



The impact of skilled birth attendants trained on newborn resuscitation in Tanzania: A literature review

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ABSTRACT

Millions of newborns die every year worldwide. Prevention of newborn deaths is a huge challenge in developing countries. *Objective:* This literature review reports the impacts of training skilled birth attendants in newborn resuscitation in Tanzania by answering the review question. *Design:* Systematic searches were conducted in the period of January to June 2016 from following databases: PubMed, Cochrane Library, Cinahl and Maternity and Infant Care. *Participants and settings:* 113,807 newborns are included from rural to urban settings in Tanzania. "Skilled birth attendants" include midwives, doctors and nurses, who have been trained to manage childbirths and perform immediate newborn care. *Findings:* The seven included studies indicate reduction in early neonatal deaths and fresh stillbirths after training skilled birth attendants in newborn resuscitation. Overall increased knowledge, skills and performance is reported, and action within "the golden minute" is needed. Additionally, a highly cost-effective training program is documented. *Implications for practice:* Training in newborn resuscitation of skilled birth attendants is reported to be beneficial, but not strongly enough in itself to make a difference for newborn resuscitation in Tanzania. *Key conclusions:* No training is stronger than it's weakest factor, and extensive challenges in Tanzania are reported at several levels. The reported challenges are lack of human resources, knowledge, supplies, humanization and dignity in maternity wards. Additionally, hospitals often have neither water nor soap. Further training, action and research are needed to improve skilled birth attendant's possibilities to save millions of newborn lives.

1. Introduction

136 million babies are born every year, and there are an estimated 3.7 million neonatal deaths yearly globally (Lee et al., 2011; Steele, 2013). Approximately 7000 newborns die every day (World Health Organization, 2019). 98% of these deaths are reported from developing countries (Steele, 2013). World Health Organization (WHO) reports that one fourth to one half of these neonates die within the first 24 h after birth (World Health Organization, 2012). The neonatal mortality rate has declined in all world regions from 1990 to 2009 (Oestergaard et al., 2011). Among countries with high neonatal mortality, those within sub-Saharan Africa have had the slowest progress in saving newborn lives (Oestergaard et al., 2011). Tanzania, as a part of Sub-Saharan Africa, still has one of the highest neonatal mortality rates and most fresh stillbirths in the region even after several newborn resuscitation training programs (Oestergaard et al., 2011). In addition to the neonatal deaths, there are an estimated three million stillbirths yearly (Carlo et al., 2010). Analysis indicates that available

interventions can reduce the three most common cause of neonatal mortality; preterm infant deaths by 58%, intrapartum deaths by 79%, and infection-related deaths by 84% (Bhutta et al., 2014). The United Nations Millennium Development Goal number 4 (MDG4) hopes to decrease child mortality and prevention of neonatal deaths by appropriate resuscitation, and progress has already been made (United Nations, 2012). Sustainable Development Goal (SDGs) 3,2 continues to struggle to end preventable deaths of newborns by 2030 (World Health Organization, 2019). In Africa, the newborn mortality rates have decreased much more slowly than maternal mortality rates during the last three decades (Lassi, Haider, & Bhutta, 2010). If no further improvements are made, sub-Saharan Africa will account for 33% of the births and 60% of the deaths worldwide in 2030, compared with 25% and 50% in 2013. In other words; 4,4 million children below 5 years old will still die in sub-Saharan Africa in 2030 (Liu et al., 2015). Unfortunately, subnational data on neonatal mortality in Tanzania from 2015 was of poor quality with no observable trends across several regions (Armstrong, Magoma, & Ronsmans, 2015).

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WHO advocates for “skilled care at every birth”. “Skilled birth attendants” include midwives, doctors or nurses working in maternity with deliveries, who have been trained to manage normal childbirths and perform immediate newborn care (World Health Organization, 2006). About 60 million annual births globally occur outside of health facilities, mostly without skilled birth attendants (Wall et al., 2010). In Zanzibar, only 50% of deliveries are reported from health facilities, which means that another half are conducted at home most likely without a skilled birth attendant present (Fakih et al., 2016). Intrapartum-related neonatal deaths and birth asphyxia are the leading causes of child mortality globally (Lawn et al., 2009). WHO defined birth asphyxia as failure to initiate and sustain breathing at birth (World Health Organization, 2012). Birth asphyxia accounts for about 23% of the approximately four million neonatal deaths each year (Black et al., 2010). Most stillbirths occur in developing countries, and are associated with obstetric emergencies, infections and fetal growth restriction (Lawn et al., 2011). Interventions like clean delivery practices, immediate warming of the newborn, umbilical cord care, and neonatal resuscitation is reported to prevent 40 to 70% of newborn deaths (St Clair, Batra, Kuzminski, Lee, & O’Callahan, 2014). Newborn infants generally require little assistance in order to undergo the physiological transition at birth to adapt to extra uterine life, and only 10% need immediate help to breathe (Vali, Mathew, & Lakshminrusimha, 2015). Very few newborns require advanced resuscitation (Wall et al., 2009).

