⁴ Six out of 8 instruments in the current review demonstrated application of Bandura's SCT for self-efficacy.^{15,17,20,21,22}

In describing VAS for self-efficacy, Turner, defines self-efficacy as a taskspecific predictor of behavior and integrates the four constructs of SCT that influence behavior in learning resuscitation skills.²¹ The four influences are outlined as (a) vicarious experience by modeling and demonstrating the skill by health care providers of similar education level making the person likely to attempt a skill, (b) mastering skills by persistent practice, (c) social persuasion by verbally persuading the health care provider's capabilities to perform the skill, and (d) somatic and emotional state to decrease stress during performance of skills. Brennan also addresses these four influences while describing SEPRQ-R and SEBMVQ-R.²² Brennan modified Turner's VAS instrument for LMIC nurses by deleting the domain components which included higher level skills, such as intubation, intra-osseous device placement and cardiac massage. This modification reduced the number of items from 61 to 7 for the SEPRQ-R and 12 for the SEBMVQ-R.

Youngquist described self-efficacy for the PSS instrument as individuals' judgment of their capability to perform a skill and refers to skill mastery that can reduce anxiety to perform the skill. Use of SCT is evident, but the four constructs of SCT are not

described as part of the instrument construction.¹⁵ The CRM instrument developed by Plant and colleagues referred to Bandura's SCT and defined self-efficacy as an individual's confidence in his ability to perform a skill. He further includes initiation of behavior, effort expended, and persistent behavior in spite of challenges to measure performance of resuscitation.²⁰ Olson using the PPV instrument describes self-efficacy as an individual's belief to be competent in a specific behavior or ability and further references SCT to describe one's willingness to perform a task as stronger predictor of behavior outcomes.¹⁷ Olson also emphasizes the need to focus on self-efficacy while training community based midwives in neonatal resuscitation in LMIC, as confidence to intervene will impact the willingness to initiate resuscitation.¹⁷

In two instruments, the HBB³ and NRP²³, the application of SCT was not specifically identified. The HBB, used in a well-known neonatal resuscitation program for LMIC called *Helping Babies Breathe*, consisted of a post program survey to measure self-efficacy for performing neonatal resuscitation.³ Carlo also used a self-efficacy instrument, but did not refer to the theoretical framework of SCT.²³

5.3. Validity

Validity refers to the assessment of an instrument's ability to measure the concept of interest,²⁵ in this case, self-efficacy. The SEPRQ-R and the SEBMVQ-R instruments were modified from the VAS self-efficacy instrument developed by Turner and colleagues. The advanced resuscitation tasks were removed from the instrument, but revalidation was not reported.²² The HBB self-efficacy questions and the NRP based selfefficacy instrument were validated by a panel from the American Academy of Pediatrics.^{3,23} Turner and colleagues provided robust construct validity by reporting a multi-trait, multi-method matrix (MTMM) of correlations between self-efficacy survey data for resuscitation skills and data from the VAS self-efficacy instrument.²¹ Youngquist reported validity from previous studies using the PSS designed by Craven and Froman, but not validated for this specific study.¹⁵ Plant and colleagues adapted instruments previously used to assess aviation Crisis Resource Management (CRM) skills in pilots by adding a self-efficacy component to assess pediatric resuscitation skills.²⁰ CRM instrument was developed by focusing on the internal structure of the instrument and used the four factor model to validate. The four factors included situation awareness, team management, environment management, and decision making.²³

5.4. Reliability

Reliability provides an assessment of the ability of an instrument to repeatedly measure an attribute consistently.²⁵ A Cronbach's alpha value closer to 1.0 indicates higher levels of interrelatedness among the scale items and, therefore, better reliability.²⁷ In the current review, reliability is reported for seven out of eight instruments. Cronbach's alpha values for each instrument are listed in Table 1. Cronbach's alpha for the eight instruments ranged from 0.77 to 0.98. Notably, Carlo and colleagues re-evaluated reliability before training, immediately after training, and at six months post training.²³ In those three evaluation phases, Cronbach's alpha values ranged from 0.84 to 0.90. Turner and colleagues provided a thorough evaluation of internal consistency for each domain of the VAS self-efficacy instrument: Self-efficacy for overall resuscitation (0.77), for cardiac massage (0.95), for bag/mask ventilation (0.98, and for use of intraosseous device0.98).²¹ Singhal and team did not report reliability statistics for their HBB self-efficacy scale; however, those researchers used pre- and post- training multiple

choice questions from the Objective Structured Clinical Examination (OSCE) to assess skill-performance self-efficacy.³ Plant and colleagues provided extensive exploratory factor analysis within confirmatory factor analysis to examine inter-item correlations,²⁰ with the Cronbach's alpha value reported > 0.70. These factors consisted of situation awareness, decision making, and team and environment management adapted from the CRM instrument.²⁰

5.5. Evaluation of Self-efficacy for Pre- and Post-training

Four studies evaluated changes in pre- and post-training self-efficacy scores among health care providers in LMIC.^{17,22,23} Carlo and colleagues used the NRP based 14-item self-efficacy instrument, studied in Zambia and identified a 0.8 point (paired *t* tests P< .001) increase in self-efficacy score comparing pre-to-post training.²³ Brennan and colleagues utilized the SEPRQ-R and SEBMVQ-R instruments with a visual analog instrument in LMIC and reported a 33.61 point increase for overall resuscitation selfefficacy and a 22.4 point increase for self-efficacy regarding skill performance post training.²² Olson used path analysis to correlate increase in self-efficacy with the intervention cohort receiving training.¹⁷ For the studies conducted in high-income countries, Turner and Youngquist also showed point increases ranging from 7.9 to 13.2 in self-efficacy questionnaire scores from pre to post training^{15,21} Youngquist further reported a decline in overall self-efficacy scores 6 months post training due to less frequent resuscitation events to maintain practice.¹⁵

5.6. Comparison of Instrument use in LMIC and High-income Countries5.6.1 Number of instrument items in relation to level of education

All eight instruments were related to essential knowledge and skill based training for neonatal and pediatric resuscitation. The instruments used in LMIC had fewer items than those instruments used in high-income countries. The instruments used in Indonesia and Ghana used the fewest items (one to twelve) in their scales.^{17,22} In Indonesia, Olson used a one item self-efficacy question and path analysis to assess self-efficacy in community based midwives with varying education levels.¹⁷ Brennan and colleagues conducted the study in Ghana with nurses whose education level ranged from 1 to 4 years.²² Both, instruments SEPRO-R, a 7-item scale, and SEBM-VQ, a 12-item scale, were used as part of the training program. A 14-item scale was used to evaluate the NRP training program conducted in Zambia with midwives who had 4 years of training.²³ Another NRP based training used two self-efficacy questions as part of the HBB program. Singhal and colleagues conducted this study in two LMIC, Kenya and Pakistan.³ Their participants ranged from community lady workers to physicians and their education level varied accordingly. Overall, the number of items for the instruments used in LMIC ranged from 1 to 14.

The three instruments reviewed from high-income countries (United States and the Netherlands) targeted participants with more than one year of formal professional education. Pediatric faculty at a US teaching institute developed a 24-item scale based on the Crisis Resource Management (CRM) skills curriculum.²⁰ That study showed a correlation between self-efficacy and skill performance. Youngquist used a 24-item scale with paramedics in the US, whose formal education varied from one to two years. That

study showed an increase in self-efficacy scores from pre- to post- training measurement.¹⁵ Turner used a 61-item scale instrument and provided robust statistical analysis for validity and reliability.²¹ This study showed an increase of 12 point score from pre to post training. Overall, in high-income countries, the number of scale items used ranged from 24 to 61.

5.6.2. Cultural appropriateness

Two studies, Singhal³ and Olson¹⁷, utilized the local language where the studies took place to collect survey information verbally and confirm participant answers regarding self-efficacy. Olson emphasized the value of using the SCT to incorporate culturally appropriate training methods such as pictorial charts, demonstration by peers which can reflect on the learners' self-efficacy related to neonatal resuscitation.¹⁷

6. Discussion

This integrative review identified eight instruments that focused on measurement of the self-efficacy of health care providers to perform pediatric and neonatal resuscitation skills in both LMIC and high income countries. The results revealed several key considerations in selecting or adapting an existing instrument including the theoretical framework, validity, reliability, number of items, and adaptability in LMIC for health care providers who have low literacy level.

6.1 Theoretical framework

Regarding theoretical frameworks, six out of eight instruments,^{15,17,20-22} were informed by the SCT by Bandura. Theory gives guidance to the researcher to focus on the construct of interest to develop the instrument. Turner and Brennan both described how the four constructs of SCT provided the underpinning for the instruments. All four constructs were incorporated in each training module. The reliability reported as

Cronbach's alpha for these instruments ranged from 0.77 to 0.98 which is acceptable as the value is above 0.7. Singhal and colleagues did not mention using the SCT and reliability information was not reported. The importance of self-efficacy guided by SCT is noted as willingness to learn one's judgment of their capabilities and attempt a difficult skill rather than avoidance. ¹⁵ The SEPRQ-R AND SEBMVQ-R self-efficacy instrument used in Ghana, by Brennan and colleagues, applied the SCT with all four constructs and the post training evaluation results had 20% increase compared to pre training.²² A panel of 5 experts in pediatric emergency resuscitation validated the SEPRQ-R AND SEBMVQ-R instruments. .²²

Plant and Turner further implied there is a difference between confidence and self-confidence.^{20,21} Confidence refers to performing a specific skill, while self-confidence reflects one's personality trait.^{20,21} This distinction is also noted by Maibach and colleagues as important because any health care provider, whether from LMIC or high income countries, can accomplish a skill with confidence given the opportunity of training regardless of a personality trait.²⁸

6.2 Validity and reliability

Experts assessed content validity for most of the instruments in the current review. Singhal et al. provided strong content validity by using the Delphi panel of experts for the HBB self-efficacy questions.³ Carlo and colleagues reported a lack of content validity as a limitation of their study; however the training was based on the neonatal resuscitation program adapted from the American Academy of Pediatrics.²³ Overall the Cronbach's value of the reviewed instruments ranged from 0.74 to 0.98, demonstrating reliability of the instruments as all the values are above 0.7. In the current

review, Turner and Plant provided robust reliability analyses which supported the repeatability and reproducibility of the VAS for self-efficacy and CRM instruments.^{20,21} Those studies provide a basis for exploring the use of their instruments in a limited resource setting.²⁹ Turner also validated the VAS self-efficacy instrument to the numbered score questionnaire to measure the same construct.²¹ Brennan and colleagues modified the VAS instrument for LMIC by deleting the items of physician level resuscitation skills that did not pertain to the nurses.²² Another element of this instrument is to use VAS, which is easier to comprehend, by health care providers with low literacy. The, reliability of the VAS instrument indicates the dependability of the instrument. Research conducted in LMIC is challenging due to limited resources, variable literacy levels, and possible language barriers. The value of Brennan's validated instruments, SEPRQ-R and SEBMVQ-R, is that it is concise. The instruments contain fewer items and use VAS as a simpler tool than number scoring tool. Drawn from the synthesized Table1, these reasonable inferences are worthy of future investigation for health care providers in LMIC who have low literacy levels.

6.3 Measurement of self-efficacy in LMIC and Adaptability

A majority of the instruments were tested among formally trained health care providers including physicians, nurses, midwives and paramedics. Only 30% of these participants were community based midwives, having the least amount of formal training. The HBB self-efficacy instrument used to evaluate training of the community midwives, reported validation by a Delphi panel of experts.³ Thus, future testing of instruments for measuring self-efficacy for neonatal resuscitation is needed among health care providers with low literacy in LMIC. Findings from this review suggest that using VAS²² and utilizing the local language to collect data for the survey questions regarding self-efficacy^{3,17} are culturally appropriate methods for healthcare providers in LMIC. Because language barriers were not explicitly described by other authors who conducted studies in LMIC, responses to respective instrument items may vary due to the known or suspected low literacy level of some providers in LMIC. Although instruments with fewer items may be less reliable, they are often easier to use in low resource settings with providers who have low literacy levels, in particular, those whose primary language is not English, the standard language today for global health education.²⁹

Although these studies were conducted across a diverse group of low- to highresource settings, they all provide potentially relevant findings for our review of instruments that can be used or adapted to measure self-efficacy for performing neonatal resuscitation in vulnerable low resource populations. For the purposes of this review and its stated goals, five instruments are especially relevant because they have been utilized in LMIC: NRP self-efficacy instrument in Zambia²³; HBB self-efficacy questions in Kenya and Pakistan³; SEPRQ-R and SEBMVQ-R instruments in Ghana²²; and, PPV self-efficacy question in Indonesia.¹⁷ Use of self-efficacy instruments in LMIC requires additional contextual considerations, such as social modeling by demonstrating skills by peers and social persuasion by positive encouragement.

Both self-efficacy instruments in Brennan's study, namely SEPRO-R and SEBM-VQ can be adapted for providers such as community-based midwives and traditional birth attendants in LMIC who have limited formal education. These VAS instruments which are simple and easy to use were adapted with fewer items to use in LMIC and reported

acceptable reliability with Cronbach's ranging from 0.77 to 0.93. Instruments that can accurately measure provider self-efficacy to perform resuscitation are a critical step towards teaching and evaluating training intervention that can address global neonatal mortality.

