

# Self-Efficacy and Determinants of Newborn Resuscitation Practices among Healthcare Professionals in Chipata District, Eastern Province, Zambia

Mwanida Daka<sup>1</sup>, Anatolii Tsarkov<sup>2,\*</sup>, Petro Petlovanyi<sup>2</sup>, Maureen Masumo Makoleka<sup>3</sup>, Gabriel Lungu<sup>4</sup>, Gabriel Mpundu<sup>5</sup>, Estella Mukuka Chanda<sup>6</sup>, and Crecious Phiri<sup>6</sup>

## ABSTRACT

**Background:** Effective newborn resuscitation in healthcare institutions depends on factors like supervisor support, knowledge, availability of functional equipment, and self-efficacy of healthcare professionals. This study investigated self-efficacy and related factors in newborn resuscitation among healthcare professionals in Chipata District Health facilities.

**Methodology:** This cross-sectional study involved 85 healthcare professionals selected through simple random sampling. Data were collected using a self-administered questionnaire on self-efficacy for newborn resuscitation, completed after obtaining consent. Data analysis was performed using SPSS version 21, employing Pearson chi-square or Fisher's exact tests. A multivariate binary logistic regression model analyzed associated factors, with significance set at  $p < 0.05$ .

**Results:** Overall, 69% of respondents exhibited high self-efficacy in newborn resuscitation. Among females, 88.5% reported low self-efficacy compared to 11.5% of males. High self-efficacy was seen in 83.1% of those trained in the past five years. Additionally, 58.8% demonstrated high knowledge levels. Supervisor support was reported by 56%, but 85.7% of facilities lacked functional resuscitation equipment and supplies.

**Conclusion:** Despite high self-efficacy levels, gaps remain in the provision of newborn resuscitation and professional self-efficacy. Ineffective supervision and lack of resuscitation equipment hindered practice experience and full commitment, especially among female participants.

**Keywords:** Clinical competence, health facilities, pediatric care, Skill proficiency.

Submitted: May 21, 2024

Published: June 19, 2024

 10.24018/ejclinimed.2024.5.3.341

<sup>1</sup>Mwami College of Nursing and Midwifery, Zambia.

<sup>2</sup>Department of Psychiatry, School of Medicine, University of Zambia, Zambia.

<sup>3</sup>Department of Midwifery, Women's, and Child Health, School of Nursing Sciences, University of Zambia, Zambia.

<sup>4</sup>Mental Health Department, Ministry of Health (Headquarters), Zambia.

<sup>5</sup>Levy Mwanawasa University Teaching Hospital, Zambia.

<sup>6</sup>School of Public Health, Levy Mwanawasa Medical University, Zambia.

\*Corresponding Author:

e-mail: anatoliydoc@gmail.com

## 1. INTRODUCTION

Globally, asphyxia accounts for approximately 23% of the 4 million annual newborn deaths [1]. The incidence of asphyxia-related mortality is notably higher in Sub-Saharan Africa and South Asia, where newborn mortality rates can reach 25–27 per thousand live births [2]. This high incidence in these regions underscores the urgent need for effective interventions and training to reduce newborn mortality.

At the national level, Zambia's newborn mortality rate stands at 23.6 deaths per 1000 live births, with asphyxia contributing to 9% of these deaths [3], [4]. The Zambian

Ministry of Health set a target to reduce this rate to less than 12 per 1000 live births by 2021 [5]. However, achieving this goal requires comprehensive strategies and concerted efforts from healthcare providers, policymakers, and the community at large.

Studies across East, Central, and Southern Africa, including Zambia, found birth asphyxia to be the leading cause (22%) of newborn mortality, with 87% of affected infants surviving to discharge [6], [7]. These findings highlight the critical need for improving resuscitation practices to enhance survival rates and reduce long-term disabilities among newborns. The COVID-19 pandemic has further complicated healthcare delivery, significantly impacting



the mental well-being and operational capacity of healthcare providers [8]. Dietary and lifestyle factors play a significant role in health outcomes [9], [10]. Similarly, providing comprehensive support and resources to healthcare professionals can significantly enhance their self-efficacy and effectiveness in clinical procedures [11]. Additionally, alcohol use during pregnancy has been identified as a significant factor affecting both maternal and newborn health outcomes [12]. Addressing systemic barriers, such as improving health-seeking behaviors and access to care, is essential for better health outcomes in resource-limited settings like Zambia [13], [14].

Adequate newborn resuscitation practices are crucial for preventing the majority of deaths due to asphyxia, thus reducing overall newborn mortality. Newborn resuscitation encompasses interventions to support the airway, breathing, and circulation of a newborn immediately after birth [15], [16]. Approximately 10% of the nearly 4 million babies born annually require some resuscitation, and 1% require extensive resuscitation [17].

The primary objective of newborn resuscitation is to stabilize the newborn's heart rate, respiratory rate and pattern, blood pressure, color, and general activity within seven minutes of birth to prevent cerebral damage that could result in cerebral palsy, long-term disability, or death [18]. The World Health Organization (WHO) emphasizes that newborn resuscitation is an essential skill for all health professionals involved in deliveries [19]. WHO further states that the knowledge and skills to perform effective newborn resuscitation can mean the difference between life and death.

Effective resuscitation requires health care professionals to possess sufficient knowledge and skills. Duncan and colleagues note that proper resuscitation at birth can significantly improve outcomes for newborns with asphyxia [20]. Basic equipment and minimal skills, when used correctly, can achieve effective resuscitation [4], [18]. However, in many developing countries, effective newborn resuscitation is often seen as a complex procedure requiring expensive technology, making it inaccessible to low-income health facilities [19]. Consequently, resuscitation is frequently inadequately performed or not initiated at all [20].

Self-efficacy, defined as an individual's confidence in their ability to complete a task or achieve a goal, plays a significant role in the success of newborn resuscitation [21]. Low self-efficacy can lead to disengagement or avoidance of neonatal resuscitation, with severe consequences including cerebral damage, long-term disability, and death [18]. Lawn with colleagues highlight that resuscitation at birth is critical to infant survival, with the potential to save up to 190,000 lives annually [22].

To reduce newborn mortality due to birth asphyxia, WHO, in collaboration with the American Academy of Pediatrics (AAP), United States Agency for International Development (USAID), Save the Children's Saving Newborn Lives, and other global health stakeholders, developed an evidence-based educational program called Basic Newborn Resuscitation. This program aims to educate and train healthcare professionals in resource-limited countries on effective resuscitation techniques [23]. Zambia's Ministry of Health has adopted these guidelines,

involving standardized algorithms to reduce newborn mortality.