A scientifically based education program called Helping Babies Breathe (HBB) was created by the American Academy of Pediatrics in 2010 to equip birth attendants working in developing countries with skills for neonatal resuscitation and newborn care by using train-the-trainer model (Steele, 2013). The focus is “the golden minute”, which is described as the first 60 s after the birth of the baby (Steele, 2013). The course is hands-on simulation training, and focuses on simple techniques like keeping the baby warm, rubbing the baby dry, and suctioning the baby’s mouth and initiated correct face-mask ventilation within 60 s if necessary (Little, Keenan, Niermeyer, Singhal, & Lawn, 2011). The purpose of this evidence-based program is reducing global neonatal mortality by educating birth attendants to provide basic neonatal resuscitation (Steele, 2013). Steele (2013) relates this program directly to correspond to the MDG4 and SGD3 of reducing newborn deaths (United Nations, 2012; World Health Organization, 2019).

Simulation training of midwifery skills has been documented to be beneficial, and provides opportunities to learn from mistakes without risks to patients (Cooper et al., 2012). Effective simulation training is reported to improve perinatal care and outcome, and improves practical skills which may reduce the time it takes to achieve competence (Cooper et al., 2012). Several training courses worldwide promote improvement in the quality of care and resuscitation provided to newborns in developing countries (Opiyo & English, 2015). Neonatal resuscitation is a skill, and health workers need to be properly trained (Opiyo & English, 2015). Mastering the skills of newborn resuscitation is difficult, both in high and low resource settings (Thallinger, Ersdal, Ombay, Eilevstjonn, & Stordal, 2015). Health workers in poor countries often do not have these skills, and these babies are therefore more likely to die (Opiyo & English, 2015). Lack of evidence from sub-Saharan Africa related to promotion of newborn care and newborn survival is remarkable (Penfold, Willey, & Schellenberg, 2013).

This review report the impacts of training skilled birth attendants in newborn resuscitation in Tanzania identified in literature published within the last 5 years. Among developing countries, the progress of African countries has been slowest in reducing neonatal mortality, even if there has been increased focus on education and training (Oestergaard et al., 2011; Steele, 2013). Lack of human resources is reported from Sub-Saharan Africa, and the region has even the lowest number of health care workers per capita in the whole world (Soucat, Scheffler, & Ghebreyesus, 2012). Limited availability of human resources, supplies and primary needs like soap and water in the hospitals, makes it challenging to provide essential newborn care and clean

births (Soucat et al., 2012).

2. Methods

A systematic review method was used to investigate the review question (Aveyard, 2014).

2.1. Objective

The objective of this study was to report the impact of skilled birth attendants trained on newborn resuscitation in Tanzania.

2.2. Review question

What impacts are reported by training skilled birth attendants on newborn resuscitation in Tanzania?

2.3. The inclusion and exclusion criteria

The inclusion criteria were: full text studies from peer-reviewed journals published on training of skilled birth attendants in newborn resuscitation in Tanzania published in English from 2011 to June 2016. The exclusion criteria were: studies from other countries than Tanzania, expert statements, theoretical and review studies. Studies older than five years and studies on other professions than skilled birth attendants were also excluded.

2.4. Search and selection strategy

Searches were done in PubMed, Cochrane Library, Cinahl and Maternity and Infant care in the period from January to June 2016. Fig. 1, PRISMA flow chart, documents the searching process and selection of included studies (Moher et al., 2009). Reference lists of identified studies were searched for relevant studies, but none were found matching the inclusion criteria. Searches including “training” were frequently done, resulting in fewer studies matching the inclusion criteria. Therefore, “training” was manually added to the search before including the studies in this review. After repetitive searches, seven studies could answer the review question and were included.

Searches have been done with an experienced librarian. Searching on web pages was done regularly searching for grey literature, resulting in no included studies. The following search string was conducted: “newborn OR infant OR neonate” AND “resuscitation OR mask OR ventilation” AND “Tanzania”, limited to the last 5 years.

