**ORIGINAL ARTICLE**

# ASSESSMENT OF KNOWLEDGE OF NICU NURSES AND MIDWIVES IN NEONATAL RESUSCITATION IN FOUR URBAN HOSPITALS IN ADDIS ABABA, ETHIOPIA

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**ABSTRACT**

***Introduction :*** *Resuscitation with bag and mask is a high-impact intervention that can reduce neonatal deaths in resource-poor settings. The quality of resuscitation and stabilization of a neonate immediately after birth has significant effects on neonatal morbidity and mortality. This study was done to assess the knowledge of neonatal resuscitation among Neonatal Intensive Care Unit (NICU) nurses and delivery ward midwives from select referral hospitals in Addis Ababa, Ethiopia.*

***Method****: Data were collected from 172 midwife and NICU nurses from four referral hospitals in urban Addis Ababa between January and June 2017. Knowledge related to newborn resuscitation were assessed using a structured questionnaire prepared for the study. The collected data were analyzed using SPSS version 20.*

***Result****: Seventy-six percent (n=131) of respondents were female. Among all respondents, 89.0% self-reported adequate knowledge of neonatal resuscitation (answers knowledge question above 80. Fifty-eight percent (n=99) of respondents had resuscitated newborns in the hospital setting while the rest in the clinics.*

***Conclusion:*** *Within this study population, NICU and delivery wards nurses had good knowledge about neonatal resuscitation; however, they have in particularly poor knowledge of airway management .*

***Keywords:*** *Neonatal Resuscitation, Ethiopia, Health Worker Capacity-Building, Health Systems Strengthening*

## INTRODUCTION

Globally in 2017, 5.5 million children under five years of age died prematurely. Of these preventable child deaths, 2.5 million (46%) occurred in the first month of life, which is known as neonatal mortality(1). Most neonatal mortality happens in low and middle-income countries (LMICs), and mostly to babies born at home (2,3). The highest neonatal mortality rates are seen in sub-Saharan Africa. In Asia, prevalence rates are lower; however, this region accounts for over 60%

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of the estimated global total because of its large population and high fertility rates (4–6) (4, 5, 6). Worldwide, the common direct causes of neonatal death are considered to be preterm birth (28%), severe infections (26%), and asphyxia (23%). (7) Ethiopia's neonatal mortality rate is estimated at 48 per 1,000 live births in 2016 (8). One factor that contributes to Ethiopia's high neonatal mortality rate is home delivery, as opposed to delivering in a health facility.

The first moments of a newborn's life are critical and require effective emergency care to prevent lifelong consequences when there are difficulties. If there is difficulty with airway, breathing, and circulation there will be a need for neonatal resuscitation. Proper resuscitation requires essential equipment and knowledge about protocols to take before delivery. Prior knowledge of the gestational age of the newborn is helpful to anticipate the need for resuscitation because low birth weight and premature delivery are two factors that predispose infants to need resuscitative efforts (9).

The significant effects in mortality and morbidity are seen with quality of resuscitation and stabilization of a neonate immediately after birth. Quality of resuscitation is meant by having knowledgeable and skilled health professionals with institutional equipment and supplies coordinated system. Identifying the reasons for neonatal admission and mortality in a hospital setting is crucial to improving the quality of existing health worker practices and hospital systems (10).

Prior studies have demonstrated gaps between health systems quality and preparedness and newborn resuscitation rates and survival (11). Therefore, the objective of this study was to assess the capacity to perform newborn resuscitation, as well as individual and facility characteristics associated with provider knowledge and clinical skills, among Neonatal Intensive Care Unit (NICU) and delivery ward nurses and midwives from four referral hospitals in Addis Ababa, Ethiopia.