The Ministry of Health, in collaboration with stakeholders, has been training nurses, clinical officers, midwives, and doctors on Help Baby Breathe, Emergency Obstetrical Neonatal Care, Essential Newborn Care, and Basic and Advanced Newborn Resuscitation [24]. Additionally, the Ministry of Health provides newborn resuscitation guidelines displayed in health facilities as working aides. These guidelines aim to change healthcare professionals' behavior, leading to better health outcomes and achieving the newborn health targets outlined in Sustainable Development Goal 3 (Good Health and Well-being).

Success in resuscitation raises healthcare professionals' self-efficacy, making them more likely to effectively engage in resuscitation in future situations, potentially decreasing newborn mortality in Zambia. This study aims to investigate self-efficacy and related factors concerning newborn resuscitation among health professionals in the Chipata district of Zambia.

Moreover, continuous professional development and training are essential to maintain and improve the skills necessary for effective newborn resuscitation [18], [25]. Regular refresher courses and simulations can help healthcare providers stay updated with the latest resuscitation techniques and protocols, ensuring they are well-prepared to handle emergencies efficiently. Implementing such training programs requires a collaborative effort from government agencies, non-governmental organizations, and international health bodies to provide the necessary resources and support [25], [26].

In addition to training, there is a need for adequate infrastructure and equipment in healthcare facilities, especially in rural and low-resource settings [26]. Ensuring the availability of essential resuscitation equipment such as bag-valve masks, suction devices, and oxygen supplies can significantly improve the outcomes of newborn resuscitation efforts. Healthcare facilities must be equipped with the necessary tools to enable healthcare providers to perform resuscitation effectively [26], [27].

Furthermore, community awareness and involvement play a crucial role in reducing newborn mortality [26]. Educating expectant mothers and families about the importance of skilled birth attendance and the signs of newborn distress can help ensure timely and appropriate medical intervention. Community health workers can also be trained to provide basic newborn care and recognize when to refer cases to higher-level facilities for advanced care.

Research and data collection are vital components of improving newborn resuscitation practices. Conducting studies to identify barriers to effective resuscitation and evaluating the impact of training programs can provide valuable insights for developing targeted interventions. Data on newborn mortality and resuscitation outcomes can help track progress towards national and global health goals, guiding policy, and resource allocation [18], [26].

Newborn asphyxia remains a significant challenge contributing to high newborn mortality rates globally, particularly in Sub-Saharan Africa and South Asia. Effective newborn resuscitation practices are essential to prevent

deaths and long-term disabilities associated with asphyxia. Training healthcare providers, ensuring adequate equipment, raising community awareness, and conducting research are critical strategies to enhance resuscitation outcomes and reduce newborn mortality. By addressing these factors, Zambia can make significant strides toward achieving its health targets and improving the survival and health of newborns.

This study's objective to investigate self-efficacy and related factors concerning newborn resuscitation among health professionals in the Chipata district of Zambia is timely and essential. Understanding healthcare providers' confidence and capabilities can inform targeted training programs and interventions, ultimately contributing to better health outcomes for newborns in the region.

## 2. METHOD

### 2.1. Study Design

This research employed a cross-sectional analytical study design to examine newborn resuscitation practices among healthcare professionals. This design was chosen due to its suitability for studying areas with limited existing data, as it allows for data collection from health professionals at a single point in time [28]. The analytical nature of the design facilitated the identification and exploration of factors influencing the self-efficacy of health professionals in neonatal resuscitation.

### 2.2. Research Setting

The study was conducted in Chipata District, Eastern Province of Zambia, across three hospitals and several health centers providing 24-hour maternity services. These facilities had staff trained in programs such as Help Baby Breathe, Emergency Obstetrical Neonatal Care, Essential Newborn Care, and both Basic and Advanced Newborn Resuscitation. The sites included:

- *Chipata Central Hospital*: A level three hospital in central Chipata with approximately 500 beds, including 70 maternity beds and newborn cots, and an average of 630 deliveries per month.
- *Chipata District Hospital*: A level one hospital situated 5 km from central Chipata with 20 beds (6 maternity) and an average of 25 deliveries per month.
- *Mwami Mission Hospital*: A faith-based rural hospital located 30 km southeast of Chipata near the Malawi border, with 200 beds (41 maternity) and an average of 170 deliveries per month.
- *Kapata Urban Health Center*: A zonal center in Chipata city with 26 beds (8 maternity) and an average of 105 deliveries per month.
- *Namuseche Health Centre*: Located 5 km from Chipata city, with 20 beds (5 maternity) and an average of 80 deliveries per month.
- *Katandala Rural Health Centre*: Situated 22 km east of Chipata, with 7 beds (3 maternity) and an average of 13 deliveries per month.

- *Walela Health Post*: Located 8 km from Chipata city, with 8 beds (6 maternity) and an average of 25 deliveries per month.

### 2.3. Study Population

The study population included healthcare professionals working in the labor wards of the selected facilities in Chipata District. This included Medical Doctors, Medical Licentiates, Clinical Officers, Midwives, and Nurses.

### 2.4. Target Population

The target population comprised Medical Doctors, Medical Licentiates, Clinical Officers, Midwives, and Nurses from the labor wards of the selected health facilities in Chipata District.

### 2.5. Sample Selection

Health centers providing 24-hour maternity services and staffed by personnel trained in relevant neonatal resuscitation programs were randomly sampled. The study included three hospitals (Chipata Central, Chipata District, and Mwami Mission) and four health centers (Kapata Urban, Namuseche, Walela, and Katandala Rural Health Centre). Simple random sampling was used to select respondents from the approximately 108 health professionals stationed in labor wards.

### 2.6. Inclusion Criteria

The inclusion criteria were meticulously crafted to ensure the selection of highly qualified participants with recent and relevant experience in neonatal resuscitation. Participants included practicing Medical Doctors, Nurses, Clinical Officers, and Midwives who had undergone training in the past two years in programs such as Help Baby Breathe, Emergency Obstetrical Neonatal Care, Essential Newborn Care, and both Basic and Advanced Newborn Resuscitation. Additionally, participants needed at least one year of experience in conducting deliveries and neonatal resuscitation, had to be available for follow-up assessments, and provided written consent.

### 2.7. Exclusion Criteria

The exclusion criteria aimed to ensure that participants were actively engaged in neonatal resuscitation and possessed current, relevant experience. Exclusions included Medical Doctors, Nurses, Clinical Officers, and Midwives not practicing in the labor wards of Chipata District, those whose neonatal resuscitation training was older than five years, individuals on long-term leave (exceeding one month), and healthcare providers primarily engaged in administrative or non-clinical duties.

