


# Saving the Lives of Asphyxiated Newborns in Public Health Facilities: An Implementation Research

Sanjay Shinde , Firew Tiruneh , Dinaol Abdissa 

Department of Midwifery, College of Health Sciences, Mizan-Tepi University, Mizan Teferi, Ethiopia

Correspondence: Sanjay Shinde, Department of Midwifery, College of health Sciences, Mizan Tepi university, Mizan Teferi, Ethiopia, Email [mscshinde@gmail.com](mailto:mscshinde@gmail.com)

**Back Ground:** Globally, 2.6 million children died in their first month of life—approximately 7 000 newborn deaths per day—with approximately one million dying on the first day and nearly one million dying within the next six days. Perinatal asphyxia plays a significant role in this mortality. Even those who survive will suffer from mental retardation and other complications. One programme to save the lives of asphyxiated newborns is “Helping Baby Breathe.” However, it has yet to be successful in Ethiopia.

**Objective:** To assess the status of implementation of helping baby breath and to design alternative best way to improve the service, in public hospitals of Bench-Maji, Kaffa and Sheka zones.

**Methods:** Concurrent triangulation was used in the design. We used a phenomenological and descriptive cross-sectional study design. The subjects of the study were key informants, postnatal mothers, and health care providers in the delivery ward. Atlas Ti and SPSS software were used to analyze qualitative and quantitative data, respectively.

**Results:** We reported on the knowledge and skills of health care providers in neonatal resuscitation in this study. The findings revealed that participants with good knowledge and skill were 54% and 27%, respectively. A number of contextual factors that may be impeding neonatal resuscitation were also identified qualitatively.

**Conclusion:** The majority of health care providers’ skill and knowledge of neonatal resuscitation were far below the minimum expected competency.

**Keywords:** saving the life, asphyxiated, newborn, public health facilities, implementation

## Introduction

One of the most difficult challenges confronting the global health community is figuring out how to take proven interventions and put them into practice in the real world. There are low-cost, life-saving interventions available to address many of the health issues we face, but their effectiveness varies widely. The disparity between what is known to be effective and what is actually delivered in the normal course of medical care has elevated the profile of implementation research.<sup>1</sup> The goal of implementation research is to close this gap by developing a thorough understanding of “real world” contextual factors that are either overlooked or not captured by other research disciplines. Failure to effectively implement interventions comes at a cost. More than 3.1 million newborns die each year from diseases that are preventable or treatable with existing interventions.<sup>2</sup>

Prematurity and low birth weight are the leading causes of newborn deaths, followed by infections, asphyxia (lack of oxygen at birth), and birth trauma. These factors account for nearly 80% of deaths in this age group.<sup>3</sup> Birth asphyxia is defined as the inability to initiate or sustain respiration.<sup>4</sup> When a newborn enters a new world, the transition from intrauterine to extra uterine life necessitates a successful cardiopulmonary change in order to adapt quickly.<sup>5</sup> Newborns may experience difficulties as a result of antepartum or intrapartum causes, necessitating interventional treatment. In almost 40% of instances, birth asphyxia is not anticipated.<sup>6</sup>

The APGAR score or Cardiopulmonary function alone can be used to diagnose birth asphyxia, which occurs when the respiration rate is less than 30 breaths per minute or when the baby is gasping and the heart rate is less than 60 beats

per minute. Neonatal resuscitation is a procedure used to treat birth asphyxia. In resource-constrained countries, positive-pressure ventilation is one of the most widely used and effective approaches.<sup>7</sup>

The United Nations has launched a Global Strategy for Women's and Children's Rights and Ethiopia has signed on as a member of the global community. The focus on newborn health has prompted a number of stakeholders to propose "Every Newborn: an action plan to end preventable deaths by 2035." Ethiopia also has a plan to reduce neonatal mortality to 10 per 1000 live births.<sup>8</sup>

At every delivery, at least one person should be present whose primary responsibility is the newly born. This individual must be capable of initiating resuscitation, including positive-pressure ventilation and chest compressions. Every midwife and nurse who performs neonatal resuscitation is expected to be competent and to possess the necessary knowledge and skill.<sup>9</sup>