## METHODS

### Study Population

This cross-sectional study was conducted among four public referral hospitals in Addis Ababa, Ethiopia from January 2017 to June 2017. There are a total of thirteen government referral hospitals in Addis Ababa. Among these, three were excluded from the study: one was excluded because it does not provide delivery or neonatal care services (Emmanuelle Psychiatric Hospital), and two were excluded as permission was not granted (Medical Defense College Hospital and the Police Hospital). From the remaining ten hospitals, four were selected to participate in this study. The hospitals selected are the largest in the number of beds and each has a practicing neonatologist. Daily, eight to ten newborns from all categories of disease are admitted and, on average, one to two

newborns are resuscitated at these hospitals (Unit admission registration book). All midwives and nurses (n=180) selected to participate in this study had worked in the delivery room and/or NICU in these hospitals for at least six months. In delivery rooms of Ethiopian hospitals, midwives are the first responsible person, while in the NICU, pediatric nurses are the first responsible party. We excluded those who did not give consent to participate in the study and those who were on leave during the study period.

Survey Tool had three parts: demographic part containing 7 questions while the second part has 33 MCQ knowledge questions. All the questions were in English, and it was distributed to nurses and midwives while they were at the job in respective labor wards and NICUs. The clinicians were asked to complete the questionnaires. The tool was adopted from neonatal resuscitation guidelines. (12)

**Operational Definitions**

**Knowledge:** Good knowledge considers overall knowledge of questions. If a respondent answers greater than 80%, they were determined to have good knowledge. If participants answer less than 80%, it is poor knowledge. (13).

**Neonatal resuscitation:** Intervention after birth to 28 days of the baby to assist in breathing and circulation.

**Data Collection**

Data were collected using structured questionnaires adopted from the WHO guidelines. Current health professionals were recruited as enumerators for this study so they could elaborate on the content of the questionnaire to ensure participants had a thorough understanding of the questions. A total of four enumerators were selected and trained in the study protocols and methods before the data collection period. Data collection was managed and monitored by two supervisors.

Ethical clearance was obtained from the Department of Pediatrics and Child Health Research Publications Committee at the College of Health Sciences Addis Ababa University and also from respected hospitals. An information sheet was provided to participants and verbal consent was obtained from each. To ensure confidentiality, no personal identifiers (e.g., name) were recorded on the questionnaire.

**Data Analysis**

Data were verified, cleaned, and entered into Epi by the principal investigator and analyzed using SPSS version 20. Results from the univariate analysis were presented as descriptive statistics. For continuous variables, we present the means and standard deviations, and for categorical variables we present proportions.

## RESULTS

A total of 180 midwives and NICU nurses from the four public referral hospitals met the inclusion criteria and were invited to participate in the study. The questionnaire was completed by 172 respondents for a response rate of 95.5%. Fifty-two percent of the respondents (n=91) were midwives, and 48% (n=81) were NICU nurses. Most respondents, 76.2% (n=131) were female and between the ages of 20-30 years (78.0%, n=135). Eighty-three percent of respondents (n=143) were BSc nurses with work experience, and 65.7% (n=113) had between 1 to 5 years of experience. The proportion of participants from each hospital was as follows: Hospital 1 (29.1%), Hospital 2 (22.0%), Hospital 3 (23.8%), and Hospital 4 (22.1%).

Table 1: Socio-demographic characteristics of NICU nurses and Midwives, working in delivery rooms at four selected hospitals, in Addis Ababa, Ethiopia 2017.

| Variable | characteristics | Frequency ($N_{o=172}$) | Percent (%) |
|---|---|---|---|
| Sex | F | 131 | 76.2 |
| | M | 41 | 23.8 |
| Age | 20-30 | 135 | 78.5 |
| | 31-40 | 31 | 18 |
| | 41 and above | 6 | 3.5 |
| Level of education | Diploma | 24 | 14.0 |
| | Degree | 143 | 83.1 |
| | Masters | 5 | 2.9 |
| Work experiences | 1-5 years | 113 | 65.7 |
| | 6-10 years | 40 | 23.3 |
| | 11-15 years | 13 | 7.6 |
| | 16 and above | 6 | 3.5 |
| Working department | NICU | 80 | 46.5 |
| | Delivery room | 92 | 53.5 |
| Hospital | Hospital 1 | 50 | 29.1 |
| | Hospital 2 | 43 | 25.0 |
| | Hospital 3 | 38 | 22.1 |
| | Hospital 4 | 41 | 23.8 |