In addition to the value of using self-efficacy instrument with the neonatal resuscitation training, the importance of knowledge retention has also been recognized. Discrepancy between self-efficacy related to skill performance and retention suggests further research is needed to guide the timing of refresher training. ¹⁷ Six months post-training written and performance scores declined but the overall self-efficacy score remained high.²³ Youngquist reports that self-efficacy was maintained even if skill performances scores declined six months after training.¹⁵

7. Limitations

The intended focus of this review was on healthcare providers with low literacy level LMIC, yet, only two studies in the review included participants with low literacy levels. Olson and Singhal included community based midwives, community birth attendants, and lady health workers, respectively.^{3,17} A second limitation related to our search strategy which may have resulted in missing articles by not including other specific health care providers in LMIC.

8. Implication for future research

Instruments developed in high income countries will need to be adapted to match key contextual factors in LMIC, such as resource availability, language translation and level of provider education. None of the authors discuss the feasibility of administering these instruments in LMIC, which indicates the need for future feasibility research. The reliability and validity can be studied in LMIC to adapt the instruments developed in high

income countries. Future research is needed to assess the frequency of retraining to maintain skill performances and self-efficacy.

9. Conclusion

This integrative review critiqued eight instruments, five from LMIC and three from high income countries. The SCT, and its conceptualization of self-efficacy, was reflected in most of the instruments. The social cognitive principles and practices are a valuable framework to interpret the synthesized findings in the current analysis. The number of scale items in the instruments used in LMIC ranged from 1 to 14, while the number of items ranged from 24 to 61 in instruments used in high-income countries. An instrument with lower items may be feasible, for example, less information will need to be translated in local language to maintain accuracy, for community-based midwives and traditional birth attendants in LMIC. The level of complexity of the instruments matched the spectrum of health providers' knowledge base from low to high income countries. Both the Likert scale and the VAS were mostly utilized and can be adapted in LMIC.

A valid and reliable self-efficacy instrument is an important component required to evaluate the effectiveness of the neonatal resuscitation program. There is a need for more research about teaching and learning self-efficacy for neonatal resuscitation in LMIC in order to decrease global neonatal mortality rates. The current integrative review contributes to the research conversation about the need to develop effective self-efficacy instruments tailored to the educational background and needs of healthcare workers in LMIC.

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Figure 1. Self-efficacy constructs related to neonatal resuscitation

Adapted from: Bandura A. Social cognitive theory: an agentic perspective. *Annual. Rev. Psychology*. 2001;52:1-26

Maibach EW, Schieber RA, Carroll MF. Self-efficacy in pediatric resuscitation: implications for education and performance. *Pediatrics*. Jan 1996;97(1):94-99.



Figure 2. *Search strategy*

Table 1. Instrument Psychometrics

Instrument Reference	Framework	Sample subjects Study Location	Instrument Description and Scoring	Reliability	Validity	Overall pre –post test self-efficacy measurement outcomes	LOE (cebm. net)	
Pediatric skill survey (PSS) measuring self efficacy studied with pediatric airway management skills. (Youngquist, 2008)	Bandura's Social Cognitive Theory	Paramedics USA n = 212	24 item self-efficacy scale for confidence and anxiety to assess and skills to manage airway by using BMV and ETI Likert scale range Level of anxiety 1-4 Level of confidence 1-4 Control group without retraining	Internal consistency Cronbach's alpha 0.98	The PSS was validated by Craven and Froman reporting positive correlations between knowledge/ significance of pediatric care, attitude towards pediatric patients and PSS scores. No statistical values reported	Mean of 7.9 point increase in self efficacy from pre to post training. (p=0.002)	1b	
Self –efficacy scale studied with NRP skills (Carlo, 2009)	Not reported	Nurse midwives (college educated 4 years)	14 item self-efficacy scale pertaining to confidence performing neonatal airway management according to NRP protocol	Internal consistence Cronbach's alpha Pre training = 0.90 Post training = 0.84	Author reports validity for the self-efficacy scale is not thoroughly validated therefore a limitation to the study	Paired <i>t</i> tests comparing pre and post test scores (P< .001	2b	
		Zan n =	Zambia n =127	5- very confident	training = 0.87	The Neonatal Resuscitation Program (NRP) developed by American Academy of Pediatrics to validate the	Overall score Mean (SD) Pretest 3.7 (0.7)	

Instrument Reference	Framework	Sample subjects Study Location	Instrument Description and Scoring	Reliability	Validity	Overall pre –post test self-efficacy measurement outcomes	LOE (cebm. net)
					content as expert panel.	Post test 4.5 (0.5)	
						Post minus pre 0.8 (0.8)	
Visual Analogue Scale(VAS) to measure self- efficacy in resuscitation skills (Turner, 2008)	Bandura's Social Cognitive Theory	Physicians -5261 items self-efficacy scale pertaining to 4 domains of pediatric resuscitation.Cronbach's alphaMulti -trait, multi-m matrix (MTMM) of correlations between efficacy questionnair resuscitation students -22Medical students -22(Domains - overall resuscitation, Cardiac massage, Bag/mask ventilation and Intra- osseous device) Scored on horizontal and 5 mmOverall resuscitation 0.77 Multi -trait, multi-m matrix (MTMM) of correlations between efficacy questionnair resuscitation 0.77 Netherlandsa scale of 0-100.Intra- osseous device 0.98 Intra- osseous device 0.98 n = 115vertical with end bars and anchor statement "Not at all confident and extremely confident), was used to assess each domain.Intra- osseous device 0.98	Multi –trait, multi-method matrix (MTMM) of correlations between self- efficacy questionnaire for resuscitation skills and VAS used to assess construct validity.	Overall score Mean (SD) Questionnaire Pretest 77(13) Post test 83.6(7.7) VAS	2b		
					Pretest 59.7(15.2) Post test 72.9 (16.3)		
Self-Efficacy in Pediatric Resuscitation	Bandura's Social Cognitive	Nurses	7 item self-efficacy scale pertaining to the resuscitation skills performed by nurses	(SEPRO-R) Alpha correlation coefficient	Content validity of the ETAT developed by	Overall score Mean (SD)	2b

Instrument Reference	Framework	Sample subjects Study Location	Instrument Description and Scoring	Reliability	Validity	Overall pre –post test self-efficacy measurement outcomes	LOE (cebm. net)
Overall Questionnaire- revised (SEPRQ-R)	Theory	Ghana n=41	according to Emergency Triage Assessment and Treatment (ETAT) protocol. Scoring on a scale of 0-100 with simple wording "I cannot do this at all to "I can do this"	Cronbach's alpha 0.77.	WHO and confirmed by panel of 5 experts in pediatric emergency resuscitation. The ETAH is based on Advanced Pediatric Life Support guidelines.	SEPRO-R Pretest 58.91 (17.02) Post test 92.72(5.06) P < 0.000	
Self-Efficacy in Bag and Mask Ventilation in a Child Questionnaire- Revised (SEBMVQ-R) (Brennan, 2013)		Nurses Ghana n=41		(SEBMVQ) Alpha correlation coefficient Cronbach's alpha 0.93.		SEBMVQ Pretest 70.7 (19.09) Post test 93.10(8.61) P < 0.000	
Instrument Reference	Framework	Sample subjects Study Location	Instrument Description and Scoring	Reliability	Validity	Overall pre –post test self-efficacy measurement outcomes	LOE (cebm. net)
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Helping Babies Breath- HBB (survey with OSCE) (Singhal et al, 2012)	Theory not reported. Train the Trainer model used.	Physicians Nurses Midwives Community Birth Attendants Lady Health Volunteers Pilot study Conducted in two countries	22 item program evaluation survey. 2 Self- efficacy questions embedded within. Scale ranking each item from 1- 5	Statistics not reported	Content validity by Delphi panel of experts in global child health and neonatal resuscitation. Regional technical expert review conducted at the World Health Organization. Used NRP guidelines	Post program evaluation scores for self-efficacy questions range 4.6 to 4.7	2b
Pediatric	Bandura's	Kenya n = 48 Pakistan n = 54 Pediatric	24 item self-efficacy scale	Cronbach's alpha (4		Not evaluated	2b
residents' self-	Social	residents,	5 point Likert scale rating	factors) range 0.77 –	Pilot testing by content		

Instrument Reference	Framework	Sample subjects	Instrument Description and Scoring	Reliability	Validity	Overall pre –post test self-efficacy	LOE (cebm.
		Study Location				outcomes	net)
efficacy in CRM skill (Plant, 2010)	Cognitive Theory	re Fellows and faculty	four factors	0.91	experts		
			Situation awareness				
		USA	Team management	Pilot study inter- rater reliability overall 0.59 -0.61	Use of validated Crisis Resource Management (CRM) skill for resuscitation		
			Environment management				
		n = 125 total	Decision making				
			Correlation between self- efficacy and performance	Exploratory FA within confirmatory FA			
Modified NRP training with use of Positive Pressure Ventilation device	RP Bandura's ve Social Cognitive Theory	a's Midwives ve	One item self-efficacy question using 5 point	Correlation between knowledge and PPV attempt and Self efficacy noted using Path analysis	Using NRP guidelines	12 month retrospective study	2b
			Likert scale 1 – 5.			Intervention cohort received additional training with PPV device	
			1 – not at all confident				
		Indonesia	5 – very confident				
efficacy						Control cohort	
(Olson 2015)		n = 348		Cronbach's alpha not reported		newborn care training	

Instrument Reference	Framework	Sample subjects Study Location	Instrument Description and Scoring	Reliability	Validity	Overall pre –post test self-efficacy measurement outcomes	LOE (cebm. net)
						Intervention cohort	
						SE score 4.15	
						Knowledge 87%	
						Control cohort	
						SE score 2.86	
						Knowledge 56%	

Manuscript 3

Perceptions of traditional birth attendants and midwives related to neonatal airway

management in rural Uganda: A focused ethnographic qualitative study

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Abstract

Objective:

To capture the "voices" of traditional birth attendants and midwives practicing in rural Uganda and assess their perceptions of safe neonatal airway management, to inform strategies for modifying educational resources, such as the *Helping Babies Breathe* guidelines, in ways that are culturally appropriate and incorporate learning preferences that fit local contexts.

Design and Participants:

A focused ethnographic approach was used to collect data through: 1) field-notes; 2) informal interviews while observing five Ugandan midwives providing perinatal care; 3) semi-structured interviews with medical center managers and clinic coordinators; and, 4) a focus group with seven traditional birth attendants in Uganda. This qualitative study used a feminist theoretical stance to show the "lived reality" of women taking care of other women's health during childbirth and neonatal airway management, with limited resources.

Setting:

The study took place at a Medical Center in Masindi and its affiliated community areas in rural Uganda where the neonatal mortality rate is 10 times higher than in the United States.

Findings:

The findings showed that the more formally trained midwives exhibited competence in providing neonatal airway management. In contrast, the traditional birth attendants experienced barriers to performing optimal neonatal airway management due to lack of resources, limited knowledge and cultural practices. The traditional birth attendants identified their learning preferences as demonstration, poem, or song, and by using local spoken language to learn and implement neonatal airway management.

Key conclusions and implications for practice:

Findings will contribute to the development and dissemination of a culturally tailored educational intervention to enhance traditional birth attendants' understanding of effective neonatal airway management, with appropriate technology. The joint effort of midwives and traditional birth attendants as a foundation for creating a training intervention with their preferred learning method constitutes a scaled-up team approach to meet the World Health Organization Sustainable Development Goal #3, to implement the Helping Babies Breathe guidelines.

Keywords (6)

Traditional birth attendants, midwives, neonatal, airway management, birth asphyxia, Uganda

Introduction

The neonatal mortality rate in rural Uganda is 40 - 54 per 1000 births as compared to 4 per 1000 in the United States (Worldbank, 2012). As a contributor to neonatal mortality, hypoxic events, also referred to as birth asphyxia, represent 25% of the neonatal deaths worldwide (Singhal et al., 2012; N. Wall et al., 2010). Nearly 60% of birth asphyxia occurs in home-based deliveries worldwide with informally trained or unskilled birth attendants (Singhal & Bhutta, 2008). The WHO has defined two categories of birth attendants in LMIC: (1) Skilled birth attendants, who are formally educated and trained to manage childbirth, including physicians, nurses, and formally trained midwives practicing in facility based clinics and (2) TBAs who usually acquire skills through apprenticeship and have home-based practices in rural areas(Wilson et al., 2011). Thus, there is an urgent need to provide neonatal resuscitation education and to build capacity in low resource settings, where access to health care is poor and the burden of long term impairment due to hypoxic brain is substantial (N. Wall et al., 2010). A newborn who is unable to breathe presents an emergent event that requires prompt intervention within one minute (Singhal et al., 2012). Implementing simple airway management skills can revive the newborn and prevent negative long term health consequences.

Researchers have developed programs to teach neonatal airway management in low- and middle-income countries (LMIC) (Lee et al., 2011); however, many of those programs are geared toward physicians and nurses who have received a formal education (Glenton et al., 2013). This approach neglects the fact that rural area midwives and traditional birth attendants (TBAs) with low literacy levels deliver more than 50% of

births in rural areas (Carlo et al., 2010) and are the primary maternal child health care providers in LMIC. Therefore, interventions that educate rural TBAs are essential to decrease early neonatal deaths.

The objective of this study is to capture the "voices" of TBAs and midwives practicing in rural Uganda and assess their perceptions of safe neonatal airway management, in order to determine how the *Helping Babies Breathe* guidelines are being used and what modifications may be needed. The perspectives of study participants will be used to contribute to more culturally appropriate adaptation of neonatal airway management training that incorporates the learning preferences of TBAs and midwives in settings like rural Uganda.