### 2.8. Sample Size

The sample size was calculated using Cochran's formula. With a target population of 108 healthcare professionals, the adjusted sample size was determined to be 85, accounting for a desired level of precision and estimated population proportions.

### 2.9. Data Collection Tool

Data collection utilized a semi-structured self-administered questionnaire to assess the knowledge and self-efficacy of healthcare professionals in neonatal resuscitation. The questionnaire included open and close-ended questions and was reviewed by district experts before a pilot study. A checklist was also employed to evaluate the availability of resuscitation equipment and medical supplies.

### 2.10. Data Collection Technique

Data were collected through a semi-structured self-administered questionnaire. Participants were informed about the study's purpose, assured of confidentiality, and asked for consent. Questionnaires were distributed and collected immediately after completion, ensuring consistency and completeness.

### 2.11. Questionnaire Distribution

The researcher distributed the questionnaires to all healthcare professionals after explaining the research goals. Respondents had 40 minutes to complete the questionnaires, which were then reviewed for completeness.

### 2.12. Checklist

The checklist collected accurate information on the availability of protocols and equipment that could not be obtained through the questionnaire. It consisted of two sections: one for protocols and guidelines, and another for equipment availability.

### 2.13. Pilot Study

A pilot study was conducted at Msekera Health Centre to assess the feasibility of the study and refine the questionnaire. Feedback from the pilot study helped ensure clarity and validity of the instruments.

### 2.14. Validity

Internal validity was ensured by constructing the questionnaire to capture essential issues regarding self-efficacy in neonatal resuscitation. The tool was reviewed by experts and pre-tested in a pilot study.

### 2.15. Reliability

Reliability was achieved by testing the tool to eliminate biases and minimize errors during data collection. The pilot study ensured the stability and necessary adjustments to the tool before the main study.

### 2.16. Data Management and Storage

Questionnaires were checked daily for completeness and accuracy. Data were entered into SPSS version 26, and frequencies and proportions were used to summarize responses. Data from open-ended questions were coded and grouped for easier comparison.

### 2.17. Data Processing and Analysis

Data analysis involved using SPSS version 26 to test associations between dependent (self-efficacy) and independent variables (knowledge, equipment availability,

management support). Pearson chi-square tests and multivariate logistical regression were employed to analyze the data, with significance set at a p-value of 0.05.

### 2.18. Ethical Consideration

Ethical clearance was obtained from the University of Zambia Biomedical Research Ethics Committee and the National Health Research Authority. Permissions were secured from relevant health authorities, and participants were informed about the study's purpose and their rights. Confidentiality and anonymity were assured, and written consent was obtained from all participants. Justice and respect were upheld throughout the study, ensuring equal treatment and voluntary participation.

## 3. RESULTS

Data from 85 respondents (achieving a 100% response rate) across 7 facilities in the Chipata district were analyzed using SPSS version 26 software. Responses were coded and summarized using descriptive statistics, including frequency tables, bar charts, pie charts, and cross-tabulations. Variables were aggregated to obtain overall scores based on the indicators and cut-off points.

Associations between the dependent variable (self-efficacy in newborn resuscitation) and independent variables (individual characteristics, knowledge, management support for self-efficacy in newborn resuscitation, availability of functional equipment, medical and surgical supplies, and protocols) were tested using Pearson's chi-square test or Fisher's Exact Test through cross-tabulations.

For inferential statistics, variables with p-values less than 0.25 at a 95% confidence level in univariate analysis were included in the multivariable logistic regression model. The logistic regression model was chosen as the outcome variable (self-efficacy, categorized as high or low) was binary.

### 3.1. Demographic Characteristics

The demographic characteristics of the respondents encompassed sex, age, position, job status, the highest level of training, time since last training in newborn resuscitation, duration working in the labor ward, and work department. [Table I](#) reveals that most respondents were female (71.8%,  $n = 61$ ) and aged over 40 years (35.3%,  $n = 30$ ). Most respondents were nurses/midwives (85.9%,  $n = 73$ ), and nearly all healthcare professionals (98.8%,  $n = 84$ ) were employed full-time. Less than half of the respondents (45.9%,  $n = 39$ ) had attained diploma-level training. Approximately half (50.6%,  $n = 43$ ) had received training in newborn resuscitation within two years prior to the study. Additionally, 42.3% ( $n = 36$ ) had worked in the labor ward for between two and five years, and around 41% ( $n = 35$ ) worked in labor wards within health centers.

### 3.2. Knowledge on Newborn Resuscitation

This section details the knowledge of health professionals, including medical doctors, medical licentiates, clinical officers, nurses, midwives, and obstetricians, regarding newborn resuscitation. According to [Table I](#), the vast majority of respondents (95.3%,  $n = 81$ ) recognized that

TABLE I: KNOWLEDGE OF HEALTH PROFESSIONALS ON NEWBORN RESUSCITATION (PART 1) (N = 85)

| Characteristic                                                                            | Frequency | Percentage  |
|-------------------------------------------------------------------------------------------|-----------|-------------|
| <b>Importance of wiping secretions or meconium while the head appears before delivery</b> |           |             |
| To promote aspiration                                                                     | 2         | 2.4         |
| To prevent aspiration                                                                     | 81        | 95.3        |
| To promote aspiration and facilitate fast delivery                                        | 2         | 2.4         |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |
| <b>What to do in the golden minute of delivery</b>                                        |           |             |
| Bath the newborn                                                                          | 1         | 1.2         |
| Evaluate the heart rate                                                                   | 4         | 4.7         |
| Help the newborn breathe if necessary                                                     | 80        | 94.1        |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |
| <b>Newborn requiring routine care after birth</b>                                         |           |             |
| A newborn who is not breathing                                                            | 2         | 2.4         |
| A newborn who is gasping                                                                  | 9         | 10.6        |
| A newborn who is crying and/or breathing well                                             | 71        | 83.5        |
| A newborn who is limp                                                                     | 3         | 3.5         |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |
| <b>When to clamp or tie and cut umbilical cord during routine care</b>                    |           |             |
| 1–3 minutes after birth                                                                   | 70        | 82.4        |
| Immediately after the baby is born                                                        | 15        | 17.6        |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |
| <b>What to do when a newborn is limp and not breathing at birth</b>                       |           |             |
| Dry the baby thoroughly                                                                   | 65        | 76.5        |
| Shake the newborn                                                                         | 8         | 9.4         |
| Hold the newborn upside down                                                              | 12        | 14.1        |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |
| <b>How to stimulate a newborn after delivery</b>                                          |           |             |
| Drying the baby thoroughly                                                                | 27        | 38.6        |
| Rubbing the baby's back                                                                   | 24        | 34.3        |
| Drying the baby, suctioning and ventilation                                               | 7         | 10.0        |
| Changing environment, squeezing ribs, flicking back/feet                                  | 12        | 17.1        |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |
| <b>What the face mask should cover during mask ventilation</b>                            |           |             |
| Nose, mouth and chin                                                                      | 84        | 98.8        |
| Eyes, nose, mouth and chin                                                                | 1         | 1.2         |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |
| <b>Indicators of effective mask ventilation</b>                                           |           |             |
| Improving oxygen levels                                                                   | 11        | 12.9        |
| Slight rise of chest and upper abdomen with each inflation                                | 51        | 60.0        |
| Heart rate rising to at least 100 beats/minute                                            | 23        | 27.1        |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |

wiping secretions or meconium from the newborn's face and nose prevents aspiration. Within the first critical minute after birth, 94.1% (n = 80) indicated they would assist the newborn in breathing if necessary. Routine care for a gasping newborn was provided by 10.6% (n = 9) of the respondents. 17.6% (n = 15) of the healthcare professionals clamped and cut the umbilical cord immediately after birth, while 76.5% (n = 65) identified thorough drying as the best intervention for a limp and non-breathing newborn. For newborn stimulation, 38.6% (n = 27) endorsed thorough drying and 34.3% (n = 24) recommended rubbing the back as effective methods. Moreover, 60% (n = 51) of the respondents identified a slight rise of the chest and upper abdomen with each inflation as indicators of effective ventilation in newborns.

Table II indicates that 80% (n = 68) of respondents would initiate ventilation if a newborn does not respond to initial steps to stimulate breathing. Additionally, 16.5% (n = 14) would stimulate the newborn's back. A significant majority, 91.8% (n = 78), would suction a newborn with secretions blocking the mouth and nose. Furthermore,

80% (n = 68) reported that squeezing the bag to produce chest movement and reapplying the mask for a better seal when the chest is not moving is the correct approach for bag and mask ventilation.

Regarding the preferred position for opening the airway, 17.6% (n = 15) of respondents indicated the sniffing position. Additionally, 94.1% (n = 80) would stop ventilation once the newborn's heart rate normalizes and they begin breathing or crying. When asked about the observation period after ventilation before initiating routine care, 56.5% (n = 48) indicated a duration of 15–30 minutes, while 34.2% (n = 29) suggested 5–10 minutes.

Fig. 1 illustrates that 58.8% (n = 50) of respondents possessed high knowledge on newborn resuscitation, whereas 41.2% (n = 35) demonstrated low knowledge.

### 3.3. Management/Supervisor Support on Newborn Resuscitation

81.2% (n = 69) of respondents had a supervisory team composed of their supervisor and clinical team with adequate expertise in newborn resuscitation. The most

TABLE II: KNOWLEDGE OF HEALTH PROFESSIONALS ON NEWBORN RESUSCITATION (PART 2) (N = 85)

| Characteristic                                                                            | Frequency | Percentage  |
|-------------------------------------------------------------------------------------------|-----------|-------------|
| <b>Action to take when a newborn does not respond to steps to stimulate breathing</b>     |           |             |
| Stimulate the newborn's back                                                              | 14        | 16.5        |
| Hold the newborn upside down                                                              | 2         | 2.4         |
| Squeeze the newborn's ribs                                                                | 1         | 1.2         |
| Begin ventilation                                                                         | 68        | 80.0        |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |
| <b>When to suction a newborn</b>                                                          |           |             |
| Newborn crying at birth                                                                   | 1         | 1.2         |
| Newborn crying with meconium in the amniotic fluid                                        | 2         | 2.4         |
| When there are secretions blocking the mouth and nose                                     | 78        | 91.8        |
| Before drying the newborn                                                                 | 4         | 4.7         |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |
| <b>Correct ventilation with bag and mask</b>                                              |           |             |
| Squeeze the bag to produce movement of the chest                                          | 68        | 80.0        |
| Squeeze the bag to give 80 to 100 breaths per minute                                      | 17        | 20.0        |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |
| <b>Action to take when newborn's chest is not moving with bag and mask ventilation</b>    |           |             |
| Stop the ventilation                                                                      | 10        | 11.8        |
| Reapply the mask to get a better seal                                                     | 68        | 80.0        |
| Stimulate the newborn's back                                                              | 3         | 3.5         |
| Give medicine to the newborn                                                              | 4         | 4.7         |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |
| <b>The preferred position of a newborn on opening the airway</b>                          |           |             |
| Sniffing position                                                                         | 15        | 17.6        |
| Neck slightly and hyper extended                                                          | 75        | 82.4        |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |
| <b>When to stop ventilation during newborn care</b>                                       |           |             |
| The heart rate is slow                                                                    | 2         | 2.4         |
| The newborn is blue and limp                                                              | 2         | 2.4         |
| Heart rate is normal and the chest is not moving                                          | 1         | 1.2         |
| Heart rate is normal and the newborn is breathing/crying                                  | 80        | 94.1        |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |
| <b>Observation duration of a newborn after ventilation before initiating routine care</b> |           |             |
| Every 15–30 minutes                                                                       | 48        | 56.5        |
| Every 5–10 minutes                                                                        | 29        | 34.2        |
| Every 1–2 minutes                                                                         | 6         | 7.1         |
| Never                                                                                     | 2         | 2.4         |
| <b>Total</b>                                                                              | <b>85</b> | <b>100%</b> |

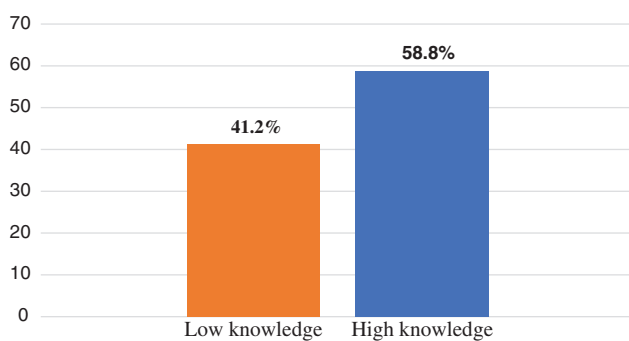


Fig. 1. Overall knowledge of respondents on newborn resuscitation (n = 85).

mentioned methods through which supervisors helped respondents gain skills and knowledge in newborn resuscitation were demonstrations, drills, and ward meetings (46.3%, n = 31), followed by mentorship, supervision, technical support, and training (37.3%, n = 25).