### Resuscitation knowledge of midwives and NICU nurses

The mean knowledge score of all midwives and NICU nurses was 15.2 (scale of 15-19; SD=2.6). Among midwives and NICU nurses who participated in the survey, 68.6% (n=118) did not receive in-service training. A total of 154 (89.3%) of midwives and NICU nurses had good knowledge of the immediate preparation of newborn resuscitation.

Sixty-nine-point five percent (n=118) of the participant, had good knowledge of airway management. Regarding the pressure used during chest compression, 63.1% (n=108) of respondents had good knowledge.

Table 2: Distribution of knowledge score in terms of resuscitation steps of NICU nurses and Midwives, working in delivery rooms at four selected hospitals, in Addis Ababa, Ethiopia 2017

| **Resuscitation steps** | **<80%** | **>80%** |
|---|---|---|
| Preparation | 18 (10.5%) | 154 (89.5%) |
| Airway management | 54 (31.4%) | 118 (68.6%) |
| Chest compression | 64 (37.2%) | 108 (62.8%) |

**The preparation, airway and chest compression knowledge of midwives and NICU nurses**

On neonatal resuscitation, from the total of 172 participants, 68% (n=117) had good preparation to practice newborn resuscitation. The minority of the participants 35.5% (n=61) have good knowledge of airway management.

Most participants, 57.6% (n=99) have performed neonatal resuscitation in NICU or delivery room. Among participants, 71.5% (n=123) mentioned lack of all equipment during neonatal resuscitation, and 54.1%, (n=93) faced a lack of trained assistants.

**Table** 3: Distribution of preparation, knowledge of airway and chest compression in terms of resuscitation steps of NICU nurses and Midwives, working in delivery rooms at four selected hospitals, in Addis Ababa, Ethiopia 2017

| **Resuscitation steps** | **Good** | **Bad** |
|---|---|---|
| Preparation | 117(68%) | 55 (32%) |
| Knowledge of Airway management | 61(35.5) | 111(64.5%) |
| Knowledge of Chest compression | 115 (66.8%) | 57 (33.2%) |

In the logistic regression analysis of newborn resuscitation there is no significant association with working experience sex, and age-based on logistic binary regression but there is significant relation to the educational level and the p-value was less than (<0.05).

Table 4: Logistic regression analysis variable with practice of neonatal resuscitation of NICU nurses and Midwives, working in delivery rooms at four selected hospitals, in Addis Ababa, Ethiopia 2017

| **Variables** | **Category** | **COR (95% CI)** | **(P-Value)** |
|---|---|---|---|
| Age | 20-30 years | | 1000 |
| | 31-40 years | 2.236(0.240-20.879) | 0.480 |
| | 41 and above years | 0.606(0.68-6.882) | 0.748 |
| Sex | Male | .818(0.393-1.704) | 0.592 |
| | Female | 1.418 | 0.605 |
| Profession | NICU Nurse | 0.797(0.422-1.505) | 0.484 |
| | Midwife | 1.429 | 0.489 |
| Education | Diploma | 0.667 (0.641-69.344) | 0.112 |
| | Degree | 9.000 (0.978-82.857) | 0.002* |
| Work experience | 1-5 years | 1.266 (0.221-7.254) | 0.316 |
| | 6-10 years | 0.833 (0.136-5.113) | 0.791 |
| | 11-15years | 2.333(.0.310-17.545) | 0.844 |
| Department | Delivery Room | 1.300(0.688-2.456) | 0.491 |
| | NICU | 1.759 | 0.115 |

*Educational level is statistically significant

The knowledge of the participant was assessed by correctly answered questions, if the participant answered more than 80% considered good knowledge and less than 80% considered poor knowledge.