Background

According to the United Nations Children's Fund (UNICEF) 2015 child mortality report, significant improvement is reflected in the overall neonatal mortality rate globally, which declined from 36 to 19 deaths per 1,000 births over 25 years (UNICEF, WHO, World Bank, & UN-DESA Population Division). However, a slower decline in early neonatal deaths occurring in the first 24 hours following birth (Pathirana et al., 2016) reflects an increase in the proportion of childhood mortality attributable to neonatal deaths from 37 to 44 percent (UNICEF et al., 2015). These early neonatal deaths require a time sensitive intervention from TBAs related to neonatal airway mangement (Berkelhamer, Kamath-Rayne, & Niermeyer, 2016). The World Health Organization (WHO) and UNICEF are advocating use of the *Every Newborn Action Plan* (Berkelhamer et al., 2016) for midwives and TBAs to decrease neonatal deaths to 12 per 1,000 births by 2030 as part of Sustainable Development Goal #3. Significant challenges and opportunities exist related to neonatal care with a focus on neonatal airway management by TBAs and midwives in rural Uganda, utilizing strategies currently promoted by the WHO and UNICEF. Figure 1, taken from Wilson and colleagues (2011), describes the support system needed by the TBAs for effective practice, which represents the complex factors that affect TBA decision making about neonatal resuscitation in rural areas.



Figure 1 Conceptual model of traditional birth attendant support systems

Wilson et al, 2011 Effectiveness of strategies incorporating training and support of traditional birth attendants on perinatal and maternal mortality: meta-analysis *BMJ* 2011;343:d7102 doi: 10.1136/bmj.d7102 (Published 1 December 2011)

Lack of skilled birth attendants

In Sub-Saharan Africa, approximately 47% of births occur in facility-based clinics, whereas the rest occur outside clinical facilities (Chinkhumba, De Allegri, Muula, & Robberstad, 2014). There is a lack of adequately trained nurses, midwives and physicians to cover all the urban and rural areas in LMIC (Bhutta et al., 2011; Gogia & Sachdev, 2016; N. Wall et al., 2010). Standardized education requirements, which typically vary from 1.5 to 5 years, to practice midwifery in SSA are lacking (Adegoke, Utz, Msuya, & van den Broek, 2012). Although, the work of skilled birth attendants decreases the neonatal mortality rate, their limited numbers cannot cover all rural areas (Glenton et al., 2013; Singhal & Bhutta, 2008; Wilson et al., 2011). The proportion of rural births assisted by TBAs has been reported to range from 2% to 79% in 2006 in SSA (Sibley & Sipe, 2006) to about 50% in SSA reported by UNICEF in 2017 (UNICEF, 2017). Therefore, to address the 60% of birth asphyxias (Singhal & Bhutta, 2008) that occur in rural areas, expanding the education of health care providers such as TBAs may result in a significant impact on neonatal mortality.

Access to facility-based care in rural areas

Neonates born in home-based environments have limited access to facility-based care for urgent airway management due to inadequate infrastructure, difficulty in travel, and lack of resources. As an influence on resource support and referral pathways (Wilson et al., 2011), the infrastructure is inadequate in LMIC as evident from the limited roadways and availability of safe transportation, which makes it very difficult for pregnant women in labor to reach a healthcare facility (Fiagbe, Asamoah, & Oduro, 2012). Cost of transportation and health facility charges are other barriers to accessing facility-based care (Bhutta et al., 2011; Lassi & Bhutta, 2015; N. Wall et al., 2010). According to the recent demographic data, 41.6% of all births are home-based in Uganda. Nationally, the neonatal mortality rate (NNMR) in Uganda is 19-22 per 1000 births; in the western region, which includes Masindi, the rate is 40 – 54 per 1000 births (WHO, 2013). In LMIC, the NNMR is usually higher in rural areas versus urban areas, as noted in a recent Ugandan study (Kananura et al., 2016).

Access to educational resources

The low literacy of TBAs contributes to a lack of access to educational resources for implementing safe neonatal resuscitation, since most resources are in written form. Three studies in Sudan, Nepal, and India, assessing TBA skills have found varying levels of illiteracy from 74% to 100% in (Ali & Siddig, 2012) (Falle et al., 2009) (Satishchandra, Naik, Wantamutte, & Mallapur, 2009). Low literacy is a significant challenge in LMIC where training tends to rely on written materials and lectures using medical language, yet is potentially modifiable by adapting the training methods tailored to TBA learning needs and preferences.

Programs such as *Helping Babies Breathe* (HBB) (American Academy of, 2011) are available to facilitate improvement in neonatal resuscitation in LMIC. The HBB recommendations were developed by the American Academy of Pediatrics and are supported by the United States Agency for International Development (USAID) (Kak, Johnson, Mcpherson, Keenan, & Schoen, 2015). HBB written training materials and guidelines are currently used in 77 LMIC countries, but typically focused on formally trained health care professionals (physicians, nurses and midwives). The HBB program is primarily available to facility-based neonatal care providers, but is not easily accessible

to home-based neonatal care providers in rural areas, including TBAs with low literacy levels (Kak et al., 2015). Therefore, a significant gap exists. This study explores the perspectives of home-based care providers and facility midwives regarding their knowledge and use of the HBB, as a basis for future intervention.

Respect for home-based health care providers

Historically TBAs, as primary maternal-child healthcare (MCH) providers, have learned mostly through apprenticeship. More formally trained healthcare providers tend to disrespect TBAs because of their low educational attainment and limited experience with neonatal training. Izugbara and colleagues (C. Izugbara, A. Ezeh, & J. C. Fotso, 2009) noted the humiliation experienced by TBAs when taking their clients to the hospital for obstetrical emergencies; the TBAs are often referred to as "quacks" (C. Izugbara, A. Ezeh, & J.-C. Fotso, 2009). This type of treatment also causes disrespect for TBAs in the public sector, as reflected in ambivalence by a Ministry of Health in Zimbabwe (Choguya, 2014), and attitudes in public health facilities in Honduras(Low, Scheib, Bailey, & Sacks, 2006).

Opportunities:

Alternative methods of teaching

Gill (2011) noted that 98% of TBAs in their Zambian study were farmers, and 13% had a primary school education level. Low literacy can be a challenge to providing adequate educational material; thus, alternative methods of teaching have been utilized. Gill and colleagues (2011), using the time-honored "call and response" method, showed a 63% reduction in neonatal deaths due to hypoxic events in the intervention group with additional neonatal resuscitation program component (Gill et al., 2011). A meta-analysis

of 60 studies in LMIC on the effectiveness of training TBAs revealed significant increases in TBA knowledge (90%), attitude change (74%), and behavior changes (63%) for providing safe clean delivery and essential newborn care, including effective neonatal resuscitation (Sibley, Sipe, & Koblinsky, 2004). Most importantly, the training led to an 11% decrease in birth asphyxia mortality (Sibley, Sipe, & Koblinsky, 2004). Most of the studies used alternative methods of teaching, such as demonstrations and verbally teaching the concepts. Notably, Silver and colleagues packaged the newborn care teaching material in a form of a song for home-based health care providers in Uganda (Silver, 2001).

Linkage between facility and home based Maternal-Child Healthcare (MCH) providers

In a systematic review, persistent barriers for mothers who wanted to use health facility-based care were: accessibility, affordability, and cultural acceptability of TBAs(Byrne & Morgan, 2011). The authors concluded that integrating and providing linkage between TBAs and formally trained health care providers at the health facility may promote safer maternal and neonatal care (Byrne & Morgan, 2011). Other researchers have recommended promoting stronger linkage between home-based and facility-based neonatal care providers in order to maintain sustainable educational resources (Lassi & Bhutta, 2015; Wilson et al., 2011).

Exploring the challenges and utilizing the opportunities

Our study explored the clinical and cultural practices of midwives and TBAs that support (facilitators) or interfere (barriers) with neonatal airway management in rural Uganda. Using an innovative focused ethnography method (Higginbottom, Pillay, & Boadu, 2013; Knoblauch, 2005), data collection involved observing and interviewing midwives and TBAs regarding their practices of neonatal airway management as the basis for developing future training interventions. Such embedded participant observation in a low resource environment can significantly inform and guide culturally appropriate adaptations of existing HBB materials for neonatal airway management in rural areas of LMIC.

Method

Preliminary Study

To conduct preliminary observations prior to the study reported below, the primary investigator (MM) joined One World Health (OWH), a faith-based organization, on a mission trip to serve as a volunteer health care worker at the Masindi Kitara Medical Center (MKMC) in Uganda. During that mission trip, the investigator also served as a nurse at three offsite temporary village clinics. During the preliminary observation period, relationships were established with MKMC management staff, midwives, nurses, and local community health care workers. Prior to that mission trip, the primary investigator shared research objectives by email with the director of the OWH and with MKMC's management to explore their interest as stakeholders for future development of adapting training materials for TBAs and midwives. The project was proposed as a joint effort of midwives and TBAs from affiliated villages to promote collaboration between the MKMC staff and TBAs from those villages. This relationship was meant to gain the trust of TBAs in order to promote facility-based care and increase the volume of village mothers to the facility for maternal-child health care, a care deficit well-documented in other studies of TBAs that may improve with TBA training (Brighton, D'Arcy, Kirtley, &

Kennedy, 2013; Sibley et al., 2004). In return, the MKMC would gain client volume and ability to share their standard of care with village members.

Theroretical framework

For the purposes of this study, the feminist perspective is derived from several feminist frameworks that collectively adopt a range of epistemic stances to address gender, culture, social class, experiences of oppression, hierarchy, patriarchal, power and knowledge (Im, 2010). The postcolonial feminist perspective, aligned with the critical feminist theory, focuses beyond the gender distinction and also emphasizes issues of identity in social class, economic locality, and ability to function within oppressive situation (Archer, 2009; Racine, 2003), health care system hierarchy (Qin, 2004), and patriarchal society (Im, 2010; Warren, 1994). These factors influence the role of midwives and TBAs in neonatal care, as women with disadvantaged social status, poverty, and practicing in a hierarchical system that tends to exclude them. (Glenton et al., 2013; Satishchandra et al., 2009).

Fahy and Parratt's critical feminist perspective proposes the theory of *Birth Territory*, in which midwives advocate and empower women influenced by Michel Foucault's concepts of power and knowledge (K. M. Fahy & Parratt, 2006) Fahy, 2006), though originally framed for hospital deliveries. Fahy and Parratt (K. M. Fahy & Parratt, 2006)describe the theory of *Birth Territory* by expanding on Foucault's concept to show how integrative power used by midwives in the medical setting can assist the mother's birthing decisions. This view aligns with how TBAs can gain adequate knowledge regarding neonatal airway mangement and practice with integrative power, a form of shared decision making which harnesses the ability of the mother and the health care

provider to make combined decisions that support the mothers during home-based births. This increase in knowledge reflects the capacity of power to make decisions while assessing the neonate and implementing measures to resuscitate the neonate as necessary. In addition, the feminist praxis approach emphasizes midwifery practice that focuses on the needs of women providing health care for women and, hence, contributing to the generation of knowledge (Barnes, 1999). The two principles of feminist praxis outlined by Barnes (Barnes, 1999): 1) research that benefits women; and, 2) research as means of social change, provide a means to review the teaching methods of the interventions regarding neonatal resuscitation, particularly to TBAs with low literacy level.

Several prior studies have used a feminist perspective to explore the hidden health care needs of vulnerable populations and to empower those who are oppressed and discriminated against in the health care system (K. Fahy, 2002; Im, 2010; Kaphle, Hancock, & Newman, 2013; Keating, 2007). Feminists advocate detailed analysis with flexible and subjective thinking to represent women's experiences in a patriarchal society (Aune, 2008). This study used an unstructured style, uninhibited by strict research guidelines as recommended for feminist studies (Duffy, 1985) and adopts a nonhierarchical approach when interviewing to create equal exchange which promoted reciprocity and reflexivity (Roberts, 1981). The non-hierarchical approach was reflected in the investigator's observation and participation as co-equal providers in birth events and invited facility and collaboration in planning. This feminist perspective provided the rural midwives and TBAs the ability to voice their concerns regarding the facilitators and barriers to providing adequate newborn care and airway management. Figure 1 depicts the feminist perspective for midwives and TBAs to represent factors that influence their

role in neonatal care. This focused ethnographic study draws from the postcolonial feminist perspective aligned with the critical feminist theory to analyze the data, further explained in the analysis.

Methodological Approach:

In viewing the chosen method for data collection, ethnography is an approach to fieldwork research used originally by anthropologists Bronislaw Malinowksi and Franz Boas, who utilized a holistic perspective in their study of cultural influences in human behavior (Le Compte & Schensul, 2010). Ethnography is a qualitative approach in which researchers submerge themselves in a study setting as was done in this study. Table 1 describes the characteristics of ethnographic. As a form of inquiry that requires an investigator to experience research activities personally, ethnography was used by the investigator as a participant observer, in order to gain the emic view of the setting as the basis for an insider subjective account of behavior within a culture (Headland, Pike, & Harris, 1990; Wolcott, 1999). Using ethnography as a platform, the focused ethnographic methodology in this study features a short-term field visit with semi-structured observations at the MKMC in Uganda. The focused ethnographic approach examines cultures and sub-cultures among a specified community where the participants have knowledge of an identified issue (Higginbottom et al., 2013). The identified issue for this research is the practice of neonatal airway management at the MKMC and affiliated villages. Table 2 illustrates the components of the focused ethnographic approach.

The short duration of the field trip was compensated by the intensive data collection tools, which included immersion in the setting, photographs, interviews with subsequent transcriptions, a focus group discussion (FGD), and audio recordings,

following recommendations for effective focused ethnography (Knoblauch, 2005; Le Compte & Schensul, 2010). During the two weeks, semi-structured observations were conducted using the HBB guidelines as criteria to evaluate midwives' neonatal airway management. In addition, through iterative data collection from multiple sources such as field observations, photographs which were restricted to the medical center, semistructured interviews, and focus group discussions, the data was then analyzed guided by a feminist theoretical framework. Reflexivity and bracketing were incorporated with qualitative content analysis (Roberts, 1981), with data documented and stored to provide an audit trail.