2.5. Methodological quality assessment

Examination of the methodologies of the primary studies were assessed by the 12-point checklist from Critical Appraisal Skills Program (CASP, 2013). No articles were excluded due to poor quality leaving $n = 7$ to be included in the review. Methodological information of all included studies about design, sample and measurements has systematically been criticized and evaluated and described in Table 1. The risk of bias and Bradford hills criteria were considered in each article individually (CASP, 2013). Risk of bias due to confounding factors is frequently seen in observational studies. The Hawthorne effect; by being observed you might perform better, will always affect observational studies (CASP, 2013). It is therefore important to review methodological procedures such as validity, reliability, generalization and rigor. Four studies are described as strong, and three studies as moderate according to the quality assessment.

2.6. Thematic analyzes

Both content analyzes and thematic analyzes was inspiring the author during analyzing process (Graneheim & Lundman, 2004;

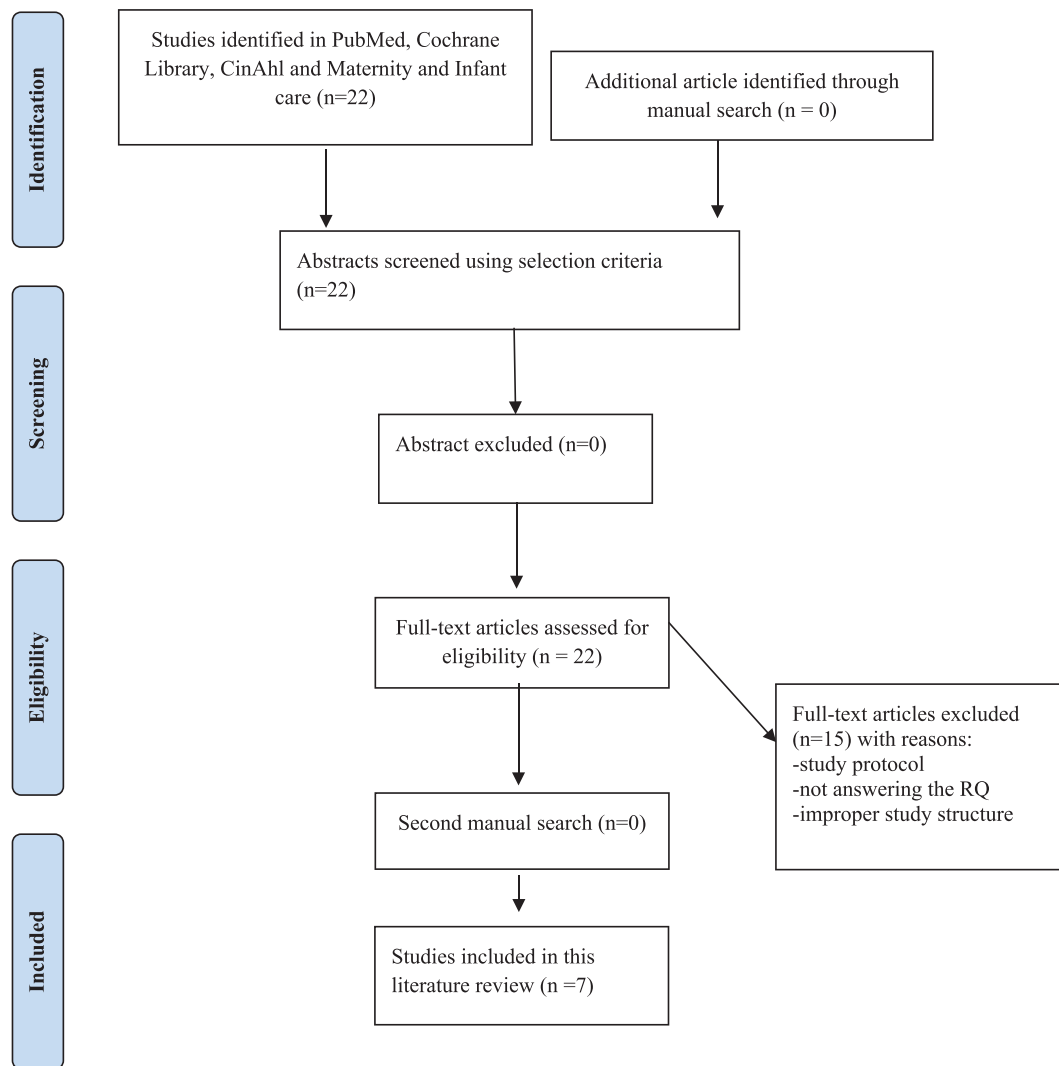


Fig. 1. Data search using the PRISMA flow diagram (Moher et al., 2009).