The knowledge score total of NICU nurses that were 82 (80.2%) had good knowledge, while midwives count 91, from this 88 (96.7%) had good knowledge .

Table 5: The knowledge of NICU nurses and Midwives in four selected hospitals Addis Ababa, Ethiopia, 2017.

| Type of profession | Knowledge (N=172) | |
|---|---|---|
| | **Good** | **Poor** |
| NICU Nurse | 65 (80.2%) | 16(19.8%) |
| Midwifes | 88(96.7%) | 3(3.3%) |
| Total | 153 (89%) | 19(11%) |

## DISCUSSION

Nursing is a profession that deals with human health and thus life. It, therefore, demands high professional knowledge for effective and efficient management of human health. In this study, the mean knowledge score of midwives and nurses was 15.2 SD=2.6. This finding was inconsistent with results from a similar study conducted in Gondar (northwest Ethiopia) 19.9 (SD=3.1). (13,14) The discrepancy could be due to the difference in the quality of training on neonatal resuscitation, the facilities available for neonatal resuscitation, and the level of health professionals.

The participants of this study 99 (57.6%) have practiced or participated in real neonatal resuscitation. A similar study was done in the Department of Pediatrics, University College of Medicine and JNM Hospital, Kalyani, West Bengal, India in 2014 showed among nursing staff was found that nursing staff has average knowledge (15).The findings in our study suggested that most of the participants (71.5%) responded there is a shortage of availability of equipment in the resuscitation area which is similar to the study conducted in Zimbabwe and South Africa (16,17).

In our study, knowledge of chest compression was 115 (66.8%). This finding was not in agreement with a study conducted in Afghanistan. This discrepancy might be due to the availability of simulation-based training, updating training, and certification process before graduation in Afghanistan which does not exist in our case. (18) This finding was similar to the study conducted in Western Nigeria. (19) This is considered due to the absence of standardized training during the undergraduate and postgraduate courses in both sets up.

### Conclusion

The overall knowledge of participants on neonatal resuscitation was good, however their knowledge in airway management was not satisfactory.

### Recommendation

- Include proper neonatal resuscitation training in pre-service training for all NICU nurses and Midwives to improve knowledge in neonatal resuscitation.
- Encourage simulation on newborn resuscitation regularly to improve in knowledge and skill of neonatal resuscitation.

### References

1. Levels and Trends in Child Mortality Report 2018 | UNICEF [Internet]. [cited 2022 Jan 15]. Available from: https://www.unicef.org/reports/levels-and-trends-child-mortality-report-2018
2. The State of the World's Children 2016 | UNICEF [Internet]. [cited 2022 Jan 15]. Available from: https://www.unicef.org/reports/state-worlds-children-2016