Ethical considerations

The authors' research protocol was reviewed and approved for human subjects' protection by the Medical University of South Carolina's Institutional Review Board (See appendix A). The One World Health and MKMC sent a letter of invitation to conduct the study at the MKMC (See appendix B). The One World Health foundation and the MKMC received the statement of research prior to the study, which was inclusive of verbal permission scripts seeking participant consent (See appendix C). The midwife summarized the statement of research for the TBAs in Runyoro (local language). Verbal consent was obtained for the focus group discussion.

Setting and Sample:

The study was conducted in Masindi, Uganda at the MKMC and in nearby affiliated community areas. Masindi town is situated in a rural area of Uganda. The population has tripled since 1991 from 129,682 to 305,400. Masindi town has one district government hospital, and the Masindi Kitara Medical Center (MKMC) a private clinic.

The MKMC includes an outpatient department and inpatient ward that can house 20 patients. The maternity center includes one delivery room, a recovery ward, and an operating room. The health care staff includes five midwives, one nurse anesthetist, four nurses, and one physician. All clinic staff members can communicate in English, but the TBAs in the surrounding areas speak the local language, Runyoro. Midwives and CHW who speak Runyoro assisted with interpretation during the focus group discussion (FGD). The Center's project manager was "the gatekeeper" or key informant providing a direct channel of communication between the primary investigator and the participants (Hesse-Biber & Leavy, 2011). The key informant provided insider perspectives of the center's governance, as described as the emic view (Al-Busaidi, 2008). The project manager also provided the communication link between the researcher and the lead CHW, who provided contact with the TBA facilitator for the villages affiliated with the MKMC. Many contacts were established during the pre-planning phase of the study, which aligned with a focused ethnographic approach. The researcher communicated by email with the MKMC project manager through the intercession of the OWH director and obtained written permission from the OWH director to conduct the study.

Using the purposeful sampling technique, interviews were conducted with three managers of the MKMC, one public health coordinator of the local health district, and one TBA facilitator for the villages in the local district, who were all the representatives of the system available in this rural area. In qualitative research, purposeful sampling identifies a specific set of people who exemplify or have extensive experience with the phenomenon being described and are available and willing to participate (Palinkas et al., 2015). During the volunteer work in the maternity ward, the PI was able to observe five

midwives and participate in informal conversations during break time. The focus group discussion was conducted with seven TBAs who were chosen to participate by the TBA facilitator. Their ages ranged from 42 to 68 years, and for most their primary profession was farming. Table 3 summarizes detailed TBA demographics of the sample.

The researchers

As a source of reflexivity expected in focused ethnography(Wall, S. 2015), the PI has over 20 years of experience as a nurse anesthetist and has a background in labor and delivery nursing. She has volunteered with mission trips in other LMIC, where she taught neonatal airway management to nurses and midwives. The PI lived in Uganda for 14 years and is able to speak Swahili, one of the national languages. A novice investigator, the PI is guided by an experienced researcher who has expertise in ethnography, feminist perspectives, sociolinguistics, and has conducted research in LMIC regarding TBAs. Her role in this study was as a qualitative methodologist mentor familiar with cultural adaptations both practically and theoretically (Bernal & Domenech, 2012).

Data collection

Data collection occurred included semi-structured interviews with midwives, and MKMC managers, FGD with TBAs, field notes, and photographs, and. for Interviews and the focus group discussion were audio recorded. Field notes were used to capture interactions where the recorder would have been intrusive such as during field observations in open spaces with multiple patients and staff present. The researcher had the opportunity as a participant to observe the midwives during deliveries and utilize the HBB checklist in order to record the immediate newborn care given on three occasions.

Interviews

Open-ended questions were designed to reflect the goals of the specific aims of the study. Separate sets of questions were designed for each type of provider, ranging from 11 questions for the midwives to 14 questions for managers.

- Semi-structured interviews with midwives were guided by the ethnographic view to gain the emic or insider view. These interviews took place throughout the work day. Using qualitative interviewing methods (Rubin & Rubin, 2012), probing open-ended questions were asked to prompt narrative stories concerning the midwives' length of practice, their experience with newborn respiratory assessment and resuscitation, and their key learning experiences of neonatal care during airway management (See Appendix D for interview guide).
- Semi-structured interviews with the managers were conducted using their specific interview guide to explore their perceptions of the TBA's role in maternal child health services. Further probes about their cultural practices were explored.

Focus Group Discussion (FGD)

The focus group questions were developed using modification of the WHO guidelines for focus group discussions, originally developed for collecting information on patient safety (WHO template with guide ref). The topics emerged from previous observations of the facility and issues raised by midwives, managers, informal meetings with TBAs and community health workers on the initial visit.

Focus group discussion with seven TBAs occurred at the MKMC. Three of the staff midwives and the lead community health team member helped to organize the FGD. One of the midwives read all the questions from the FGD guide to the TBAs. First in

English and then translated in the local language (Runyoro). The TBAs responded to all questions in their local language. They answered the questions individually or as a group sometimes in unison to a question, and each TBA added her experience. The responses were repeated in English by the midwife after all TBAs had completed their discussion. Sometimes the answers were summarized when given in English. The PI also had a second midwife write down the responses in English as TBAs were speaking. The FGD was also audio recorded (See appendix E for FGD guide). Member checking of summaries were done subsequently in comparing first and second midwife accounts of what was said.

The FGD responses were captured in three different ways: 1) Audio recording, 2) the notes recorded by two midwives as the TBAs responded, and those responses were translated into English, and 3) the PI's notes from the English translation written during the FGD. Focus group responses captured by those three methods were especially rich. These steps create an audit trail that permits a transparent account of the process used to acquire and analyze the data (Cohen D. & Crabtree, 2006). Overall, the three sources of data were very congruent, with only minor variations. Two variations of newborn care sequence were noted differently by both midwives. This was resolved by listening to the recordings again and the verbalized sequence was noted.

Field observation

Throughout the two weeks of data collection, the researcher took field notes. Some key times to take notes included every day walks from the Masindi hotel to the MKMC, where the PI had to cross the main road and walk through the dirt road and farm land. All the staff members started their day together with a prayer session. The PI

engaged in ward rounds with the medical director, and attended all the surgical operations that occurred in the theater (operating room). Observations also included interpersonal interactions between the midwives, nurses, and the housekeeping and kitchen staff. On two occasions, the PI was called to attend C-Sections during the evening hours, which allowed her to experience how the staff travelled after work hours to the MKMC. Mother and newborn care provided by the staff was also observed.

Photographs

Photographs of the environment compare the differences between MKMC and the village areas where childbirths occur.



Private and goverment district health facilities where midwives practices



Data Analysis

The ethnographic data analysis begins at the inquiry phase as a recursive process, which continually raises questions while collecting the data to gain further insight and compare interview data and focus group responses with the PI's written observations (Le Compte & Schensul, 2010). During data collection, this iterative process did not change the interview guides, but often added secondary prompts for more information. To elucidate the extensive data collected, a qualitative content analysis was conducted using the conventional approach recommended by Hsieh and Shannon (2005).

The content analysis process began by reading all data to get an overall sense of the interviews as units of analysis, through thorough reading and immersion to elicit potential topics within the content that provide a basis for coding and categorization, as described by Hsieh and Shannon (Hsieh & Shannon, 2005). The primary investigator (MM) transcribed data from the interviews and focus group word-for-word, and then both investigators (MM and CP) derived codes to reflect key concepts pertaining to the research aims. Subsequently, the codes were placed in categories and supplemented by

field notes. The emerging results were assembled in a matrix, which allowed the investigators to compare the codes and categories and reflect on each emerging theme from a feminist perspective. The goal of ethnography research is to tell a coherent story of participants' experiences with vivid details and interpretation of observed events (Archer, 2009).

Findings

The feminist perspective components were utilized to analyze the data. The perceptions of the midwives and TBAs were grouped into four categories: (1) barriers to providing neonatal airway management in home-based births based on social inequalities experienced by TBAs and mothers; (2) cultural beliefs in TBA practices that limited access to services for female workers in a disenfranchised social position; (3) facilitators to assisting the TBAs in accessing educational resources from a previously non-supportive social system; and, (4) learning preferences of the TBAs that privilege their formerly marginalized strengths. Findings in each category were assessed through feminist lens (Keating, 2007) that focused on participants' lived experiences of their social class in a patriarchal society, their health care hierarchy system, their cultural beliefs that affected their work as maternal-child healthcare providers, and gender issues that pertained to their work as providers. Figure 2 provides the process of data collection and analysis.



Figure 2. Visual Display of the Data Collection and Analysis with Feminist Perspective.

1. Barriers to providing neonatal airway management in home-based births based on social inequalities experienced by TBAs and mothers

In the rural Ugandan area where the study occurred, health care facilities and hospitals have trained personnel and equipment to attend to neonates in case of emergency needs, such as airway management. The TBA facilitator verbalized that the government has laws making TBA practice illegal, though this was the report of the participant the specific legal status will need to be explored with the Ministry of Health in future research. The health ministry encourages mothers to deliver their children at the health facility rather than at home, but several factors were noted regarding why mothers choose to deliver at home.

1. a. Barriers related to health care system hierarchy:

Currently, the Ugandan health care system does not allow TBAs to conduct childbirths and, instead, encourages mothers to deliver at the hospital. Although contradictory, the TBA facilitator (TF) shared several accounts concerning how TBA practice has been limited by the health ministry, yet many mothers prefer to deliver at home assisted by a TBA.

TF: They were fearing long ago, they were conducting deliveries fearing that they would prison them. Because they are not supposed to conduct.

We held a workshop; we told them now no more delivers. You are suppose to examine these mothers, health educate them, on hygiene and environment and escort them for labor (to the hospital).

Notable among those findings is the perception that TBAs were afraid they would be imprisoned if they conducted or admitted conducting deliveries. This perception of fear emerged from coding and analysis of the FGD.

1. b. Lack of access to health facility and financial support

The project manager identified several issues with community infrastructure, such as inadequate and congested roadways and the pressures of population growth, which the person reported as having tripled over the past 20 years. The business manager further described the lack of health facilities available in this rural area. In addition, the TBA facilitator mentioned similar issues and highlighted the lack of financial support for pregnant mothers. In contrast, the business manager believed there is a misconception among mothers that hospitals are prohibitively expensive. **PM**: (project manager)

So I think inaccessibility to health services is one of the factors, why mothers opt to deliver from their home.

Financial and infrastructural in terms of the roads. Surely, it has just started raining here, if you move 15 kilometers from the town to many places, you will get stuck. Even a motorcycle may not go through. So assuming that a mother wants to deliver 20 kilometers (away), it becomes hard.

TF (TBA facilitator)

Plus it is very far and no transport, no money, so they (mothers and family members) would refuse.

BA (business manager)

Secondly, in the rural Masindi district, apart from the government hospital, this is the only other health facility that gives delivery services.

Some of them also have a misconception about hospitals, they think hospitals are very expensive, hospitals are for the rich.

1. c. Home-based birthing places as alternative to health facility

Though the FGD were planned with the seven TBAs, one of the midwives suggested that we seek demographic information from the TBAs in a private manner because one of the questions included "place where they delivered the babies". The answers to this question required privacy. Providing privacy and protection, especially to the vulnerable TBA population regarding personal information, reflects our application of the feminist perspective to this research. In keeping with the flexibility recommended in focused ethnography, individual demographics were collected during a break in a private space, to respect the concerns for privacy. After the break, participants returned to the focus group. According to the TBAs' answers, home-based births occur in various remote areas such as in a hut, at the banana plantation, near the roadside, near a lake, or on a farm. In those remote areas, the TBA is usually conducting the birth by herself; therefore,

the neonate and the mother receive the care simultaneously from one person. Attention to the neonate, who may need immediate attention to assist with breathing, may be delayed until after the mother receives care. As mentioned by the nursing manager: "The midwife at the hospital or facility has someone else to assist as needed, and the TBA is the only one taking care of the mother." In contrast, the TBAs during the FGD gave the following responses to the question, "Do you ask for help if the baby is having difficulty breathing?"

1) No

2) We use our knowledge to save the baby.

3) It is already an emergency, call for other attendant (TBA) to help.

1. d. Access to TBA education /knowledge and airway management supplies

The TBAs' formal education ranged from primary level 4 to secondary level 6. The TBAs had vast childbirth experience ranging from 12 to 21 years. Most of their knowledge base did not align with current HBB standards of care. The five steps of the HBB guidelines is as follows: 1) Recognizing infant not crying, 2) Positioning head, 3) Clearing the airway, 4) Stimulating, 5) Recognizing breathing, 6) Initiating ventilation within one minute.

During the FGD, the TBAs shared the following responses relaying their knowledge of neonatal airway management. One of the FGD questions is responded as follows.

Describe if the baby is having difficulty breathing, how do you help the baby?

- We use the "Panga" (a farming tool to cut large stems similar to machetes) to bang together and create a loud noise over the head to wake the baby up.
- 2) Hold the baby upside down and slap on the legs.

- 3) Wipe nose and mouth with a cloth.
- 4) Provide oxygen as fresh air by fanning with a cloth.
- 5) Refer to the hospital when everything fails.

For example, only one of the HBB guidelines for helping a neonate in distress is "stimulation" by slapping the child's legs, followed the step four of the guidelines. The other responses reported by the TBAs' did not align with the current HBB guidelines for neonatal airway management, such as loud noises to wake the baby and fanning with a cloth to provide fresh air and oxygen. The lack of adequate supplies for TBAs to conduct a safe childbirth was evident in several accounts from the midwives, the TBAs, and their facilitator based on following responses to the question below.