Graneheim, Lindgren, & Lundman, 2017; Holopainen, Hakulinen-Viitanen, & Tossavainen, 2008). The author made a document to organize all components from the results of included studies. These components were summarized into four themes, which is reported as results in this review documented in Table 3. Content analyses describes manifest content as the visible, obvious component what a text says, in contrast to interpret the underlying meaning of a text, which is referred to as latent content (Graneheim & Lundman, 2004; Graneheim et al., 2017). Interpretation as well as “unit of analyzes” are basic decisions when using content analyzes (Graneheim & Lundman, 2004; Graneheim et al., 2017). The seven studies were read several times, to get a broader understanding of the content. The thematic synthesis emerged by reading and re-reading the studies in order to synthesize the findings (Holopainen et al., 2008). Different patterns and concepts were identified across the data, leading to common meanings and concepts that were considered descriptions of the effects of training skilled birth attendants in newborn resuscitation in Tanzania. By analyzing the meaning unit into themes matching each other, the author rewrote the names repeatedly to avoid losing some aspects of the results into these four themes. The process has gone back and forth between different steps (Graneheim & Lundman, 2004; Graneheim et al., 2017). During this process, we discussed how to interpret the content of each theme. The themes emerged naturally during this process. The final categories were condensed and formed as themes documented in Table 3.

3. Results

Only quantitative studies were found, even though the search was open for all kind of studies. Qualitative studies would have been of interest. 113 807 newborns are included in total, but the number of skilled birth attendants is not mentioned. No studies were identified written in non-English languages. The seven included studies indicate reduction in early neonatal deaths and fresh stillbirths after training of skilled birth attendants in newborn resuscitation. Overall increased knowledge, skills and performance in newborn resuscitation was reported, and action within “the golden minute” is needed. Additionally, a highly cost-effective training program (HBB) has been documented.

Characteristics of each included study is summarized in Table 2. Four studies included the organization Helping Babies Breathe (HBB) educational programs, and three studies did not include HBB. There were variations in length and repetition in the programs. HBB had both one-day and two-days training programs, and some with re-trainings. Observation in delivery room and videotaping have been used for practical evaluations.

All included studies are observational studies, and most studies have before and after design (Makene et al., 2014). Additionally, used cross-sectional surveys as study design. All training was conducted on mannequins, and cannot be transferred directly into clinical skills and performance. Ersdal and Singhal (2013) reported that the increased number of providers passing the training on a mannequin were not

Table 1
Quality assessment of the included studies, CASP table (Critical Appraisal Skills Programme, 2013).

Studies	1	2	3	4	5	6	7	8	9	10	11	12. Implications for practice	Quality assessment
1 Msemo et al. (2013)	Y	Y	Y	Y	U	Y	Y	Y	Y	Y	Y	This study indicates that asphyxia accounts for a much higher percentage (60% of early deaths). Prematurity (18%), low birth weight (8%), and overt infections are less common. 5-minute Apgar score is an unreliable indicator of birth asphyxia.	Strong
2 Ersdal et al. (2013)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	The authors suggest that documentation of strategies to improve the skills of basic neonatal resuscitative action is needed.	Strong
3 Mduma et al. (2015)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Further research is necessary. More focus on early stimulation and discussions around local implementation should be prioritized during HBB training.	Strong
4 Ersdal et al. (2012b)	Y	Y	Y	Y	U	Y	Y	Y	Y	Y	Y	Attributing changes in the health facilities in the study to the maternal and newborn quality improvement intervention. There were no other documented improvement measures occurring at the same time.	Moderate
5 Ersdal et al. (2012b)	Y	Y	Y	Y	U	Y	Y	Y	Y	Y	Y	The implication of this study put focus on brief, on-site simulation practice to increase the knowledge of birth attendants.	Moderate
6 Makene et al. (2014)	Y	Y	Y	U	Y	Y	Y	Y	Y	Y	Y	By educating local staff they will be able to perform newborn resuscitation.	Moderate
7 Vossius et al. (2014)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	The authors suggest that to facilitate further global implantation of the program an analysis of the cost-effectiveness in a multi-center setting including urban and government owned hospitals, is necessary.	Strong

Critical Appraisal Skills Program, CASP. Y = Yes, N = No, U = Unclear. 1. Did the study address a clearly focused issue? 2. Was the cohort recruited in an acceptable way? 3. Was the exposure accurately measured to minimize bias? 4. Was the outcome accurately measured to minimize bias? 5. Have the authors identified all important confounding factors? 6. Was the follow up of subjects complete enough? 7. What are the results of this study? 8. How precise are the results? 9. Do you believe the results? 10. Can the results be applied to the local population? 11. Do the results of this study for other available evidence? 12. What are the implications of this study for practice?

reported as an improvement for clinical practice (Ersdal & Singhal, 2013). Some included studies even reported sustained same level of ventilation skills, stimulation and resuscitation, although improvements in these skills were generally documented. All included studies documented effect of training in newborn resuscitation in diverse ways, documented as themes after the thematic analyses in Table 3.