When trained skilled birth attendants (SBAs) use high-quality devices to deliver the intervention, mortality can be reduced by up to 30%.<sup>4</sup> The United Nations Commission on the Status of the Child identified neonatal resuscitation as one of 13 key strategic, cost-effective interventions that can prevent and reduce child mortality, and it has supported activities to improve the global and facility-level availability of resuscitation devices. Basic neonatal resuscitation necessitates the use of a resuscitator and a suction device, and it must be performed by an SBA who has received competency-based training using a training model.<sup>10</sup>

## Methods

### Study Area and Period

Kaffa, Bench-Maji and Sheka zones are found in SNNPR southwest of Ethiopia about an average of 600 km away from Addis Ababa. Based on the 2007 Census conducted by the CSA, Kefa Zone has a total population of 874,716, of whom 431,778 were men and 442,938 women. Bench-Maji Zone has a total population of 652,531, of whom 323,348 were men and 329,183 women; Sheka Zone has a total population of 199,314, of whom 101,059 were men and 98,255 women. In the three zones there are 4 hospitals and 95 health centers.

### Study Design

- Concurrent triangulation was employed.

Because the quantitative study design generated evidence within the researcher's conceptual box, this design was selected. When qualitative study design was added to this evidence, it made it more informative. Because qualitative research methods allowed us to gain a deeper grasp of hidden causes and situations.

- Phenomenological study design was used to explore the study participants' thought an opinion towards contextual factors that hinder service implementation. The real-life experiences of health-care providers were investigated. With this, we were able to have a better grasp of the study question that was being investigated.
- Cross sectional study design was employed in order to bring a descriptive explanation of the research question.

### Study Participants

- Health care providers who work in delivery rooms were included in the quantitative study.
- Based on the stakeholder analysis and consultations with Zonal Maternal and Child Health (MCH) programme personnel, a detailed list of officials to be interviewed for the key informant interview was prepared. The following officials have been added to a preliminary list of officials:
  - Front line workers and postnatal moms were involved in the FGD, as were the Zonal MCH head, Partners on HBB, Medical director, and Delivery ward head Midwives.

## Sample Size and Sampling Procedure

- Sample size for qualitative study, FGD were considered until data saturation and Key informants were going to be selected purposively.
- For the quantitative design since the source population was less than 100, a survey was done.

## Data Collection Procedure

### Data Collection Approach and Instrument

- For the phenomenological design:
  - A semi-structured direct participatory observation was used to investigate the contextual elements influencing health care workers' willingness to implement helping babies breathe.
  - In-depth interview with stakeholders was used.
  - Front-line staff and post-natal women were also involved in focus group discussions.
- For the cross sectional study design:
  - A structured interview was conducted using a standardized technique. The tool was adapted from a previous research project. Furthermore, the instrument was previously translated into Amharic and used in a Gondar study.
  - Through a direct participation method, a standard checklist was used to assess skills.

### Data Collectors

- Data collectors with a BSc background were recruited from the delivery room. A minimum of two years of clinical experience in midwifery is required. The researchers next instructed them on data gathering strategies for both quantitative and qualitative data. The data collecting was then carried out as planned. Meanwhile, because this is an implementation research study, participants are involved at each stage of the research process.

### Data Analysis

All interviews and discussions were recorded with a sound recorder, along with participant background information. The recordings were then verbatim transcribed. The researchers developed a preliminary list of emerging categories from the data into which they grouped the notes and remarks. These categories were compiled and attached to the data in the form of a list. The researcher formed a theme that was mutually exclusive and thematically coherent after refining the category. The Atlas Ti programme was then used to evaluate the coded theme. The information was presented in the form of tales and was supplemented with quantitative information.

The coded data was input in Epi Data and then exported into Statistical Package for the Social Sciences (SPSS window version 25) for data cleaning and analysis for the quantitative data. Frequencies, tables, graphs, mean and standard deviations were used to show descriptive statistics on newborn resuscitation knowledge and skill.