What things or equipment would you like to better take care of the baby?

The midwives in the FGD identified equipment that they had seen or knew was used in birth kits in previous years when births by TBAs were legal:

- 1) Bulb syringes
- 2) Scissors
- 3) Clamping forceps
- 4) Protective gear, such as boots, aprons and uniforms.
- 2. Cultural practices, attitudes and beliefs at community level that limited access to health care facilities for females in a disenfranchised social position
- 2. a. Cultural practices

The project manager (PM) described two rituals that typically occur to bless the newborn.

PM (project manager)

1) Many of our communities they believe that when a mother delivers, you should get the placenta, then the father of the kid should go dig a hole in the corner and

bury that one. We call it "Umuko". Carries the child to adulthood and provides a good life.

2) Traditional "leaves", so they squeeze it immediately when the baby is born, after certain time they pour the "leaves" (over the baby's body) to give blessings to the baby. So... married by a very rich man or if the baby is a man, he will be very courageous.

These rituals reflect a significant desire to provide a better future for the child, yet it is

difficult to accommodate those cultural practices at the health facility. Therefore, births

by the TBAs in a home-based environment provide opportunity to accommodate the

families expected cultural practices.

2. b. Cultural beliefs and attitudes

The project manager noted privacy and birth attendant age as reasons why mothers deliver at home.

PM (project manager)

...they feel it is not good for a younger midwife or any midwife whom you are older than to see you naked. Rather go be delivered by very old Traditional Birth Attendant. Culturally, that is how they see it.

The mothers are not comfortable having younger women as midwives, which is more likely to occur in the health facility. Mothers feel that their privacy is maintained better at home with a midwife who is older.

Sister N, a midwife, clearly communicated during an interview that midwives are respected as long as the baby delivered is alive. If the baby dies, which may not be due to the midwife's skills, she feels that the community will directly point to her as the cause of the baby's death. It is difficult for the midwife to say the words, "dying" or "the baby is dead"; instead she uses the word, "opposite."

MW (midwife Sister N)

They always respect the midwives. First of all we bring new life to the community and the mother. But when it becomes the opposite, they say "you killed the baby, you killed my child".

Sister N also recognized that the TBAs are discouraged from practicing and they have less knowledge. She thinks the mothers who receive services from TBAs are "behind" and are not progressive enough to receive services from the hospital. This account identifies a social barrier between TBAs and midwives. Another social barrier noted by the public health coordinator was that mothers do not take advantage of antenatal care services that are offered free at the MKMC, due to culturally based reasons. They fear that the facility will not respect their cultural practices or the rituals expected in pregnancy and childbirth.

3. Facilitators to assisting the TBAs in accessing educational resources of neonatal airway management from a previously non-supportive social system

3. a. Midwives have adequate education to teach TBAs

All five midwives at the MKMC have at least three years of education and have been practicing midwifery from three to eight years. The nurse manager's dual profession as a midwife and practicing nurse anesthetist equip her with excellent teaching skills in neonatal airway management. All staff midwives were able to verbalize the HBB guideline steps very clearly and they thought that most of the basic steps can be taught to the TBAs.

3. b. Value to the medical center to provide educational resources for the TBAs

The MKMC is willing to hold training for the TBAs because it will benefit their Center. If TBAs are taught at the Center, they will likely refer more mothers sooner to the

facility. The business manager expanded on that by saying that educational programs for TBAs at the facility will build positive relationships between midwives and TBAs and, thus, increase trust and facilitate teamwork for taking care of mothers and neonates. Another benefit noted by the manager is that Center-based training will provide an opportunity for the midwives to receive continuing education and review; moreover, the midwives will act as "change agents" for their own empowerment as well as the TBAs in delivering more effective and safe neonatal care. The business manager summarized the overall benefits of a training program this way:

BA (business manager)

I appreciate that one (*Refers to the process to teaching TBAs at the facility*), it is a great thing for the Traditional Birth Attendants, for the midwives, and even for the management team within here, because we can make advance in our communities by assuring that our mothers have safe deliveries. Those who cannot make it to the facility, because we still have a number that cannot make it, will be handled by those we shall have trained and what I want to assure you that, even these who come here for training, the number may look small will obviously take this information to their colleagues where they come from... this may help the number of our referrals to grow.

4. Learning Preferences of the TBAs that privilege their formerly marginalized strengths.

TBAs with a low literacy level expressed various learning preferences, defined as individuals' preferred means for absorbing new information and retaining skills (Dunn, 1986). The TBAs were willing to learn neonatal airway management and were enthusiastic about receiving new information. During the FGD, when asked if there were different ways of helping the baby breathe better, would you like to learn them? All the TBAs answered "yes". 4. a. Use of local language and culturally appropriate learning preferences

The TBA facilitator voiced that the person planning training needed to become familiar with their local living areas before creating training methods for TBAs and midwives.

TF (TBA facilitator)

You have to go to their areas ... You have to look at their homes, so when you call them for training and being that they will be trained, you have to be exemplary in the community, so that one will take some time. It is the assessment.

In addition, to the assessment of the environment, TF mentioned the need to use the local language. The training materials, e.g., the first five steps of the HBB guidelines, have to be translated. The TBA facilitator verbalized willingness to help translate the five steps in the local language. "You can even get help to translate in local language, draw picture and we shall team up." The TBA facilitator followed up by describing the teaching process that she has used successfully to teach TBAs.

TF (TBA facilitator)

Before you start training, you give them a pre-test. They may not know how to write, but we formulate questions. You sit with her as you are counseling her. For example, how do you get to put (place) the baby. How do you do this and this. They can tell you what they do, and you can identify what you are going to teach them, during that interview. Then you start the process for two weeks, and then afterwards, give them a post test. Then you set them to go (to perform), in the community. There are three phases... pre-test, performance, and post-test.

The public health coordinator (PC) who teaches preventive health sessions for the

village communities also described a similar process to follow up existing training.

PC (public health coordinator)

Problem solve with them, why are you not doing that or is there some additional challenge as you had not initially perceived. I think, not just using visuals and using demonstrations, but also understanding education learning is a process. It just does not end at the training session. Sometimes needing additional support and follow up.

4.2 Preferred learning methods

Further discussion regarding learning preferences occurred during the interview

with the TBA facilitator. The MKMC midwife, who accompanied the researcher, and the

TBA facilitator exchanged ideas about learning preferences for the TBAs.

TF (TBA facilitator), MW (midwife)

TF – They have flip charts. They even show them videos, or a scenario, or a drama.

MW- or a song

Learning preferences, such as a pictorial chart, a song, a poem, a scenario or drama, or a demonstration as suggested by the TBA facilitator, the midwives, or the public health coordinator as methods were, later confirmed by the TBAs during one of the FGD questions.

How would you like to learn and remember the steps to help the baby breathe?

1) Use of charts containing with pictures

2) Through demonstration, drama

3) Use of poems, song

The nursing manager (SF) and the public health coordinator (PC) further emphasized re-demonstration and engaging the TBAs to develop the teaching material and to critique their peers during the training. Both SF and PC agreed that paper format to take home such as pamphlets will not work for TBAs to learn and remember the

resuscitation steps; rather a song or poem can be remembered and taught to others in the

village area.

SF (nurse manager)

Here what we tell them, because most of them they are illiterate, so we call like few people, we teach them and it is normally through demonstration and then if we have some charts for the baby from step one to maybe five, this is what we can do. To teach them and if you want return demonstration you can also ask for someone who is willing to come up and demonstrate but mostly it is through demonstration and telling them what exactly they can do. Because giving them the paper may not help much.

PC (public health coordinator)

To be more visual or hands on, less verbal based.

I will show a short video, but it is something visual or audio, that will get people thinking about the topic and what they already know or what they what to learn.

Actually demonstrating, and then I give them time to actually have a volunteer come over. Few volunteers we have them trying to do the steps and rest of them will give feedback. They can say "oh no, no, no that not right, you need to do this." They will try to say what the next step for that person to perform. And then ...sort of assessment at the end to see whether or not that they are able to do it.

So I think as long as it is connected together, because just teaching the song, they will remember the steps, but they might not be able to implement the steps. I think if we can connect them with the demonstration, and going line by line through the poem and then putting it all together with the poem and having them practice all together. I think if there is a way to connect them. I think that will be helpful. In general a lot of people here, they are very big on drama, very big on songs something they relate to, and it is part of culture.

Learning preferences such as demonstrations, pictorial charts, poems, songs, and drama

were revealed as culturally appropriate.
Discussion

This qualitative study used the focused ethnographic approach with a group of midwives and TBAs in rural Uganda to identify and explore facilitators for, and barriers to, learning and implementing skills for effective neonatal airway management for the development of future training. By applying the feminist perspective during data analysis, the investigators identified four categories in the qualitative data: (1) barriers to providing neonatal airway management in home-based births based on social inequalities; (2) cultural beliefs in TBA practices that limited access to services for female workers in a disenfranchised social position; (3) facilitators to assist the TBAs in accessing educational resources from a previously non-supportive social system; and, (4) learning preferences of the TBAs that privilege their formerly marginalized strengths, which use more hands-on strategies and shared lived experience to compensate for low literacy.

In keeping with the focused ethnographic method, interviews, FGDs, and field notes from observations were coded line-by-line, with a focus on beliefs, attitudes, inferred social and cultural contexts and behaviors within the participants' world. These codes were grouped into the four listed categories, using a process of sorting within the groups of data (interviews, FGDs, and field notes), looking for replications across the data groups, and examining codes that differed across groups, as described by Silverman (Silverman, 2006). As Wall describes (Wall, S. 2015), the ideas, beliefs, and values of how the see their world, the skills and activities they refer to what they do in their world, and references to power and control make up how these categories are derived from this structured comparison.

Barriers to provide neonatal airway management in home-based births on social inequalities experienced by TBAs and mothers

In this local context, barriers for TBAs to provide neonatal airway management in home-based births are due to several factors. These factors include hierarchy in the health care system, limited education, limited resources, and an environment that is not conducive to patient safety, inadequate equipment, and specific cultural practices. Within the Masindi district, the hierarchy of the health care system creates a barrier in which TBAs are placed lowest in the social and health system, a status that limits their access to support and resources. Framed in a perspective of ecological feminism, a hierarchical structure is one of the four concepts described in a patriarchal society (Warren, 1994), where the highest position retains the ultimate control. Keating and colleagues (Keating, 2007) also described a similar hierarchical system within a maternity unit where the obstetricians ranked highest, followed by senior midwives, and then junior midwives, who received the least support with their decisions. TBAs were perceived as least important within the Masindi health care system according to the accounts of the managers and midwives, yet the TBAs provide care for more than 40% of the births in the local rural areas. TBAs are also the least formally trained health care providers among all the MCH care providers (nurses, midwives, physicians) (Wilson et al., 2011).

TBAs receive their training mostly by apprenticeship, rather than formal training. In the past, the World Health Organization has developed programs for TBAs such as Essential Newborn Care (WHO, 2012), but currently TBAs are discouraged from conducting births in the Masindi district. The TBA facilitator voiced her concern that TBAs are "afraid they will be imprisoned" if they conduct births. However, the mothers

cannot easily reach the health care facility to give birth, nor are there enough midwives to assist the mothers at home with the births. These constraints provide a strong rationale for TBA practice, where access to approved facilities is difficult, midwives sanctioned officially for deliveries are too few, and TBAs are currently prohibited by law from conducting deliveries at home. TBAs would like to provide their services as birth attendants, but remain marginalized and oppressed by the hierarchal system.

Several studies that used the feminist perspective have concluded that oppression plays an important part in determining who does not receive information and who does not participate in decision making in a health care system (Kaphle et al., 2013; Keating, 2007). As a response to oppression, conscientization provides a means for developing a critical consciousness of oppression, a consciousness that is understood to have the power to transform reality (Freire, 2000). Other concepts, such as the importance of dialogue (Freire, 2000), were applied when the primary investigator was speaking with TBAs at the study site. The process of dialogue involves building trust, as stated in the following observation: "Founding itself upon love, humility, and faith, dialogue becomes a horizontal relationship of which mutual trust between the dialoguers is the logical consequence" (Freire, 2000, p.91). In planning for future training, the use of conscientization as a form of consciousness-raising and dialogue as a pedagogic strategy can function as threads in curriculum design. Freire's concept of conscientization is also recognized by Werner and Bower, who authors' a guide book how to teach health care providers in LMIC and emphasizes that training courses need to be modified for each area and each time it is taught as recipients of the knowledge may vary each time (Werner & Bower, 1982). The TBAs at the end of the FGD were eager to plan the

training session with the midwives as they seem to have developed a bond during this time.

Cultural practices, attitudes and beliefs at community level that limited access to health care facilities for females in a disenfranchised social position

Cultural practices

The concept of culture is embedded in the ethnographic approach (Spradley, 1979). Culture is a system where accumulated knowledge and experiences are shared by a group of people and reflected in their behavior (Spradley & McCurdy, 1987). The importance of cultural values, and in particular cultural beliefs practiced with rituals during childbirth, were revealed through the data collection. Cultural rituals, such as burying the placenta at the home site, represent creating a foundation and a positive future for the child. The lack of this cultural practice and others that may not be allowed in a health care facility discourages the family's expectation for the child's best possible life, while restricting access to the safest neonatal resuscitation practices available. Efforts can be made in future to involve facility managers in a dialogue about more inclusive practice.