Additionally, 43.5% (n = 37) reported that their supervisors reinforced performance in newborn resuscitation by building on strengths, while 38.8% (n = 33) stated that

performance was reinforced by addressing weaknesses. Furthermore, 55.3% (n = 47) reported that supervisors conducted direct observation and interviews during visits, and 83.5% (n = 71) indicated that supervisors could better support efficacy by producing full reports with action points and motivating health workers.

Fig. 2 demonstrates that less than half of the respondents (44%, n = 37) reported not receiving help from management/supervisors in gaining knowledge and skills in newborn resuscitation during supervisory visits, while over half (56%, n = 48) reported receiving such assistance.

### 3.4. Resuscitation Equipment, Supplies, and Protocols

The neonatal resuscitation guidelines and flow charts were available in all facilities (100%, n = 7). However, Apgar scoring charts, procedure manuals, management of hypothermia guidelines, and resuscitation record sheets were unavailable in any of the facilities (100%, n = 7). Only one facility (14.3%) had a resuscitation equipment checklist.

All health facilities (100%, n = 7) experienced shortages of supplies such as umbilical catheterization kits, spare batteries and bulbs, and warm, clean, dry towels or clothes.

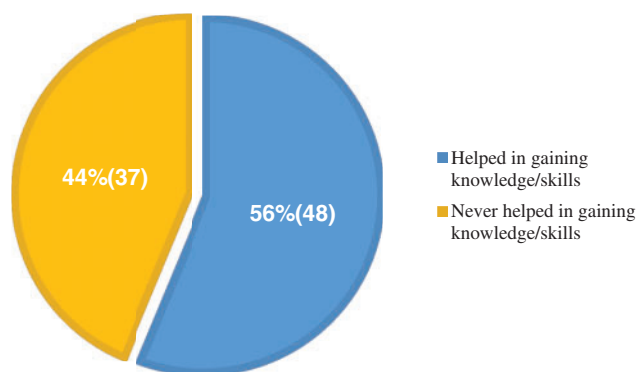


Fig. 2. Support provided by management/supervisors during supervisory visits to enhance knowledge and skills in neonatal resuscitation (n = 85).

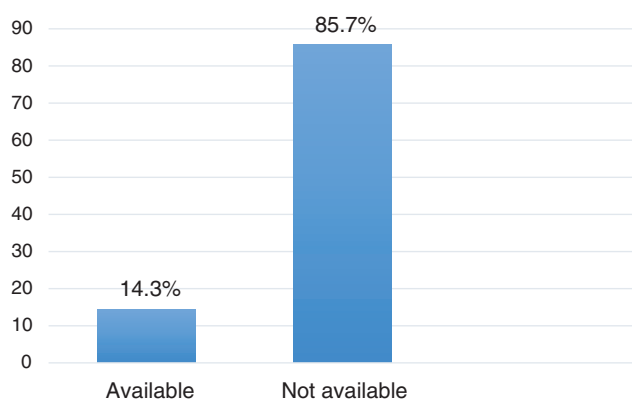


Fig. 3. Availability of equipment and medical/surgical supplies for newborn management (n = 7).

There were substantial shortages of endotracheal tubes, scalp vein cannulas, laryngoscopes, and pulse oximeters in many facilities. Additionally, 28.6% (n = 2) of the facilities lacked functioning neonatal resuscitators, suction machines, oxygen cylinders/concentrators, suction tubing, timer clocks, overhead heaters, and oxygen tubing.

Fig. 3 shows that only one facility (14.3%) had most of the necessary equipment and medical/surgical supplies for newborn management available. In contrast, many facilities (85.7%, n = 6) lacked most of the essential equipment and supplies.

### 3.5. Respondents' Self-Efficacy in Newborn Resuscitation

Most respondents were very confident in keeping newborns warm (71.8%), preparing the environment to maintain warmth (64.7%), placing the newborn on the mother's abdomen (67.4%), thoroughly drying the newborn, and providing initial stimulation (62.4%), and evaluating the newborn's cry, color, breathing, and movement (67.1%).

However, respondents were less confident in preparing the delivery area (47.2%), preparing equipment for newborn resuscitation (50.6%), evaluating the amniotic fluid (54.1%), and identifying a helper and making an emergency plan (51.8%).

Over half of the respondents were very confident in identifying a normal newborn heart rate (58.8%), performing ventilation with a bag and mask (52.9%), and timing the disinfection of the bag, mask, and suctioning device used

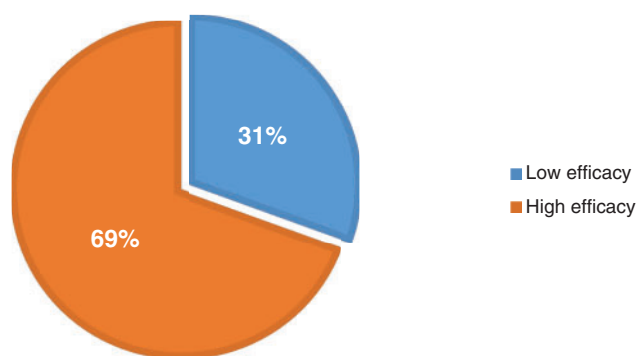


Fig. 4. Overall self-efficacy in newborn resuscitation among respondents (n = 85).

(61.2%). Conversely, 56.5% (n = 48), 55.3% (n = 47), and 49.4% (n = 42) of the respondents were not confident in addressing situations where the newborn's chest is not moving during bag and mask ventilation, managing a newborn who has received ventilation, and handling a newborn who is quiet, limp, not crying, and unresponsive to initial breathing stimulation steps, respectively.

Over a quarter of the respondents (30.6%, n = 26) reported low self-efficacy in newborn resuscitation interventions, while over two-thirds (69.4%, n = 59) expressed high self-efficacy (Fig. 4).

### 3.6. Association Between Variables

A significant association (p = 0.023) was found between self-efficacy in newborn resuscitation and gender. Most females (88.5%) reported low self-efficacy compared to males (11.5%). High self-efficacy was observed in the majority (83.1%) of respondents who had received newborn resuscitation training within the last 5 years, compared to 13.6% and 3.3% for those trained 6–10 years ago and over 10 years ago, respectively. This difference was significant (p = 0.025).

Differences in age groups, highest education, profession, length of service, work unit, knowledge, and management support did not show significant variations in efficacy (p-values > 0.05).

Variables that met the predetermined cutoff (p-value ≤ 0.25) in the chi-square/Fisher's exact test analysis were included in the multivariable logistic regression. These variables included gender, highest education attained, profession, last newborn resuscitation training, and length of service. The analysis revealed that, holding all other variables constant, females had 0.04 times lower odds of reporting high self-efficacy in newborn resuscitation interventions compared to males, and this effect was significant (AOR = 0.043, p = 0.028). Similarly, doctors had 0.006 times lower odds of reporting high self-efficacy compared to nurses/midwives (AOR = 0.0057, p = 0.009), and this decrease was statistically significant.