## Quality Management

The questionnaire was designed and tweaked to perfection. The questionnaire was translated into Amharic to ensure that all participants understood it and then returned to English to ensure consistency. Data collectors had three days of training. A week before the start of the real data collection, a pre-test was conducted; based on the results of the pre-test, the questioner was amended and adopted, and the time needed for the interview was estimated. The data collectors were overseen on a daily basis, and the principle investigator evaluated 10% of the collected data each day, and quality was maintained by field checks by field supervisors and the principal investigator. Double entry of data on the day of collection using Epi-Data proved the data's completeness, accuracy, and consistency.

## Operational Definition

- Birth asphyxia: is defined as a baby who is either gasping or not breathing or having breathing less than 30 per minute.
- Neonatal resuscitation: defined as a procedure done to initiate breathing or providing bag and mask ventilation.

- Knowledge of neonatal resuscitation: A score of more than the mean value of a knowledge exam is considered good knowledge.
- Skill of Neonatal Resuscitation: good skill is defined as a score of more than 75% for the skill checklist.

## Result

### Sociodemographic Characteristics of the Study Participants

About 100 study respondents were chosen from the whole population of the study area, with a 100% response rate. The average age of the participants in the study was 27.7 (SD). In terms of gender, around 33% of participants were male and 67% were female. Before enrolling in this study, 36% of the total study participants had received HBB training. The majority of the study participants (67%) had fewer than five years of experience. When we looked at their educational backgrounds, we discovered that the majority of them were midwives (56%). When it comes to their educational levels, 58% and 42% have a college degree or above, respectively. The detail sociodemographic characteristics are indicated in [Table 1](#).

### Knowledge of the Study Participants Towards Neonatal Resuscitation

The HBB 2nd Knowledge Check was used to measure the knowledge of research participants in this investigation. The majority (54%) of the health professionals who took part in this survey (54%) had poor knowledge on newborn resuscitation. The average score for the knowledge test comprising 24 items is  $13.2 \pm 2.4$ . The lowest and highest knowledge scores were (Nine) and (Eighteen), respectively. The passing rate of participants with respect to their speciality is 37.5%, 62.5% and 100% for Midwives, Nurses and Health officer respectively. Despite the lack of statistical significance, the majority of those who received a passing grade had less than five years of experience. Health professionals who worked in hospitals had more knowledge of neonatal resuscitation than those who worked in health centers, but the length of their work experience had no effect on their knowledge of neonatal resuscitation.

### Skill of the Study Participants Towards Neonatal Resuscitation

The HBB 2nd Edition bag and mask ventilation skill check list was used to assess the study participants' abilities. The study participant's total minimum and maximum skill scores were 5 and 14, respectively, and their mean skill score was 9.62.1 with standard deviation. In the study area, 27% of health professionals had good overall skills. The mean

**Table 1** Socio-Demographic Characteristics of Study Participants

Variable	Frequency (N)	Percent (%)
Age		
18–24	21	21%
25–30	33	33%
30–35	25	25%
>35	21	21%
Sex		
Female	67	67%
Male	33	33%
Profession		
Midwifery	56	56%
Nurse	32	32%
Public Health Officer	12	12%
Education levels		
Level IV diploma	58	58%
BSc degree or above	42	42%
Experience in years		
Below five years	67	67%
Five or above	33	33%

competence score of midwives, nurses, and health officials, respectively, was 9.8 (SD 1.97), 9.3 (SD 2.29), and 9.6 (SD 1.93). In terms of gender, work experience, and educational level, the mean skill score is nearly same.

## Qualitative Result

Thematic analysis was used to assess qualitative data from three focus groups. Respondents stated emphatically that their experience with an asphyxiated newborn was difficult. They had been assisting in the restoration of newborns' lives when they had difficulty breathing. Despite their assistance in restoring breathing, they were unable to determine whether their performance met the set of standards, according to the conversation. The first participant, who came from the health centre, says.