Cultural attitude of privacy

The TBA facilitator and the project manager highlighted the cultural practices that influence the mothers' preferences during birth, stating that women felt most comfortable having their births attended by older women. At the health care facility, midwives may be younger than the mothers, so culturally they may not be accepted to attend births. Mothers may question the experience of younger midwives compared to the TBAs who typically are older women. According to the focus group demographics, the age of TBAs

in this study ranged from 42 to 68 years old. Another childbirth preference revealed by the TBA facilitator is that mothers prefer to give birth in a private place such as their home, a banana plantation, or at a lake side. Those sites are considered private, compared to the health facility maternity ward, in which they are surrounded by strangers in an unfamiliar setting beyond their control and without family support.

From a feminist perspective, regardless of safety concerns for childbirth occurring outside of the health care facility, the TBAs respect the women's privacy and their preference to give birth in a home or private environment. Kaphle and colleagues (2013) reported that Nepalese women living in a rural mountain area preferred to give birth at a private place outside of the house, e.g. in a cowshed, to maintain their socio-cultural tradition (Kaphle et al., 2013). This feminist perspective to preserve privacy is reflected by the cultural belief to respect the mother's preferences.

Facilitators to assisting the TBAs in accessing educational resources of neonatal airway management from a previously non-supportive social system

Consistent with the ethnographic research approach, the factors that influence and facilitate the learning process for TBAs regarding neonatal airway management were explored, before planning or launching an intervention in the future to improve neonatal care. These facilitators included the need for learning and for educational resources that would affect the health care facility and the whole community. The TBA facilitator recognized the need to educate the TBAs on neonatal airway management because they are frontline providers during childbirth. The TBA facilitator also emphasized that education will increase TBA morale. During the focus group discussion TBAs explained they were willing to learn new skills, and they verbalized that they would organize with

other TBAs to participate in training. The focused ethnographic approach in this study enabled a demonstration of reciprocal respect for the TBAs who are marginalized in their work as MCH providers. The invitation to the MKMC for the focus group discussion signaled acceptance. The TBAs were accepted by the midwives with love, humility, and faith as part of the maternal-child health care provider community in the region, while also encouraged to bring mothers to the Center (Freire, 2000).

The educational resources can be provided by the staff midwives at the MKMC. They have adequate education to teach neonatal airway management to TBAs. During the observation phase, the researcher witnessed how a midwife resuscitated twins with just one ambu-bag. The midwife followed the HBB guidelines and taught the junior nurse how to assist her. The midwives were very enthusiastic about translating the basic HBB steps into the local language to teach the TBAs. This teaching opportunity provided them recognition within the MKMC and allowed them to gain Continuing Education Units, part of the already expected requirement in the facility. This opportunity also built bridges of trust between the TBAs and midwives while breaking social cultural barriers separating providers at the healthcare facility and home-based providers. The Community Health Care Workers who are part of the Masindi Health Ministry system played a vital role as liaisons between the Midwives and TBAs.

As an example of a facility committed to reducing infant mortality, the managers recognized the value in teaching the TBAs basic neonatal airway management steps. The managers envision a training program that will take place at the MKMC in the future, in which the TBAs will refer the mothers to that facility. This relationship will increase the MKMC's patient volume. Their midwives will need a refresher course annually to teach

the TBAs, which will help maintain their skills. One of the managers pointed out that this program can enable the midwives to become "change agents" and empower them to succeed in their profession. This example reflects a common response to building teamwork between different levels of community-based health workers in lesser-resourced countries, as Bhutta and colleagues (2011) and Bang (2005) describe. The overall gain for TBAs and midwives is that knowledge provides power. Fahy (2002) used Foucault's power/knowledge concept to explore women's knowledge to empower them to experience the type of childbirth they desire (K. Fahy, 2002). Another overall gain is for the MKMC to gain respect from the villages and the community. The whole community situated around the MKMC will benefit from a better standard of care practiced within the center and in home-based births. Social barriers between the community and the MKMC will be lessened because educational programs will be shared by all the MCH providers serving the community.

Learning Preferences of the TBAs that privilege their formerly marginalized strengths

This study addresses learning preferences of adults with a low literacy level using a feminist lens and Freire's concept of literacy empowerment. The feminist perspective acknowledges the value of a non-hierarchical system and environment where interactive peer learning can occur, a finding that emerges in the willingness of the facility and TBAs to consider future collaboration beyond the limits they describe. Additionally, Freire's concept of active dialogue between teacher and student reflects a key learning preference of TBAs. Previous studies by Sibley (2006) and Gill (2011) used demonstration and time-honored methods to teach TBAs. Similar teaching-learning preferences were revealed in our research data. Data collection through various sources

using the ethnographic approach revealed other common learning preferences: demonstration, pictorial materials, songs, poems, and drama. These learning preferences can be presented in a systematic process. First, the teaching materials must be translated into the local language. The MKMC midwives have translated the first five basic steps of the HBB guidelines for neonatal airway management program into Runyoro, the local language of the Masindi region of Uganda. Second, the learning environment must be non-hierarchical, whereby the midwives and TBAs create a dialogue among themselves in order to discuss and build upon their baseline knowledge of neonatal airway management. The TBAs have low literacy but vast experience with home-births, whereas the midwives have the current standard of knowledge regarding neonatal airway management. This learning-by-dialogue can formulate HBB basic steps into a teaching song, poem, drama, or pictorial scenario. In that learning process, TBAs should feel ownership of the translated teaching materials.

Limitations

The ethnographic approach for this study has the following limitations: a) small sample size, b) intensive nature of data collection in an low resource setting, c) findings that are difficult to generalize, d) subjectivity of interpretation of cultural beliefs and values, and e) the need for the researcher to be accepted into the culture of the Masindi area (Goodson & Vassar, 2011).

a) The small sample size is due to the limited number of healthcare providers in the rural area near Masindi, Uganda. Hence, the focus of this study was to explore the perceptions of a purposeful sample of MHC providers in an

area of limited health care resources. The limited sample size allowed the researchers to analyze and manage the in-depth information collected.

- b) The pursuit of data in rural Uganda makes information gathering difficult, with limited transportation, unpaved roads, working across three languages, and restrictions about movement between settings related to security and the threat of violence.
- c) In considering generalizability, communication with this specific group of TBAs and midwives depended upon the midwives as interpreters though not trained as interpreters, which holds the possibility of filtering, selective interpretation, and undue influence on what was said (Yudes, Macizo, & Bajo, 2011). Moreover, the TBAs may not have felt safe providing criticism or feedback about the midwives and their approach to teaching/learning, since they served as interpreters. However, the audit trail of recordings provides a means of confirming veracity for this specific data, with outside interpretation.
- d) Another limitation involves data collection using the participantobservation technique, which is inherently subjective (Mack, Woodsong, MacQueen, Guest, & Namey, 2005); yet the benefits of gaining the aforementioned insights may well override those limitations. Qualitative studies have documented threats regarding validity and reliability (Whittemore, Chase, & Mandle, 2001). The researcher was able to use several data collection techniques to offset that risk of subjectivity, e.g., participant observations, photographs, field notes, focus group

discussions, and semi-structured interviews with key informants. Multiple data sources and a clear audit data trail ensured triangulation and credibility of findings. Triangulation of data provided validity for the study. There is an opportunity for reliability if this study is replicated in a similar LMIC environment(Anderson, 2010).

e) Reflecting on the need for the researcher to be accepted into the culture of the Masindi area, the qualitative findings may apply only to the rural areas of Masindi, Uganda. However, they give the researcher an opportunity to generate future hypotheses and propose future culturally tailored interventions using HBB guidelines to teach neonatal airway management in rural areas of other LMIC that have similar clinics and maternal-child demographics. The ethnographic approach can be challenging for a novice researcher; therefore, a faculty member with expertise in ethnographic research and midwifery mentored this investigation.

Conclusion

The disparity in neonatal mortality rate between LMIC and high-income countries has been addressed since 1990 by the WHO and the United Nations (UN). Neonatal deaths caused by birth asphyxia (hypoxic events) occur more often with home-based births versus health facility-based births (Wilson et al., 2011). Because 60% of the births in LMIC occur in home-based environments and are attended by TBAs or family members Bhutta and Singhal (2008), we explored factors that affect TBA provision of neonatal airway management in order to alleviate hypoxic events in one community setting, MKMC, in Uganda. This qualitative focused ethnographic study revealed four

main categories regarding Ugandan TBAs' ability to provide adequate neonatal airway management: 1) barriers to provide neonatal airway management in home-based births on social inequalities, 2) cultural beliefs in TBA practices that limited access to services, 3) facilitators to help TBAs access educational resources, and 4) learning preferences of the TBAs for gaining new knowledge. Findings regarding TBA and midwives learning preferences portray that the current inadequacy of educational resources for teaching and learning neonatal airway management in rural areas of LCIM can be addressed as the basis for future research. Facilitators identified in this study, including the interest among participants in a midwife/TBA collaboration to develop future training/protocols. The training intervention can include measurement of knowledge competency and selfefficacy with educational resources tailored to Ugandan TBAs' learning preferences for demonstrations, songs, poems and specific scenarios, utilizing the voices of TBAs and midwives in this study for guidance.

Key clinical implications

By using the learning preferences of the TBAs for a scaled up, joint effort of training midwives and TBAs, the investigators can adapt the first five steps of the HBB program. Those neonatal airway management steps can be made more culturally appropriate for Masindi town in Uganda by integrating the findings of this study and relationships built in intervention mapping and development. Another insight gained during this study is the role of dialogue in the development of inter-professional bridges between midwives and TBAs. Such relationships built trust that will promote the exchange of knowledge regarding neonatal care, including airway management.

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Table 1. Seven characteristics of ethnography

	Characteristics of Ethnography (LeCompte & Schensul p.12)	Study
1	Natural setting not laboratory.	Maternity clinic in MKMC a rural area in Uganda and affiliated villages.
2	Involves face to face interactions with the participants.	Face-to-face interactions occurred as the researcher presumed the role of participant – observer during 10 days of volunteering in the labor and deliver rooms with midwives and in the operating room with an anesthetist to observe the airway management skills.
3	Presents an accurate reflection of participant perspectives and behaviors.	Accurate reflection of the midwives' perspective regarding newborn care and airway management gathered by interviews and observation during newborn care.
4	Uses inductive, interactive, and recursive data collection and analytic strategies to build local cultural theories.	Observations and perceptions collected to determine their beliefs about the initiation and support of newborn respiration, training for neonatal airway management, and cultural practices associated with assisting breathing during the perinatal period.
5	Uses multiple data sources, including both quantitative and qualitative data.	The researcher will collected data from multiple resources by observing the environment where the TBAs and midwives practice at the MKMC, in particular, direct observations using the ENC guidelines during immediate newborn care. Observing the TBAs and midwives interacting with the other staff members will provide the researcher with insight of their communication skills. Additional data regarding health care providers' structural organization by hierarchy collected during semi- structured interview with the clinic director. Interactions during FGD with TBAs A quantitative checklist adopted from the Neonatal Resuscitation Program and HBB program. Guideline components followed during births, for simple

	Ethnography (LeCompte & Schensul p.12)	
		frequencies and patterns, while observing 3 births.
6	Frames all human behavior and belief within a sociopolitical and historical context.	Historically, midwives and TBAs have provided a majority of maternal child health (MCH) care in rural areas of developing nations. Due to current global awareness of higher neonatal mortality rate compared to the high income countries, the WHO has addressed the Sustainable Development Goal #3 to reduce the mortality rate and focus on teaching MCH providers adequate neonatal resuscitation management.
7	Uses the concept of culture as a lens through which to interpret results	This study explored the cultural practices, values and beliefs of newborn care and airway management provided by the midwives and TBAs in rural clinic in Uganda.

Study

Table 2. Application of Focused Ethnographic Characteristics

Characteristics of

Focused ethnographic characteristic	Application to this study
Conceptual orientation of a single	Single PI (Marvesh Mendhi)
researcher	
Focus on a discrete community	Rural area of Masindi, Uganda
Used in academia as well as for	Future development of culturally tailored
development in healthcare services	neonatal airway management intervention for
	TBAs
Problem focused and context-specific	To reduce neonatal deaths caused by birth
	asphyxia
Involvement of a limited number of	Limited to total of 12 (midwives and TBAs)
participants	Three clinic manager, one TBA facilitator and
	one public health coordinator
Participants usually hold specific	Newborn care knowledge and practice
knowledge	
Episodic participation observation	Two weeks of preliminary visit followed by
	two weeks for data collection visit to Masindi
	Uganda by the PI to participate and observe
	newborn care and airway management

Table 3. TBA Focus Group: Demographic Detail Questionnare

SUMMARY

Due to low literacy of TB As, demographic information were verbally taken and recorded by the staff midwives at Masindi Kitara Medical Center. This took place individually (one-on-one) to provide privacy for the Traditional Birth Attendants to answer the questions.

TBA number	Years of experience	Average # of childbirths assisted per month	Type of education for childbirth and level of education	Practices and professions besides MCH	Age	Male/ Female
1.	21 years	5 without referral	Secondary 1 Trained TBA Counseling HIV patients	Tailoring Farming	63 years	Female
2.	21 years	6 handled 5-6 referred 10-12 total	Primary Trained TBA Counseling HIV patients Family planning	Farmer	60 years	Female
3.	More than 15 years	6 or more	Secondary 2	Counselor VHT TBA Community based facilitator Farmer	54 years	Female

TBA number	Years of experience	Average # of childbirths assisted per month	Type of education for childbirth and level of education	Practices and professions besides MCH	Age	Male/ Female
4.	12 - 15	1 - 2	Secondary 4	TBA	42	Female
	years	Most are referred		Nursing A Farmer	years	
5.	20 years	15	Primary 4	L. C. 1 (local	65	Female
			Trained TBA	district) Chairperson	years	
6.	19 years	30	Primary 7	Peasant	60	Female
			Trained TBA	Farmer	years	
7	15 years	4 - 5	Primary 6	Peasant Farmer	68 years	Female

Summary

This dissertation contributed to answering the overarching question of: what are the perceptions of TBAs and midwives regarding factors affecting their practice of neonatal resuscitation? This dissertation study supported identification of facilitators and barriers to implementing neonatal resuscitation in rural Uganda and the findings will inform future development of community-based, participatory training for TBAs.