The odds of reporting high self-efficacy were 55.3 times higher (AOR = 55.31, p = 0.054) among respondents with postgraduate training compared to those with certificate training, although this was not statistically significant. Individuals who had been trained in newborn resuscitation 6–10 years ago had 3.69 times increased odds of high self-efficacy (AOR = 3.694, p = 0.277) compared to those

trained less than 6 years ago; however, this effect was also not statistically significant.

#### 4. DISCUSSION

Newborn resuscitation is a critical intervention to combat one of the leading causes of newborn mortality worldwide. Despite its significance, the self-efficacy of healthcare professionals in performing newborn resuscitation remains inadequately addressed. Self-efficacy, the belief in one's ability to execute tasks successfully, plays a crucial role in how healthcare providers approach resuscitation efforts, ultimately affecting neonatal outcomes [29].

##### 4.1. Knowledge About Newborn Resuscitation

The study revealed that 58.8% of respondents had high knowledge levels on newborn resuscitation. High levels of knowledge are crucial for effective resuscitation. Research by Okonofua and colleagues, as well as Wrammert and colleagues, has demonstrated that higher knowledge levels are positively correlated with increased self-efficacy among healthcare professionals [30], [31]. However, specific knowledge gaps were identified, such as the correct techniques for newborn stimulation and airway positioning. This indicates that while overall knowledge was high, it did not significantly influence self-efficacy, which may be more dependent on practical experience and supervision.

It is important to note that while high knowledge levels are essential, they are not solely sufficient for ensuring effective resuscitation practices. For instance, studies conducted in India and in Uganda demonstrated that despite high knowledge levels, performance in essential resuscitation skills was low [32], [33]. This suggests that a certain threshold of practical application and confidence is necessary to translate knowledge into effective practice. The findings from this study align with these observations, highlighting the need for continuous training and practical exposure to enhance self-efficacy.

##### 4.2. Self-Efficacy on Newborn Resuscitation

The study found that 69% of healthcare professionals reported high self-efficacy in performing newborn resuscitation. Training within the past five years was significantly associated with higher self-efficacy. This finding aligns with research by Kc and colleagues, as well as Abdu and colleagues, who noted that recent training positively impacts self-efficacy and practical skills [34], [35]. This suggests that continuous training and practical exposure are crucial for maintaining high self-efficacy among healthcare professionals.

The importance of recent and continuous training cannot be overstated. As demonstrated by studies in Nepal and Indonesia, healthcare professionals who receive focused training and engage in regular quality improvement cycles exhibit higher levels of self-efficacy [34], [36]. This reinforces the necessity for ongoing professional development and training programs that are not only comprehensive but also regularly updated to include the latest techniques and guidelines in newborn resuscitation.

##### 4.3. Managerial and Supervisory Support

Supervisory support was reported by 56% of respondents, highlighting its importance in enhancing self-efficacy and newborn resuscitation practices. Effective supervision includes practical demonstrations, mentorship, and feedback, which have been shown to improve resuscitation skills and confidence [20], [37]. However, the lack of consistent supervisory support for some professionals indicates an area for improvement.

The role of supervisors is crucial in building and maintaining the self-efficacy of healthcare professionals. Regular and effective supervision provides not only the necessary technical support but also the motivational reinforcement needed to perform critical tasks such as newborn resuscitation. Studies from Uganda and Kenya have shown that lack of supervision can hinder the use of resuscitation guidelines and reduce the overall quality of care [37], [38]. Therefore, strengthening supervisory support systems and ensuring that supervisors are well-equipped to provide practical guidance and feedback is essential for improving resuscitation outcomes.

##### 4.4. Availability of Functional Resuscitation Equipment, Supplies, and Protocols

The study's findings indicated a significant shortage of essential resuscitation equipment and supplies in 85.7% of the health facilities surveyed. This lack of resources negatively impacts the ability of healthcare professionals to perform effective resuscitation, thereby affecting their self-efficacy. The availability of functional equipment is crucial, as emphasized by both the WHO and Trevisanuto and colleagues. They noted that having the proper tools is essential for effective newborn care and significantly reduces mortality [23], [39].

The availability of functional resuscitation equipment and supplies is a fundamental component of effective newborn resuscitation. The study found that most health facilities lacked essential equipment such as bag-valve masks, suction devices, and oxygen supplies. This shortage forces healthcare professionals to improvise, which can compromise the quality of care and reduce their confidence in performing resuscitation. Addressing this issue requires a concerted effort from health facility management and policymakers to ensure that all necessary equipment is available and functional.

##### 4.5. Application of Self-Efficacy Theory to the Research Findings

Bandura's Self-Efficacy Theory provides a framework for understanding how confidence in one's abilities can influence performance in critical tasks such as newborn resuscitation [40]. The study's findings underscore the need for targeted interventions to enhance self-efficacy among healthcare professionals, including regular training, adequate supervision, and ensuring the availability of necessary equipment.

The application of Bandura's theory in this context highlights the multifaceted nature of self-efficacy. It is influenced by various factors, including previous experience, training, feedback, and the availability of resources. Enhancing self-efficacy, therefore, requires a holistic

approach that addresses all these factors. For instance, providing regular opportunities for hands-on practice and simulations can help build confidence and competence in newborn resuscitation.

#### 4.6. Nursing Implications

The high levels of knowledge and skills observed among healthcare professionals highlight the need for strategies to translate this knowledge into effective practice. Enhancing self-efficacy through continuous education, practical training, and robust supervisory support is essential. Gender disparities in self-efficacy suggest that tailored interventions may be needed to support female healthcare professionals more effectively.

Nursing implications extend beyond individual training and support to encompass systemic changes in how newborn resuscitation is approached in healthcare facilities. Ensuring that nurses and midwives receive regular and updated training, alongside practical opportunities to apply their skills, can significantly enhance their self-efficacy. Additionally, creating a supportive work environment that encourages continuous learning and professional development is crucial for maintaining high levels of competence and confidence.

### 5. CONCLUSION

Although the current study revealed high levels of self-efficacy in newborn resuscitation among healthcare professionals, significant gaps persist in the provision of newborn resuscitation training and self-efficacy support. Supervision and support were found to be ineffective, leading to a deterioration of knowledge regarding the stimulation of newborns post-delivery and the proper positioning for airway management. Notably, the lack of resuscitation equipment and other resources has hindered practical experience, particularly among female participants, preventing them from fully utilizing their skills and commitment to newborn resuscitation.