3.1. Reduction in early neonatal deaths and fresh stillbirths

Msemo et al. (2013) observed 86 624 newborns, and documented a sustained 47% reduction in early neonatal mortality within 24 h, and a 24% reduction in fresh stillbirths after having conducted the Helping Babies Breathe program. The authors concluded that implementation of Helping Babies Breathe education program for skilled birth attendants was associated with significant reduction in both early neonatal deaths within 24 h and rates of fresh stillbirths (Msemo et al., 2013). Similar findings were documented by Mduma et al. (2015) observing 4894 deliveries pre- and 4814 post-implimentations of frequent brief on-site simulation training for skilled birth attendants, and reported that mortality at 24 h decreased from 11.1 to 7,2%. The authors concluded that frequent brief on-site simulation training appears to facilitate transfer of new knowledge and skills into clinical practice and to be accompanied by a decrease in neonatal mortality (Mduma et al., 2015).

3.2. Overall increased knowledge, skills and performance in newborn resuscitation after training

Msemo et al. (2013) and Mduma et al. (2015) both reported that the use of stimulation and suction increased, while face-mask-ventilation decreased. Practicing in “routine care” and “neonatal resuscitation” increased the number of providers who “passed” on the training on a mannequin (Ersdal et al., 2013). The number of newborns being suctioned/ventilated at birth did not change and the use of stimulation in the delivery room decreased after HBB training of skilled birth attendants. Ersdal et al. (2013) concluded that skilled birth attendants performed significantly better in simulated neonatal care and resuscitation seven months after one-day HBB training. Because the results were completed on a mannequin, the improvements were not transferred into clinical practice (Ersdal et al., 2013). Makene et al. (2014) observed newborn care and documented significant overall improvement. Skilled birth attendant’s knowledge improved, but skills in resuscitation using a newborn mannequin were persistently low (Makene et al., 2014). Makene et al. (2014) reported that only 77% of the newborns were placed skin-to-skin with their mother, increasing by 35%, and delayed cord clamping increased significantly by 12%. Makene et al. (2014) concluded that the program was successful in raising the quality of essential newborn care performed by skilled birth attendants.

3.3. Action needed within “the golden minute”

Ersdal, Mduma, Svensen, and Perlman (2012b) reported that the risk for death increases rapidly the first minutes after birth. The authors concluded that most lifeless babies were in primary apnea and responded to stimulation/ suctioning and/ or face-mask-ventilation from skilled birth attendants, and infants who required face-mask-ventilation were more likely to die when ventilation was delayed or prolonged (Ersdal, Mduma, Svensen, & Perlman, 2012a, Ersdal et al., 2012b). Ersdal et al. (2012a) observed skilled birth attendant’s routine care in labor ward and evaluated 4720 infants, where 49 infants died secondary to birth asphyxia, prematurity, low birth weight, congenital abnormalities and infections. The authors concluded that most deaths were related to birth asphyxia and that 5-minute Apgar score is an unreliable indicator for birth asphyxia (Ersdal et al., 2012a).

Table 2
Characteristics of the included studies.