The first manuscript, an integrative review, examined the specific interventions available to train TBAs in neonatal resuscitation along with the associated knowledge, self-efficacy and mortality outcomes. This review also revealed limited current educational resources available for the TBAs. Most of current training is geared towards the health facility-based, formally trained provider, rather than home-based providers such as TBAs who have low literacy levels (Kak, Johnson, Mcpherson, Keenan, & Schoen, 2015). In addition, this review identified the most effective methods used to disseminate the knowledge according to TBAs comprehension level and the local cultural appropriateness. The majority of training interventions were established programs that included Home-Based Life Saving Skills (Sibley, Buffington, Tedessa, & McNatt, 2006), the Safe Motherhood Applied Research and Training method (Miller, Rashida, Tasneem, & Haque, 2012), the simplified NRP and Helping Babies Breathe (American Academy of, 2011) in collaboration with American Academy of Pediatrics. Teamwork between TBAs and community health workers or family members was also suggested as a more sustainable approach to promote effective neonatal resuscitation, particularly for homebased births (Bang, Bang, Baitule, Reddy, & Deshmukh, 2005; Bhutta et al., 2011). The teaching methods that were culturally appropriate included pictorial format, group

discussion, demonstration, simulation with mannequins, and traditional "call and response" teaching and learning in local languages. The HBB program which is based on the NRP used a combination of the above mentioned teaching methods (Ersdal & Singhal, 2013; Kak et al., 2015). Currently, HBB is utilized in 77 low resource countries and translated in 26 languages (Kak et al., 2015) that can be further adapted for TBAs in rural Uganda.

Neonatal resuscitation is a skill, which requires the health care provider to respond immediately with confidence to revive the neonate within one minute (Olson et al., 2015; Singhal et al., 2012). The neonate who is experiencing a hypoxic event needs immediate resuscitation, otherwise, the consequences result in brain damage (Kak et al., 2015). The burden of long term impairment due to hypoxic brain damage significantly affects the population of LMIC (Wall et al., 2010) Therefore, self-efficacy, a predictor of one's capability to perform the skill confidently, is a necessary evaluation of the training program.

The second manuscript, also an integrative review, evaluated self-efficacy instruments to synthesize the evidence to guide appraisal and adaptation of instruments that measure self-efficacy in neonatal resuscitation training programs for providers in low and middle-income countries. This review incorporated the underpinning of the Social Cognitive Theory (SCT) described by Bandura (Bandura, 2001). According to SCT, selfefficacy is the perceived personal capability to perform an action that leads to a necessary outcome (Murphy & Kraft, 1993). Self-efficacy during neonatal resuscitation refers to a provider's ability to learn and confidently initiate and perform essential resuscitation skills efficiently and correctly, as well as the ability to direct others to perform those

skills successfully if necessary (Zaichkin, American Heart, & American Academy of, 2000). Eight instruments were reviewed and the key components included validity, reliability, and application of theoretical framework, and adaptability for providers with low literacy level practicing in LMIC. Two instruments, SEPRO-R and SEBM-VQ can be adapted for providers such as midwives and traditional birth attendants in LMIC as these instruments were used in Ghana, a LMIC (Brennan et al., 2013). These instruments were noted valid, reliable, incorporated fewer items, and utilized Visual Analog Scale (VAS) which can be easily comprehended by the providers with low literacy level.

These two manuscripts provided robust review regarding types of neonatal resuscitation training and evaluation with self-efficacy instruments, necessary for a future training intervention focused for traditional birth attendants and midwives practicing in rural areas of LMIC. Self efficacy is one of the criteria for evaluating the effectiveness of training programs; however, studies that reported higher self-efficacy during training sessions did not always match with the skill performance. Personal performance by "mastery experiences" is one of the most direct and powerful factors affecting selfefficacy (Bandura, 2001). Therefore, neonatal resuscitation training programs would benefit from allocating more time to practice the skills in a culturally comfortable environment. Instruments that measure self-efficacy during training sessions need to be culturally appropriate and specific for that particular environment to have optimal possibility to match the level of skill performances. Mismatch of self-efficacy scores and adequate skill performance can create an untoward event during an actual resuscitation. Systematic review of resuscitation training in LMIC by Meaney and colleagues also noted the mismatch between self-efficacy and knowledge retention (2010). Future

interventions should be designed to place equal importance to promote adequate knowledge of neonatal resuscitation and providers' self-efficacy to perform the skills.

This foundation supported the study reported in the third manuscript, which provides preliminary data on the perceptions of TBAs and midwives regarding neonatal airway management, to inform a future resuscitation training program. This manuscript describes use of a focused ethnographic approach to capture the "voices" of TBAs and midwives' to uncover facilitators and barriers to implementing neonatal resuscitation in rural Uganda and address the overarching question as mentioned above.

The third manuscript provides a report of a qualitative study using a focused ethnographic approach to collect the data in rural Uganda. The data included field-notes, photographs and observations of midwives. In addition, six semi-structured interviews were conducted with one staff midwife, three managers, one public health coordinator, and one TBA facilitator. A focus group discussion was conducted with seven TBAs. The data was analyzed using the critical feminist theoretical stance. Four major categories revealed: (1) barriers to providing neonatal airway management in home-based births based on social inequalities experienced by TBAs and mothers; (2) cultural practices, attitudes and beliefs at community level that limited access to health care facilities for females in a disenfranchised social position; (3) facilitators to assisting the TBAs in accessing educational resources of neonatal airway management from a previously nonsupportive social system; and, (4) learning preferences of the TBAs that privilege their formerly marginalized strengths.

Barriers were further defined as hierarchy within the health care system where TBAs experience oppression, lack of access to health facility, equipment, financial

support and educational resources. Cultural practices, beliefs, and attitudes collectively prevented mothers from seeking care at a health facility; therefore a home-based practice conducted by TBAs was preferred by the community village members, as reported by study participants. As one facilitator, staff midwives were observed to be competent in neonatal airway mangement to teach the TBAs. The TBA facilitator was also very eager to learn and facility managers were willing to promote training at the MKMC, which in return may increase their patient volume by strengthening their relationship with the village community members. Learning preferences were indicated as pictorial chart, song, poem, scenario drama, and demonstration of skills.

This focused ethnographic approach used structured observations and face to face interactions to obtain data concerning the perceptions and behavior of the study group (Lecompte & Schensul, 2010). A feminist theoretical framework guided the analysis and identified additional training, resources, and supports needed to build self-efficacy and confidence in airway management for TBAs and midwives. This study addressed the 60% of all rural area births in LMIC occurring in home-based situations (Bhutta et al., 2011; Singhal & Bhutta, 2008), which represents a significant missed opportunity, since most of the neonatal training resources are geared towards facility–based training.

Limitations of dissertation research

One limitation of the first and second manuscripts relates to search terms involved in the review methods. The community health care providers in LMIC are recognized by varied names and categories. For example, the term community health worker may be addressed as lady health worker or lady health visitor in Pakistan or village health worker in Uganda, but does not include traditional birth attendants as indexed by Medical

Subject Headings (MeSH) in the PubMed database. Therefore, key terms would have to be changed in future searches. There are limited numbers of studies published with neonatal resuscitation training that include self-efficacy exclusively for TBAs to provide comprehensive comparison. The limitations for the third manuscript include a small sample size, intensive data collection, findings that are difficult to generalize, and subjectivity of interpretation of cultural beliefs and values. Qualitative studies have documented threats regarding validity and reliability (Whittemore, Chase, & Mandle, 2001) Although, the researcher was able to use multiple data sources to achieve triangulation and credibility of the findings. As a novice researcher, the ethnographic approach can be challenging, therefore, a faculty member from the Medical University of South Carolina with expertise in ethnographic research and midwifery was the primary mentor.

Lessons learned

Besides the intensive data collection, manual transcriptions of interviews were time consuming. Listening to the recordings with Ugandan-English accents was challenging, which took more time than anticipated. The differences in time zones and logistic planning for international research activities can be challenging. Most of the trip logistics were planned by the One World Health Foundation, which was invaluable. These logistical challenges provided lessons learned regarding how to resolve problems in the field, how to organize data more effectively, how to adjust to cultural practices and beliefs that fit participant priorities, and how to build strong relationships that facilitated problem-solving and study success. For example, interview times were adjusted to fit established prayer times in a Christian organization. Additionally, though a preference

would have been to observe TBA deliveries, the MKMC facility and One World Health Foundation felt it could not guarantee investigator safety at the village level. Agreeing to this limit and the success of TBA contact and focus groups did establish trust for potential future village activities. These challenges also shaped insight for the needs of future grant development to support study activities, such as transcription, equipment, a guard for travel, and participant compensation for time and inconvenience.

Importance of theory, model or framework to guide overall findings

This dissertation was guided by three frameworks, 1) social cognitive theory, 2) critical feminist theory, and 3) focused ethnographic methodological framework. Social cognitive theory provides guidance for self-efficacy as one's perceived capability to perform a skill with confidence (Bandura, 2001). For a health care provider to gain confidence during a training session, the environment needs to be conducive to learning, without stress and teaching material using their learning preferences. In order for learning to occur with confidence, the feminist perspective would allow the researcher to view culturally appropriate teaching methods in local language, non-hierarchical environment, teaching and demonstration by peers, similar gender and social class group sessions. The focused ethnographic methodology provided holistic approach to collect data using methods that are culturally appropriate within the local context (Lecompte & Schensul, 2010). Self-efficacy as part of SCT, establishes the base for the dissertation as a guide to evaluate educational interventions for training health care providers, while the feminist stance provides the perspective of perceived facilitators and barriers to neonatal airway management experienced by the vulnerable oppressive population of TBAs in rural

Uganda. These facilitators and barriers are informed using focused ethnographic approach

Research trajectory (researcher's next steps)

Facilitators identified in this study can be used in the future to adapt educational resources tailored to Ugandan TBAs' learning preferences, utilizing the voices of TBAs and midwives in this study for guidance. As a scaled up joint effort of midwives and TBAs, the investigators can adapt the first 5 steps of the HBB program. These neonatal airway management steps can be made more culturally appropriate for Masindi town in Uganda and other similar settings.

Contribution of research to: nursing, interprofessional sciences

This dissertation used an innovative focused ethnographic approach to explore the views of midwives and TBAs who practice simplified neonatal airway management in rural Uganda, to acquire their needs, learning preferences, and comprehension level regarding neonatal airway management. Expanding the views available to nursing, few qualitative studies have addressed the TBAs' educational needs by capturing their "voices". Ethnography is a theory–driven approach that can contextualize the depth of information and broader perspective of a research question(Leslie, Paradis, Gropper, Reeves, & Kitto, 2014). The evidence gathered using ethnography in the nursing and medical disciplines represents the collaboration of social science and health science, an approach used in past studies (Leslie et al., 2014; Reeves, Kuper, & Hodges, 2008) that will enrich this investigator's future research

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Appendix A



Institutional Review Board for Human Research (IRB) Office of Research Integrity (ORI) Medical University of South Carolina

> Harborview Office Tower 19 Hagood Ave., Suite 601, MSC857 Charleston, SC 29425-8570 Federal Wide Assurance # 1888

APPROVAL:

This is to certify that the research proposal Pro00052058 entitled:

Exploring Facilitators and Barriers to Neonatal Airway Management Practices Among Traditional Birth Attendants and Midwives in Uganda: A Focused Ethnographic Approach

Submitted by: Marvesh Mendhi

Department: Medical University of South Carolina

for consideration has been reviewed by **IRB-I** - **Medical University of South Carolina** and approved. In accordance with 45 CFR 46.101(b)(2), the referenced study is exempt from Human Research Subject Regulations. No further action or Institutional Review Board (IRB) oversight is required, as long as the project remains the same. However, you must inform this office of any changes in procedures involving human subjects. Changes to the current research protocol could result in a reclassification of the study and further review by the IRB.

Because this project was determined to be exempt from further IRB oversight, consent document(s), if applicable, are not stamped with an expiration date.

Research related records should be retained for a minimum of three years after termination of the study.

Approval Date: 1/28/2016

Type: Exempt

Administrator, IRB - Medical University of South Carolina

Katherine Bright*

*Electronic Signature: This document has been electronically signed by the IRB Chairman through the HSSC eIRB Submission System authorizing IRB approval for this study as described in this letter.



January 04, 2016

To Whom It May Concern:

Palmetto Medical Initiative (PMI) is a 501 (c)(3) organization that exists to provide quality, affordable healthcare to people in need. Since 2009 we have been working to meet that goal through our efforts in Uganda and Nicaragua and have provided accessible medical care to over 135,000 patients.

PMI commits to going beyond medical relief and investing in the long-term health of the communities we serve. This is done through our medical campuses in Masindi, Uganda; El Viejo, Nicaragua; and Sebaco, Nicaragua. Through education and empowerment of our local staff, PMI seeks to provide a culture of learning and compassion.

It is with great excitement that we extend a formal invitation to Marvesh Mendhi, a MUSC nursing PhD student in the College of Nursing. She has volunteered with Palmetto Medical Initiative (PMI) program at Masindi Kitara Medical Center (MKMC) in Uganda in the past, and plans to pursue her research study at this center. The administration of PMI and MKMC fully support her research efforts.