Two midwives are present in the delivery room at my health centre to assist with labour and delivery of the baby, which includes me. My coworkers had received newborn resuscitation training two years prior, but I had not. However, I am performing resuscitation with the help of my classmates and colleagues. To be honest, no infant perished at my hands while I was resuscitating, but I can state that my procedure was not up to par. For example, we frequently overlook routines such as hand washing, keeping the baby warm, and instrument processing.

14 of the 27 people who took part in the focus group claimed they had completed the course. Despite the training, they were all unsure whether or not they were following the technique correctly. Eight individuals said they had witnessed a baby die from birth asphyxia and that it was the saddest experience of their lives. Participants 2 and 3 both say

At the institution where I used to work, some of them were not serious, while others tried their hardest to follow the protocol to the letter. I may say that my colleagues' implementation differs. As I previously stated, one of my friends did not attend the training, but she is highly knowledgeable about the technique. She outperforms those who did not participate in the training. Two babies were killed on the trained one.

During the focus group, we also asked them about the newborn corner, dangerous resuscitation practises, infection control, and a conference on supporting babies. The participant said that they had never given the probing point much thought. 3rd participant

"You're mocking me, hahaha, who cares about the quality of a specific service?" Let me be bold and state that newborn resuscitation has never been on the agenda of a meeting. "We're doing everything we can to assist baby breathe", said the participant. According to specialists, however, the newborn may face challenges such as cold stress or illness. Due to the fact that these two elements are commonly disregarded. Our rash is designed to help us breathe and begin breathing.

Only two people said they had been the victim of resuscitation-related misconduct. According to one of the two participants

We didn't dare to do anything that wasn't scientifically sound. However, in my institution, an elderly nurse has held a baby upside down to encourage breathing in the hopes of removing fluids from the airway. She frequently flaps the newborn's back to encourage them to begin breathing on their own.

The key informant interview analysis about the possible challenge of neonatal resuscitation with respect to provider, facility, resources, and programme revealed a number of contextual factors. The challenges seem a little bit different for those health centers and hospitals. According to key informant one

One of the biggest challenges is related to the provider. In this hospital, there is a high turnover and duty rotation in different departments. As a result, it is hard to find a trained health care provider in one department. If someone is trained this year for neonatal resuscitation, you will never find him in the delivery room. Because he will rotate to other departments, as staff in hospitals work in rotation. The other challenge is that we do not have a culture of learning forums. Nobody would ever share his talent or knowledge with others. No platform at all.

Another key informant has added common challenges. This key informant says

Like other issues such as TB, HIV, PMTCT, and malnutrition, neonatal resuscitation has no owner of the program. Hence, poor supportive supervision and monitoring have resulted in a challenge to the implementation. We have no regular supply of

equipment and we have no onsite refreshment training. In our hospital, the number of births per day is large, which makes the few health care providers busy adhering to protocols and employing proper handling of materials. Hence, materials will be easily damaged and replacement is unthinkable for us. Finally, the issues of equipment supply, lack of monitoring, and high client-to-provider ratio are the challenges, in my view.

The most common challenges indicated by key informants coming from health centres were lack of training, lack of infrastructure, capacity of health centers and lack of material supply. The third key informant, who is from the health center, says

You know, my friend, everybody pays attention to hospitals. We always receive little attention. For instance, in a hospital, there are many professionals, from diplomas to specialists, in the health center. But training most of the time offers them. Training opportunities are the big challenge. We do not have the skilled manpower for advanced resuscitation. Leave the other, even if we do not have a newborn corner in which we can carry out the resuscitation. Besides, mothers who come late after the baby are highly affected. We do not have the capacity to administer oxygen; we do not have the capacity to keep the baby in an incubator. Even electricity is a challenge; we don't have a generator to process instruments.

We have critically analyzed and summarized possible suggestions obtained from both the in-depth interview and FGD. The following is a list of suggestions.

- Training on neonatal resuscitation.
- Monitoring and evaluation.
- Material support.
- Assigning focal person.
- Establishing a newborn corners.
- Strengthening institutional delivery.
- Improving referral link with respect to neonatal resuscitation.
- Assigning one care providers only for baby.
- Training on infection prevention.