3. Størdal K. Neonatal mortality--the key to reduced neonatal mortality? Tidsskrift for den Norske Lægeforening. 2009;129 (21):2270–3.
4. DARMSTADT GL, LAWN JE, COSTELLO A. Advancing the state of the world's newborns. Bulletin of the World Health Organization. 2003;81(3):224–5.
5. Hyder AA, Wali SA, McGuckin J. The burden of disease from neonatal mortality: a review of South Asia and Sub-Saharan Africa. BJOG : an international journal of obstetrics and gynaecology [Internet]. 2003 Oct 1 [cited 2022 Jan 15];110(10):894–901.Available from: https://pubmed.ncbi.nlm.nih.gov/14550358/
6. Högberg U. The World Health Report 2005: "make every mother and child count" - including Africans. Scandinavian journal of public health [Internet]. 2005 [cited 2022 Jan 15];33(6):409–11. Available from: pubmed.ncbi.nlm.nih.gov/16332605/
7. Lawn JE, Cousens S, Zupan J. 4 million neonatal deaths: When? Where? Why? The Lancet [Internet]. 2005 Mar 5 [cited 2022 Jan 16];365(9462):891–900. Available from: http://www.thelancet.com/article/S0140673605710485/fulltext
8. Central Statistical Agency (CSA) [Ethiopia], ICF. 2016 Ethiopia Demographic and Health Survey. 2017.
9. Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE, et al. Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis. The Lancet [Internet]. 2015 Jan 31 [cited 2022 Jan 16];385(9966):430–40. Available from: http://www.thelancet.com/article/S0140673614616986/fulltext
10. Manu MJ, Sachan MM. A Study to Assess the Knowledge of Nursing Personnel Regarding Care of Neonates in Selected Hospital Kanpur.
11. Enweronu-Laryea C, Engmann C, Osafo A, Bose C. Evaluating the effectiveness of a strategy for teaching neonatal resuscitation in West Africa. Resuscitation. 2009 Nov 1;80(11):1308–11.
12. Atkins DL, Berg MD, Berg RA, Bhutta AT, Biarent D, Bingham R, et al. 2005 American Heart Association (AHA) guidelines for cardiopulmonary resuscitation (CPR) and emergency cardiovascular care (ECC) of pediatric and neonatal patients: pediatric basic life support. Pediatrics [Internet]. 2006 May [cited 2022 Jan 16];117(5). Available from: https://pubmed.ncbi.nlm.nih.gov/16651298/
13. Nifco N. A conceptualization of knowledge management practices through knowledge, awareness and meaning. The Electronic Journal of Knowledge Management. 2005;3(1):45–52.

14. Gebreegziabher E, Aregawi A, Getinet H. Knowledge and skills of neonatal resuscitation of health professionals at a university teaching hospital of Northwest Ethiopia. World Journal of Emergency Medicine [Internet]. 2014 Jan 1 [cited 2022 Jan 16];5(3):196–202. Available from: https://europepmc.org/articles/PMC4163816

15. Basu M. A study on knowledge and practice of neonatal resuscitation among nursing staff. Sri Lanka Journalof Child Health [Internet]. 2014 Mar 8 [cited 2022 Jan 16];43(1):38–40. Available from: http://sljch.sljol.info/articles/10.4038/sljch.v43i1.6660/

16. Couper ID, Thurley JD, Hugo JF. The neonatal resuscitation training project in rural South Africa. Rural and Remote Health [Internet]. 2005 Oct 24 [cited 2022 Jan 16];5(4):459–459. Available from: https://europepmc.org/article/MED/16241856

17. Lee AC, Cousens S, Wall SN, Niermeyer S, Darmstadt GL, Carlo WA, et al. Neonatal resuscitation and immediate newborn assessment and stimulation for the prevention of neonatal deaths: a systematic review, meta-analysis and Delphi estimation of mortality effect. BMC public health [Internet]. 2011 [cited 2022 Jan 16];11 Suppl 3(Suppl 3). Available from: https://pubmed.ncbi.nlm.nih.gov/21501429/

18. Kim YM, Ansari N, Kols A, Tappis H, Currie S, Zainullah P, et al. Assessing the capacity for newborn resuscitation and factors associated with providers' knowledge and skills: A cross-sectional study in Afghanistan. BMC Pediatrics [Internet]. 2013 Sep 10 [cited 2022 Jan 16];13(1):1–12. Available from: https://bmcpediatr.biomedcentral.com/articles/10.1186/1471-2431-13-140

19. Ogunlesi T, Dedeke O, Adekanmbi F, Fetuga B, Okeniyi A. Neonatal resuscitation: Knowledge and practice of nurses in western Nigeria. SAJCH South African Journal of Child Health [Internet]. 2008 [cited 2022 Jan 16];2(1):23–5. Available from: https://www.researchgate.net/publication/279480453_Neonatal_resuscitation_Knowledge_and_practice_of_nurses_in_western_Nigeria