Please do not hesitate to reach out to me with any questions.

Kindest Regards,

Michael A. O'Neal International Director, Palmetto Medical Initiative

Appendix C Statement of research

Statement of Research for focused group discussions, semi-structured and unstructured interviews. The interpretation and summary of this statement will be provided by the clinic director who speaks the local language.

Study Title: Exploring Neonatal Airway Management Practices Among Traditional Birth Attendants and Midwives in Uganda: A Focused Ethnographic Approach.

Purpose and Background:

The purpose of this study is to explore practices that support (facilitators) or interfere with (barriers) neonatal airway management during the perinatal period (newborn babies birthing problem during childbirth). To identify the perceptions (views) of neonatal airway management training needs, preferences for learning, and access to educational resources. You are being asked to volunteer your time for this research study because you are a clinic director, midwife, community health worker, village leader or Traditional Birth Attendant involved in newborn care. The main goal is to learn about your practice of newborn care and assessment of babies who have difficulty breathing 9how you take care of the newborn baby). In addition, what are your learning preferences and educational resources (how do you like to learn)? The lead investigator in this study is Marvesh Mendhi CRNA, MNA. This study will involve midwives and clinic director from the Masindi Kitara Medical Center and community health worker, village leader, TBAs from the affiliated villages. The study will take place at the MKMC and premises under the Palmetto Medical Initiative.

Procedures:

If you agree to participate in this study, the following will happen. Clinic directors for semi-structured interview

The PI will schedule an appointment (a set time) with you at your convenience during the first week of her one month stay in Masindi. This appointment can be scheduled by the PMI medical director from South Carolina and confirmed prior to her arrival. The interview will take approximately (about) one hour. The location will be chosen by the clinic director. This interview will be digitally recorded. The discussion topics will include; 1) overall description of the MKMC with particular focus on maternal child care, 2) Midwives role in the clinic, 3) policies and procedures regarding newborn care with particular focus on newborn airway management, 4) educational resources available for newborn care, 5) how are the villages affiliated with MKMC, 6) how are TBAs affiliated with the MKMC, 7) how do TBAs access educational resources from MKMC. Midwives for semi-structured interviews

The PI will get permission from the clinic director to spend time with the midwives while volunteering at the maternity ward.

The PI will spend time with you while observing / participating at the maternity ward and take lunch breaks with you during the first week. Notes will be taken throughout the day. At the end of the shift she will recapture (write-down) all the information and share with you for accuracy (correct) and include any additional information. The observation and discussion topics will include: 1) observe and participate with newborn care, 2) your role

in maternity care at the MKMC, 3) education and training, 4) newborn care experience with airway management, 5) access to educational resources, 6) affiliation with the CHW and TBAs, 7) cultural practices in home-based child births, 8) educational resources for TBAs regarding newborn care and airway management.

<u>Community Health Worker or TBA facilitator for semi-structured interview</u> The PI will schedule an appointment (a set time) with you at your convenience during the first week of her one month stay in Masindi. This appointment can be scheduled by the PMI medical director from South Carolina and confirmed prior to her arrival. The interview will take approximately (about) one hour. The location will be chosen by the clinic director. This interview will be digitally recorded. The discussion topics will include: 1) your overall role and responsibility as liaison between the MKMC and the affiliated villages, 2) your affiliation with the TBAs, 3) your perception (views) of the TBAs role in maternal child health care with particular focus on newborn care, 4)your perception of relationship between TBAs and midwives at MKMC.

Traditional Birth Attendants for focused group discussion

The session will be digitally recorded and supplemented with hand written notes and drawing on the flip charts.

The PI will lead the FGD by introducing, getting the verbal consent. The midwives and the CHW will be the interpreters for local language. Each TBA will be given an opportunity (a chance) to answer each question verbally (by talking) and may supplement by drawing on the flip charts. The discussion topics will be :1) length of experience with child-births, 2) form of education, 3) newborn care practice and experience assisting newborn to breathe, 4) describe the environment (place) where child-birth occurs, 5) access to support from family members or other providers, 6) learning preferences , and access to the MKMC or other facility.

Duration:

The interviews with the clinic director and the community health worker may take approximately 60 minutes. The lightly- structured interviews with the midwives will take place while participating and observing at the maternity ward during the first week. There are five midwives and I plan to spend one day with each midwife. This may extend to the second week if necessary.

The FGD will take approximately 3 hrs. The transportation for TBAs to the MKMC will be arranged by the CHW. If transportation is not feasible (available), the FGD may take place during the outreach clinic planned at the designated place by the PMI and MKMC.

Risks and discomforts:

There is no risk of physical harm to all the volunteers who participate in this study. You may feel uncomfortable talking about certain issues, but we reassure you that all the information will be kept strictly confidential (kept private) and you do not have to respond to any questions that make you feel uncomfortable (uneasy). The PI will begin and end all interviews and FGD by asking the participants to agree to the importance of keeping the information discussed confidential. You may at any time stop the interview, choose not to be observed or answer any questions. You may also leave the FGD at any time.

Benefits:

There may not be direct benefit to you from participating in this study. However the information gathered will help us adapt the education information related to assisting newborn to breathe according the cultural practice and resources available here in Masindi, Uganda. The MKMC could have the potential to become the future site to provide the above educational training.

Cost:

There is no financial cost to you to participate in this study.

Payment:

Lunch will be provided for the FGD participants and interpreters. ("Kanga" a cotton shawl will be given to each participant). All of you will be invited to participate in the follow up study to develop and implement the educational material.

Confidentiality:

The PI plans to publish the results of the study, but your personal identity will not be revealed. The information will be kept safe in a locked file cabinet at the MKMC and the data entered into the computer that is password –protected at the Medical University of South Carolina. All audio recording will remove the individual names, transcribed and then files will be deleted.

Employee participation:

Participating in this study will not be part of your job performance, evaluation, or part of your personnel record at MKMC. Your decision not to take part in this study will not affect your employment or benefits.

If you have questions regarding this study, please feel free to contact the primary investigator, Marvesh Mendhi, CRNA, MNA by email <u>mendhi@musc.edu</u>

Questions	stions Probes				
Tell me, how did you	- type of training, - years of experience				
become a midwife?	- apprenticeship				
	- any independent practice outside of the clinic.				
How do you choose your	Is it the mother	Note their priority (responsibility) of			
priority during child birth as a midwife?	- newborn				
	-whole family	care			
How is the midwifery	- respect from the community	How popular and			
practice recognized in this area?	- respect from the leaders	respectful is this profession in this			
How about TBAs?	- respect from the health care workers	area			
	- respect from the mother				
What has been your	- Independently takes care of				
experience taking care of	complications or refers to other the				
sick mothers and babies?	hospitals				
What has been your	- how did the baby look				
experience taking care of a baby who had problem	- what did you first think				
with breathing? (If yes) What did you do?	- what did you do to help the baby				
2	- do you have other people to help you				
What special training have	- when was the training				
you had to help babies breathe?	- easy to understand material				
After observing childbirth (If permission obtained from the mother)					
I noticed you delivered the	-do you always have assistance to take Take note of a				
baby by yourself and had an	care of the newborn	the instructions			
assistant to take care of the		given to take care			

Appendix D Semi-structured interview guide for Midwives Establishing relationship with Midwives
baby while you finished	- do you have guidelines to follow	and assess the
taking care of the mother.	- If you were teaching a new midwife how to take care of the newborn, how would you explain the steps.	normal newborn

After observing an event of newborn respiratory distress

I notice that you worked hard to help the baby start breathing. Can you tell me what you were thinking from the point you first noticed a problem through what you did, step by step till the baby was breathing normally.

If you were teaching a new midwife what to do in the above situation, what would you tell them? How would you explain why you made these decisions?

What would you change if you had to help the baby breathe again or help another provider?

Building capacity to teach TBA

Would you be interested to teach neonatal airway management to TBAs from the affiliated villages?

Appendix E. Focus Group Discussion guide

FOCUS GROUP: DISCUSSION GUIDE

Preparation for the FGD:

During the first week, the PI will discuss the FGD guide with the clinic director to make sure it abides by the cultural etiquette and will make changes as appropriate. Reserve a room at the MKMC for the FGD. The PI will bring the flip chart, recording device and demographic record printed. Confirm the transportation arrangement for the TBAs with the CHW.

During the second week, the PI will meet with the midwife and the CHW to: 1) explain the goal and processes of the FGD using the guide, 2) role play how to obtain the demographics, 3) sequence of the FGD that includes welcome, event officiated by clinic director, verbal consent, obtain demographics, introduction, ground rules, tea break, discussion questions and topics, concluding questions, and conclusion followed by lunch. All questions will be addressed. The Pi will ask the midwife and the CHW if they feel comfortable to interpret this information. As an alternative, the clinic director may help to interpret.

The day of Focus Group Discussion

PI will welcome, introduce and present instructions to participants

All the information will be interpreted in the local language by the CHW and the midwife. This event will be (officiated) started by the clinic director according to the cultural etiquette and practice. The overall research statement will be summarized by the clinic director in the local language for the TBAs.

Welcome and thank you for volunteering to take part in this (focus) group discussion. You have been asked to join us, as your point of view is important. I realize you have traveled from far and I appreciate your time.

Please let me introduce myself. The PI will refer to the sample script to obtain verbal consent (see appendix # 10). I would like everyone to introduce themselves by name and we will get detail information individually later

Demographics will be obtained.

FOCUS GROUP: DEMOGRAPHIC DETAILS QUESTIONNAIRE

Due to low literacy of TBAs, demographic information will be verbally taken and recorded by the midwife and the CHW. This will take place individually (one-on-one) See example below

TBA number	Years of experience	Average # of childbirths assisted per month	Type of education for childbirth and level of education	Practices and professions besides MCH	Age	Male/ Female
1.						
2.						
3.						
4.						
5.						
6.						
7						

Introduction: This focus group discussion is designed to learn about your practice to take care of newborn babies. The focus group discussion will take no more than two hours. We will take a break after the first hour for tea and "Mandazi" (Uganda biscuits). Lunch will be served after the FGD is completed. May I record the discussion to help me remember all the information? (If yes, switch on the recorder)

Privacy: Despite the information being recorded, I would like to assure you that the discussion will be anonymous (names not identified). The recording will be kept safely in a locked facility until they are transcribed in English. The transcribed recording of the FGD will be kept for future secondary analysis and destroyed after two years. The transcribed notes of the focus group will contain no information that would allow individual subjects to be linked to specific statements. You should try to answer and comment as accurately and truthfully as possible. It there are any questions or discussions that you do not wish to answer or participate in; you do not have to do so.

Ground rules:

1) The most important rule is that only one person speaks at a time.

2) There is no right or wrong answer.

- 3) You do not have to speak in any particular order. Everyone will get a chance to speak.
- 4) You do not have to agree with the views of other people in the group.
- 5) Does anyone have any questions? (address questions)

Introductory question

I am just going to give you what type of questions and topic of discussion to think about: your experience of providing care to newborn babies during childbirth. Describe the place where the baby is born, people available to help at home, things and equipment available for childbirth, and the steps you take during childbirth event.

Let us have some tea and mandazi and you can think about these topics while having tea. The midwife and CHW (Name) will get the detail information (demographics) during this time. We will start the rest of the discussion questions in about 15 to 20 minutes.

Guiding questions

Each question will be interpreted in the local language to the TBAs by the CHW and key points from each answer will be recorded on the Flip chart by the midwife. The PI will take notes of the answers interpreted back in English by the midwife. Each TBA will be given a chance to answer the question.

Experience and knowledge base

- 1. Describe the place where most of the births that you take care.
- 2. How does the family ask your help?
- 3. Besides yourself, who else helps you take care of the childbirth?
- 4. What things and equipment do you have for the childbirth?
- 5. Can you describe the steps you take to help with the childbirth?
- 6. When do you take care of the newborn baby?
- 7. How do you take care of the baby?
- 8. Describe if the baby is having difficulty breathing, how do you help the baby?
- 9. Do you ask for help if the baby is having difficulty breathing?
- 10. Do you feel comfortable taking care of a baby who is not breathing well?
- 11. Can you share any specific experience when a baby had difficulty breathing?
- 12. Have you experienced a baby dying because the baby was not able to breathe?

Learning preferences and needs

- 1. If there was a different way of helping the baby breathe better, would you like to learn?
- 2. How would you like to learn and remember the steps to help the baby breathe?
- 3. Once you learn the different way to help the baby breathe, how would you like to teach other TBAs?

4. What things or equipment would you like have to better take care of the baby? Conclusion question

Of all the things we have discussed today, what would you say are the most important issues you would like to express about assisting a baby to breathe and taking care of the baby?

Do you have any other information that you would like to share related to assisting a baby to breathe?

Conclusion

Thank you for participating. This has been a very successful discussion.

Your opinions will be valuable asset to the study and hopefully we can use this information to develop a teaching program for TBAs to assist the baby who is having difficulty breathing.

We hope you have found the discussion interesting.

Let us go over all the points that the midwife has written on the flip chart and see if you need to add anything else or if the information is not correct.

If the PI has photographs of the village area and home, show them to the TBAs and see if they have any comments.

I would like to remind you that any comments featuring in this report will be not identify your name.

The clinic director will be invited to close the FGD event according to the cultural practice. The TBAs, CHW, midwife, PI and clinic director will have lunch together. The gift of "Kanga" will be given to all the participants.

(Modified from the template by WHO international patient safety research methodological guide).

http://www.who.int/patientsafety/research/methodological_guide/en/.