Author/Year/ Country/ Magazine	Aim of the study	Type of study	Main findings/ conclusions	Strengths and limitations
1. Ersdal et al. (2012a)	To determine the presumed causes of neonatal death within 24 h in a rural hospital in Tanzania.	Prospective descriptive observation study.	256 infants were moved to neonatal area. 49 infants died secondary to birth asphyxia (BA). 5-minute Apgar was ≤ 7 in 50% of those who died. Early neonatal mortality mostly relates to BA. 5-min Apgar score is an unreliable indicator of BA.	Strengths: 4720 infants were born and evaluated over 1 year. Research assistants were present 24-hours a day in labor ward for observations. Limitations: infants were likely misclassified or not reported as fresh stillbirths. Gestational age is based on self-report.
2. Ersdal et al. (2012b)	To define normal transitional respiratory adaptation. To describe interventions performed by skilled birth attendants. To assess importance of "the golden minute".	Observational study	The risk for death or prolonged admission increases 16% for every 30 s' delay in initiating FMV up to six minutes and 6% for every minute of applied FMV.	Limitation: Definition of birth asphyxia is imprecise.
3. Ersdal et al. (2013)	To determine effects on practical skills and management strategies. To describe neonatal management in delivery room.	Observational study.	The providers who "passed" the simulated "routine care" and "neonatal resuscitation" increased from 41% to 74%. The number of babies being suctioned and/ or ventilated did not change, and the use of stimulation decreased after HBB training.	Strengths: Included newborns 2745 before and 3116 after. Limitations: before and after design. Increased deliveries without increasing staff. High staff turnover.
4. Makene et al. (2014)	To observe the skilled birth attendant's skills in essential newborn care in region hospitals, health care centers and dispensaries.	Cross-sectional surveys pre- and post-intervention.	Significant overall improvement from 39% to 73%. Statistically increased knowledge, but no increase in skills for newborn resuscitation using a mannequin. The knowledge of the skilled birth attendants increased. Skills in resuscitation using a newborn mannequin were persistently low. Only 77% were skin-to skin, increasing with 35%. Delayed cord clamping increased 12%.	Strengths: 489 infants in 2010 and 560 in 2012. 52 facilities included. Study period of 2 years. Limitations: the Hawthorne effect.
5. Mduma et al. (2015)	To assess the impact of frequent brief on-site simulation training on newborn resuscitation of skilled birth attendants. To assess the potential impact on 24-h neonatal mortality.	Educational interventional study.	Deliveries attended by skilled birth attendants increased, and resuscitations performed by midwives increased significantly. The number of stimulated neonates increased, suctioning babies increased and neonates receiving bag mask ventilation decreased. Mortality at 24-h decreased from 11,1% to 7,2%.	Strengths: 4894 deliveries before and 4814 after FBOS-training. Limitations: Before and after study design. Mask leak, obstruction and performance are confounding factors.
6. Msemo et al. (2013)	To document newborn mortality and fresh stillbirths in Tanzania after helping babies breathe training of skilled birth attendants.	Observational study.	Significant reduction by 47% in early neonatal mortality within 24 h, and 24% reduction in fresh stillbirths was reported after 2 years. The use of stimulation increased, suctioning increased and face-mask ventilation decreased.	Strengths: 86,624 newborns included. Limitations: before and after study design. English language in education material. Only 2-month baseline time before study start.
7. Vossius et al. (2014)	To analyze the cost-effectiveness after HBB program of skilled birth attendants at Haydom Lutheran Hospital in Tanzania.	Observational study.	Costs per life saved USD 233. Cost per life gained USD 4,21. HBB is a low-cost intervention program. Implementation has been highly cost-effective. The cost will be lower for re-trainings, as the equipment is present and the instructors have already been trained.	Strengths: a study in Zambia reported similar results for cost-effectiveness of a "essential newborn care course", 4876 deliveries observed for 12 months before education implementation. Limitations: single center design. 4734 births per year might not be enough statistical power. Rural setting might not be transferrable to other sites.

Table 3

The themes after the thematic analysis of the included studies.

Reduction in early neonatal deaths and fresh stillbirths	Mduma et al. (2015) Msemu et al. (2013)
Overall increased knowledge, skills and performance in newborn resuscitation after training	Makene et al. (2014) Ersdal et al. (2013) Msemu et al. (2013) Mduma et al. (2015)
Action needed within “the golden minute”	Ersdal et al. (2012a) Ersdal et al. (2012b)
Highly cost-effective training program	Vossius et al. (2014)

3.4. Highly cost-effective training program

Vossius et al. (2014) measured the actual cost, and concluded in their study that implementation of the HBB program in rural Tanzania is highly cost-effective. Observation and evaluation of the cost for one year before and one year after implementation of the HBB program were conducted. Once implemented, re-trainings gave no direct costs as practicing was done during working hours and with the existing training material and equipment (Vossius et al., 2014).

4. Discussion

The objective of this study was to report impacts of training skilled birth attendants on newborn resuscitation in Tanzania. The seven included studies indicate reduction in early neonatal deaths and fresh stillbirths after training skilled birth attendants on newborn resuscitation. Overall increased knowledge, skills and performance is reported, and action within “the golden minute” is needed. Additionally, a highly cost-effective training program is documented.

Early newborn deaths are likely underreported and misclassified as fresh stillbirths (Ersdal et al., 2012a; Lawn et al., 2011; Thukral et al., 2015). Africa has been slowest among developing countries in reducing neonatal mortality, and the high rate of fresh stillbirths is a strong indicator of their quality of care (Maaløe et al., 2016; Oestergaard et al., 2011). Poor quality of care in the poorest part of the world does not provide care according to human rights (Solnes Miltenburg, Lambermon, Hamelink, & Meguid, 2016). Too little, too late describes care with inadequate resources where care is not available until it is too late to provide help (Miller et al., 2016). A wider understanding of how knowledge and skills are learned and maintained are needed (Reisman et al., 2016). Too little, too late is described as an underlying problem in developing countries leading to continuous high mortality and morbidity (Miller et al., 2016). This is the most unfair situation in the world; the poorest women and newborn babies are additionally given the poorest quality of care. Factors elaborated below may help to explain why there still are challenges to improve quality of care after training programs in newborn resuscitation in Tanzania.