## Discussion

The newborn baby's life is determined by the quality of care he or she receives in the initial few hours. The competency of the healthcare professional determines how well a neonate is cared for. The ability to restore the life of an asphyxiated newborn requires knowledge and skills in neonatal resuscitation. On the other hand, a number of environmental elements may obstruct the programme of assisting babies in breathing. The effectiveness of one programme in some institutions but not in others is determined by hidden contextual factors.

The newborn baby's life is determined by the quality of care he or she receives during the first few hours. The competency of the healthcare provider has a big impact on how well a newborn is cared for. The ability to resuscitate an asphyxiated newborn requires knowledge and skills in neonatal resuscitation. However, a number of contextual factors may obstruct the programme of assisting babies in breathing. The effectiveness of one programme in one institution but not in another is determined by hidden contextual factors.

The life of a newborn baby is determined in the first few hours, and it is determined by the quality of care that the neonate receives. The competence of the healthcare professional determines how well a neonate is cared for. The ability to revive an asphyxiated newborn requires knowledge and abilities in neonatal resuscitation. On the other hand, a number of contextual elements may obstruct the programme of assisting babies with breathing. The reason that one software works in certain places but not in others is due to hidden contextual influences.<sup>10</sup>

The newborn baby's life is determined by the quality of care he or she receives in the initial few hours. The competency of the healthcare professional determines how well a neonate is cared for. The ability to restore the life of an asphyxiated infant requires knowledge and abilities in neonatal resuscitation. On the other hand, a number of environmental elements may obstruct the programme of assisting babies in breathing. The effectiveness of one programme in some institutions but not in others is determined by hidden contextual factors.<sup>11</sup>

The newborn baby's life is determined by the quality of care he or she receives within the first few hours. The expertise of the healthcare professional has a big impact on how well a newborn is cared for. The ability to resuscitate an asphyxiated newborn requires knowledge and abilities in neonatal resuscitation. However, a variety of environmental elements may obstruct the programme of assisting babies in breathing. The effectiveness of one programme at one institution but not in another is determined by hidden contextual factors.

During the FGD, we also questioned them about the newborn corner, dangerous resuscitation practices, infection control, and a conference on aiding babies. The participant said that they had never given the probing point much thought.

A number of contextual elements emerged from the key informant interview study of the prospective issue of newborn resuscitation with respect to provider, facility, resources, and programme. For those health centers and hospitals that have FGDs on the newborn corner, dangerous resuscitation practices, infection control, and meetings on helping babies practice, the issues appear to be slightly different. The participant said that they had never given the probing point much thought.

Lack of training, infrastructure, capacity of health centres, and material supply were the most common difficulties identified by key informants from health centres. The third significant informant, a health centre employee, states

## Conclusion

The majority of health care personnel working on newborn resuscitation have knowledge and abilities that are below the minimum required level, according to the report. We discovered a number of contextual factors through the qualitative analysis, including a lack of neonatal resuscitation training, poor monitoring and evaluation, a lack of material support, the absence of a focal person in charge of neonatal resuscitation, a gap in establishing newborn corners, and a delay in coming for institutional delivery.

## Ethical Approval

The ethical committee of Mizan-Tepi University's College of Health Sciences gave their approval. (MW/EC/1043/13) is the number of the ethical clearance. To gain their cooperation, an official letter from Mizan-Tepi University's college of health science was sent to each interested entity. To protect participants' rights, each questionnaire included an explanation letter. In addition, all respondents were asked to participate in the study and were given thorough explanations of the study's objectives. Then each participant signed an informed consent form, the participants informed consent included publication of anonymised response. Finally, each participant was granted for confidentiality and they were free to withdraw at any point during the interview. Their participation was not compelled in any way.

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## Author Contributions

All authors Conceived and designed the study, analyzed the data and wrote the manuscript. Involved in data analysis, drafting of the manuscript and advising the whole research paper and also were involved in the interpretation of the data and contributed to manuscript preparation. Similarly, all authors have read and approved the final version of the manuscript.

## Disclosure

The authors declare no competing interests.

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