To address these issues, greater emphasis should be placed on enhancing and sustaining self-efficacy through comprehensive mentorship programs and ensuring the provision of adequate newborn resuscitation resources. Strengthening supervisory support systems is essential to effectively address the low self-efficacy observed among healthcare professionals, thereby improving overall newborn resuscitation outcomes.

#### 5.1. Recommendations

To address gaps in newborn resuscitation, comprehensive measures are required. The Ministry of Health should ensure the provision of adequate newborn resuscitation equipment, medical supplies, procedure manuals, and protocols to hospitals and clinics. Additionally, the ministry should print and circulate newborn resuscitation record sheets through Monitoring and Evaluation (M&E) efforts.

District health offices and hospitals need to implement strategies to enhance self-efficacy in newborn resuscitation among healthcare professionals. This includes providing targeted mentorship for midwifery care, equipping health

centers with essential resuscitation equipment, and lobbying for more midwives and doctors. Effective supervision and strengthening the supervisory support system are crucial for maintaining high self-efficacy. Comprehensive midwifery procedure manuals, hypothermia management guidelines, and adequate towels for hypothermia prevention should be provided. Printing and distributing record sheets will enhance care documentation.

Future research should explore self-efficacy in various clinical settings, as the current study was limited to a few hospitals and health centers. Additionally, research should focus on sustaining self-efficacy over time. Investigating the relationship between the work environment and healthcare professionals' self-efficacy is also essential to understanding and reinforcing factors that support optimal care.

#### 5.2. Strengths and Limitations of Study

One strength of this study is the utilization of a self-efficacy scale questionnaire to measure healthcare professionals' self-efficacy accurately. However, a limitation is the diverse sample of healthcare professionals, whose varying levels of knowledge may affect the findings. To uphold validity, all practising healthcare professionals included in the study received training in Helping Babies Breathe, Emergency Obstetric and Neonatal Care, Essential Newborn Care, and both Basic and Advanced Newborn Resuscitation. Additionally, participants were required to have a minimum of six months of practical experience in conducting deliveries at the selected facilities before the study commenced.

### CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

### REFERENCES

- [1] UNICEF. Neonatal mortality. UNICEF DATA. 2020. [accessed 20.04.2021]. Available from: <https://data.unicef.org/topic/child-survival/neonatal-mortality/>.
- [2] UNICEF. Levels and trends in child mortality 2021. UNICEF DATA. 2021. [accessed 21.04.2021]. Available from: <https://data.unicef.org/resources/levels-and-trends-in-child-mortality-2021/>.
- [3] Knoema Data Appliance. Zambia-Under-5 mortality rate. World data Atlas Zambia. 2021. [accessed 18.04.2021]. Available from: <https://senegalglobalstanding.opendataforafrica.org/atlas/Zambia/topics/Health/Health-Status/Under-5-mortality-rate>.
- [4] Ministry of Community Development, Mother and Child Health. Zambia newborn health framework. 2013. [accessed 07.03.2023]. Available from: <https://www.afro.who.int/sites/default/files/2019-06/Zambia%20New%20Born%20%20Framework%202013.pdf>.
- [5] UNICEF Zambia. The European Union-funded Millennium development goal initiative (MDGi) aimed to accelerate the reduction of maternal, neonatal and child mortality. MDGi Zambia. 2020. [accessed 16.03.2024]. Available from: <https://www.unicef.org/zambia/mdgi-zambia>.
- [6] Workineh Y, Semachew A, Ayalew E, Animaw W, Tirfie M, Birhanu M. Prevalence of perinatal asphyxia in East and central Africa: systematic review and meta-analysis. *Heliyon*. 2020;6(4):e03793. doi: 10.1016/j.heliyon.2020.e03793.
- [7] Halloran DR, McClure E, Chakraborty H, Chomba E, Wright LL, Carlo WA. Birth asphyxia survivors in a developing country. *J Perinatol: Official J Calif Perinat Assoc*. 2009;29(3):243–9. doi: 10.1038/jp.2008.192.