4.1. Reduction in early neonatal deaths and fresh stillbirths

Reduction in newborn deaths is a continued goal from MDG4 to SDGs (United Nations, 2012; World Health Organization, 2019). Two included studies reported reduction in early neonatal deaths and fresh stillbirths from 2010 to 2012 (Mduma et al., 2015; Msemu et al., 2013). Correlation between reduction in neonatal deaths and increased knowledge, skills and performance of skilled birth attendants are reported in one included study (Makene et al., 2014). Stillbirths are described as a devastating burden of avoidable lost lives, which is easy to assess (Maaløe et al., 2016). Once you know these situations are easy to assess, the training programs are even more important. It is suggested that a reduction in underreporting and misclassification is achieved by increasing knowledge in an included study (Ersdal et al., 2012a). 52% of stillbirths were reported with a positive fetal heart rate on admission at maternity ward, but more than half were not even classified as

“fresh” or “macerated” stillbirths (Maaløe et al., 2016). Fresh stillbirths may be resuscitated, and are therefore important to identify immediately after delivery. Fresh stillbirths were often documented as macerated stillbirths, and inadequate documentation in the delivery record book is suggested to be a reason for misclassification (Fakih et al., 2016). Failure to document stillbirths is reported as another explanation of the misclassification (Maaløe et al., 2016). Inadequate identification of stillbirths and lack of systematic data on the numbers are suggested globally as reasons for hidden numbers of stillbirths (Lawn et al., 2009). The real numbers of stillbirths are therefore unknown. However, the fact that these lost lives can be avoided by proper resuscitation and by improved quality of care makes newborn resuscitation training programs even more essential in this context in Tanzania.

4.2. Highly cost-effective training program and overall increased knowledge

Flexible, interactive management and empowerment is essential to encourage and motivate skilled birth attendants to do their best (Tibandebage, Kida, Mackintosh, & Ikingura, 2016). This review report overall increased knowledge, skills and performance of skilled birth attendants in newborn resuscitation. Improvement on training conducted on mannequins, cannot directly be transferred into clinical practice. Knowledge and reciprocal relationship are both pillars in the theory of woman-centred care, and can likely be helpful factors to succeed with training programs if the cultural context also is taken into account (Berg, Asta Ólafsdóttir, & Lundgren, 2012).

This review also reports a highly cost-effective training program from Helping Babies Breathe (HBB), with similar findings reported in two other studies (Manasyan et al., 2011; Opiyo & English, 2015; Vossius et al., 2014). Cost-effective training programs are huge benefits in developing countries, because further training and education is at low-cost. Knowledge and skill falloff is unfortunately reported as barriers to success in training programs (Reisman et al., 2016). On the other side, refresher training, frequent re-testing and skills practice is reported promising (Reisman et al., 2016). A critique towards training in newborn resuscitation is when programs are developed and tested in western countries, unknown whether they will work or not in developing countries (Opiyo & English, 2015). Local trained trainers can motivate and inspire colleagues at their maternity wards (Tibandebage et al., 2016). Train-the-trainer-model by HBB, are using the local language in their ordinary context as a natural part of the programs (Steele, 2013). When skilled birth attendants work beside trained trainers, practical training and clinical understanding of newborn resuscitation within “the golden minute” may likely be achieved. The same result is also reported from this review. A positive view is reported from skilled birth attendants that training programs helped them to increase their knowledge, skills and confidence, and that provided equipment simplified newborn resuscitation (Isangula et al., 2016). Long-term effects more than 2 years after a training program are not measured in any of the included studies. The lack of long-term effects is obvious as Tanzania’s neonatal mortality is still one of the highest of developing countries, which needs to be addressed to MDG4 and SDGs (Oestergaard et al., 2011; United Nations, 2012; World Health

Organization, 2019).

4.3. Challenges in maternity care

To understand the context of training programs in Tanzania, current challenges must be elaborated. Context is an important surrounding factor in all relations (Berg et al., 2012). Experiences from maternity wards in Tanzania report challenges like intermittent electricity, no running water, few beds, lack of midwifery or obstetric education, insufficient monitoring, that time limits are not applied and that teaching is difficult (Main, 2016). Additionally, women are sharing beds with one or two other patients, without their partner present. Beds are located in an open room with many women in labor, being cared for by few skilled birth attendants who often do not communicate with the patients (Meguid, 2016). Lack of human resources, supplies and primary needs like soap and water in the hospitals, makes clean births and the quality of newborn care challenging (Soucat et al., 2012). Essential newborn care, hygienic birth and newborn resuscitation are related with reduced newborn mortality at low-cost (Penfold et al., 2013). Managing births and performing newborn resuscitation in this environment is challenging. Woman-centred care describes basic essential care for every woman in labor, including a birthing atmosphere with safe, calm, trusting and strengthening environment (Berg et al., 2012). Maternal and newborn care in Tanzania are often of poor quality due to lack of human resources, but also lack of insufficient knowledge and motivation (Soucat et al., 2012). Enough staffing to have one skilled birth attendant per woman in active labor is not described from developing countries illustrating a large gap in services provided (Soucat et al., 2012). The presence of a midwife during labor is important for early risk identification and to prevent situations leading to newborn resuscitation or fresh stillbirths (Berg et al., 2012; Kidanto et al., 2015; Langli Ersdal, Mduma, Svensen, Sundby, & Perlman, 2012; Mmbaga et al., 2012). A need to strengthen human resource to improve emergencies is reported from all sub-Saharan Africa, which has the lowest number of health care workers per capita in the whole world (Fakih et al., 2016; Soucat et al., 2012). A paradox in Tanzania with its large population is that the lack of human resources still is a huge challenge in health care. The low number of skilled birth attendants in Tanzania is attributed to shortages in nursing training as well as challenges in sustaining motivations for the career (Tanaka, Horiuchi, Shimpuku, & Leshabari, 2015). Additionally, there are described skill mix imbalance, uneven distribution of resources, and negative work environments in addition to poor knowledge from developing countries (Chen et al., 2004). As many as up to 85% of midwives are reported burnout and giving up their hope after years of task overloading. Burnout is a threat to reach the SDGs, which may influence emergency obstetric and newborn care (Thorsen, Tharp, & Meguid, 2011). Described in other words: too little, too late, will not lead to improved respectful maternity care worldwide (Miller et al., 2016). This is interpreted as a need for the skilled birth attendants as role-models for improving maternity wards with enthusiasm and motivation (Tibandebage et al., 2016).

4.4. Action needed within “the golden minute”

Further challenges described are lack of humanization and dignity for woman giving birth in Zanzibar (Meguid, 2016). Women in labor in sub-Saharan Africa report about disrespect and abuse, which are evident of a failing health system (Bradley, McCourt, Rayment, & Parmar, 2016; Maputle & Hiss, 2010; Sando et al., 2016). 70% of women reported experiences of disrespect and being abused, and the most frequent form is described as feeling ignored, abandoned or neglected (McMahon et al., 2014; Rosen et al., 2015; Sando et al., 2016). Improvement in quality of care, research, and policy-making and adapting to woman-centred care has been attempted to change disrespectful childbirth practice without success (Rosen et al., 2015; Sadler et al., 2016). Humanizing values and woman-centered care into midwifery

care is reported beneficial (Berg et al., 2012; Way & Scammell, 2016).

A suggested solution is to humanize the health care is treating fellow human beings, born or unborn, with respect (Meguid, 2016). When a newborn baby struggle to breathe, human rights in addition to patient safety require our immediate attention for resuscitation (Meguid, 2008). The goal should be to give the right amount of care at the right time, and to provide this care in a manner that respects, protects, and promotes human rights, because all human beings have the same rights (Miller et al., 2016). Despite these challenges, included studies reported improvements in newborn resuscitation after training programs in Tanzania. Further research, training and action is still needed within “the golden minute”.

4.5. Methodological considerations

This review did not analyze direct impact on mortality rate after training programs even though a result is reporting of reduction in newborn mortality. One included study observed the skilled birth attendant’s performance of deliveries (Ersdal et al., 2012a,b).

This study was still included as the Hawthorne-effect; by being observed health care workers perform better, and this effect is a confounding factor in observational studies. A limitation in all studies is that long-term effect after two years was not measured. The author found a broad spectrum of content, which made a meta-analysis impossible to create (Aveyard, 2014). It would be of interest to do further research of this content. No randomized controlled trials (RCT) were found to be included in this literature review, probably because it is highly unethical to perform RCTs on emergency obstetric and newborn care interventions according to WHO (World Health Organization, 2012). The majority of included studies in this review are therefore observational studies.

5. Conclusion

Training in newborn resuscitation of skilled birth attendants is reported to be beneficial, but not strongly enough in itself to make a difference for newborn resuscitation in Tanzania. No training is stronger than its weakest factor, and extensive challenges in Tanzania are reported at several levels. The reported challenges include lack of human resources, knowledge, supplies, humanization and dignity in maternity wards. Additionally, hospitals often have neither water nor soap. Further training, action and research are needed to improve skilled birth attendant’s possibilities to save millions of newborn lives.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijans.2019.100168>.

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