- [8] Musonda E, Petlovanyi P, Tsarkov A, Phiri C, Mpundu G, Kunda EM, *et al.* The psychological impact and associated factors of the COVID-19 pandemic on health care providers at Chainama Psychiatry Hospital, Lusaka. *Zambia Eur J Med Health Sci.* 2023;5(4):11–8. doi: 10.24018/ejmed.2023.5.4.1771.
- [9] Kalaluka PK, Tsarkov A, Petlovanyi P, Kunda R, Himalowa S, Bwembya P, *et al.* Dietary patterns and metabolic syndrome risk in adults living with HIV: a cross-sectional study in Lusaka district, Zambia. *Eur J Med Health Sci.* 2024;6(1):17–24. doi: 10.24018/ejmed.2024.6.1.2032.
- [10] Pandu MH, Tsarkov A, Petlovanyi P, Paul R. Optimization of early diagnosis of glucose metabolism impairment for patients receiving antipsychotic medications at the outpatient psychiatric clinic of the University Teaching Hospital, Lusaka, Zambia. *Eur J Med Health Sci.* 2022;4(4):75–83. doi: 10.24018/ejmed.2022.4.4.1410.
- [11] Moonga VJ, Tsarkov A, Petlovanyi P. A descriptive study on the factors influencing readmission of mentally ill adults at chainama hills college hospital, Lusaka, Zambia. *Eur J Med Health Sci.* 2023;5(3):51–9. doi: 10.24018/ejmed.2023.5.3.1721.
- [12] Kumar JS, Paul R, Tsarkov A, Zyambo C. The prevalence of alcohol use among pregnant women attending antenatal clinic at mother and new born hospital-university teaching hospital, Lusaka, Zambia. *EC Psychol Psychiatry.* 2020;9(9):87–111.
- [13] Phiri C, Tsarkov A, Petlovanyi P, Lingenda G. Factors contributing to oral diseases and treatment needs amongst mental patients at chainama hills college hospital, Lusaka. *Zamb Imp J Interdiscip Res (IJIR).* 2017;3(11):495–504.
- [14] Lungu G, Tsarkov A, Petlovanyi P, Phiri C, Musonda NC, Hamakala D, *et al.* Health-seeking behaviors and associated factors in individuals with substance use disorders at chainama hills college hospital, Lusaka, Zambia. *World J Adv Res Rev.* 2023;17(3):480–99. doi: 10.30574/wjarr.2023.17.3.0424.
- [15] Carlo WA, Goudar SS, Jehan I, Chomba E, Tshefu A, Garces A, *et al.* Newborn-care training and perinatal mortality in developing countries. *New Engl J Med.* 2010;362(7):614–23. doi: 10.1056/NEJMsa0806033.
- [16] Lassi ZS, Middleton PF, Crowther C, Bhutta ZA. Interventions to improve neonatal health and later survival: an overview of systematic reviews. *EBioMedicine.* 2015;2(8):985–1000. doi: 10.1016/j.ebiom.2015.05.02.
- [17] Sawyer T, Umoren RA, Gray MM. Neonatal resuscitation: advances in training and practice. *Adv Med Educ Pract.* 2016;8:11–9. doi: 10.2147/AMEPS109099.
- [18] Dippenaar J, Da Serra D. *Seller's Midwifery*. 2nd ed. Juta, Lansdowne; 2013.
- [19] World Health Organization. *WHO Technical Specifications of Neonatal Resuscitation Devices*. 1st ed. Villars-sous-Yens: World Health Organization; 2016.
- [20] Shikuku DN, Milimo B, Ayebare E, Gisore P, Nalwadda G. Practice and outcomes of neonatal resuscitation for newborns with birth asphyxia at Kakamega county general hospital, Kenya: a direct observation study. *BMC Pediatr.* 2018;18(1):167. doi: 10.1186/s12887-018-1127-6.
- [21] Klassen RM, Klassen JR. Self-efficacy beliefs of medical students: a critical review. *Perspect Med Educ.* 2018;7(1):76–82. doi: 10.1007/s40037-018-0411-3.
- [22] Lawn JE, Kerber K, Enweronu-Laryea C, Massee Bateman O. Newborn survival in low resource settings—are we delivering? *BJOG: an Int J Obstet Gynaecol.* 2009;116(1):49–59. doi: 10.1111/j.1471-0528.2009.02328.x.
- [23] World Health Organization. *Guidelines on Basic Newborn Resuscitation*. 1st ed. Geneva: World Health Organization; 2012.
- [24] Ministry of Health. *Zambia National Maternal and Neonatal Services Referral Guidelines*. 1st ed. Lusaka: Ministry of Health; 2018.
- [25] Perlman J, Kattwinkel J, Wyllie J, Guinsburg R, Velaphi S, Nalini Singhal for the Neonatal ILCOR task force group. Neonatal resuscitation: in pursuit of evidence gaps in knowledge. *Resuscitation.* 2012;83(5):545–50. doi: 10.1016/j.resuscitation.2012.01.003.
- [26] Weiner GM, Zaichkin J. *Textbook of Neonatal Resuscitation*. 8th ed. American Academy of Pediatrics; 2021. doi: 10.1542/9781610025256.
- [27] Patel A, Khatib MN, Kurhe K, Bhargava S, Bang A. Impact of neonatal resuscitation trainings on neonatal and perinatal mortality: a systematic review and meta-analysis. *BMJ Pediatr Open.* 2017;1(1):e000183. doi: 10.1136/bmjpo-2017-000183.
- [28] Setia MS. Methodology series module 3: cross-sectional studies. *Indian J Dermatol.* 2016;61(3):261–4. doi: 10.4103/0019-5154.182410.
- [29] Khalique S, Singh MK. Role of self-efficacy in improving employees performance. *Int J Eng Res Technol.* 2019;7(12):1–5.
- [30] Okonofua F, Ntoimo LFC, Ogu R, Galadanci H, Gana M, Adetoye D, *et al.* Assessing the knowledge and skills on emergency obstetric care among health providers: implications for health systems strengthening in Nigeria. *PLoS One.* 2019;14(4):e0213719. doi: 10.1371/journal.pone.0213719.
- [31] Kc A, Wrammert J, Nelin V, Clark RB, Ewald U, Peterson S, *et al.* Evaluation of helping babies breathe quality improvement cycle (HBB-QIC) on retention of neonatal resuscitation skills six months after training in Nepal. *BMC Pediatr.* 2017;17(1):103. doi: 10.1186/s12887-017-0853-5.
- [32] Suresh PM, Kumar TR, Nagalekshmi R, Anandan H. Evaluation of knowledge and practices on neonatal resuscitation among nurses in Kanyakumari District hospitals. *Int J Sci Study.* 2017;5(1):166–8.
- [33] Kim MK, Arsenault C, Atuyambe LM, Macwan'gi M, Kruk ME. Determinants of healthcare providers' confidence in their clinical skills to deliver quality obstetric and newborn care in Uganda and Zambia. *BMC Health Serv Res.* 2020;20(1):1–10. doi: 10.1186/s12913-020-05410-3.
- [34] Kc A, Wrammert J, Clark RB, Ewald U, Vitrakoti R, Chaudhary P, *et al.* Reducing perinatal mortality in nepal using helping babies breathe. *Pediatrics.* 2017;137(6):e20150117. doi: 10.1542/peds.2015-0117.
- [35] Abdu H, Gebrselassie M, Abdu M, Mare KU, Tadesse W, Liben ML. Knowledge and practice of immediate newborn care among midwives and nurses in public health facilities of Afar regional state, Northeast Ethiopia. *BMC Pregnancy Childbirth.* 2019;19(1):422. doi: 10.1186/s12884-019-2581-3.
- [36] Olson KR, Caldwell A, Sihombing M, Guarino AJ, Nelson BD, Petersen R. Assessing self-efficacy of frontline providers to perform newborn resuscitation in a low-resource setting. *Resuscitation.* 2015;89(1):58–63. doi: 10.1016/j.resuscitation.2015.01.008.
- [37] Kisakye AN, Muhumuza Kananura R, Ekirapa-Kiracho E, Bua J, Akulume M, Namazzi G, *et al.* Effect of support supervision on maternal and newborn health services and practices in rural Eastern Uganda. *Glob Health Action.* 2017;10(4):1345496. doi: 10.1080/16549716.2017.1345496.
- [38] Daniel J, Joseph T, Kenneth R. Health system factors influencing practice of neonatal resuscitation among nurses in machakos level 5 hospital. *Public Health Open Access J.* 2019;3(2):1–9. doi: 10.23880/phoa16000147.
- [39] Trevisanuto D, Cavallin F, Arnolda G, Chien TD, Lincetto O, Xuan NM, *et al.* Equipment for neonatal resuscitation in a middle-income country: a national survey in Vietnam. *BMC Pediatr.* 2016;16(1):139. doi: 10.1186/s12887-016-0664-0.
- [40] Bandura A. Social cognitive theory of personality. In *The Coherence of Personality: social-Cognitive Bases of Consistency, Variability, and Organization*. Cervone D, Shoda Y Eds. New York: Guilford Press, 1999, pp. 185–241.