KNOWLEDGE, PRACTICE AND ASSOCIATED FACTORS TOWARDS NEONATAL RESUSCITATION AMONG NURSES AND MIDWIVES WORKING IN GOVERNMENTAL HOSPITALS IN WEST SHOA, OROMIA, ETHIOPIA

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NOVEMBER, 2023

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN PEDIATRICS AND CHILD HEALTH NURSING

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Hawassa University examiners' approval sheet

We, the undersigned, members of the Board of Examiners of the final open defense by

Urgessa Chala Idato has read and evaluated his thesis entitled **"**Knowledge, practice and associated factors towards neonatal resuscitation among nurses and midwives working in government hospitals in West Shoa, Oromia, Ethiopia,2023", and examined the candidate. This is, therefore, to certify that the thesis has been accepted in partial fulfillment of the requirements for the master of science in pediatrics and child health nursing.

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SGS Approval Signature Date

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DECLARATION AND APPROVAL

Declaration

I, the undersigned MSc student declare that this thesis was my original work. It is being submitted for the masters of Science degree in pediatric and child health nursing at Hawassa University. Where I had used the works of other persons, due acknowledgment is clearly stated. No portion of this work had been submitted in support of an application for a degree or qualification to any other university.

Name: Urgessa Chala

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Approval

The research thesis culminating in this thesis was conducted under my guidance and supervision.

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ABBREVIATIONS

AGH	Ambo General Hospital
AURH	Ambo University Referral Hospital
AOR	Adjusted Odds Ratio
BMV	Bag And Mask Ventilation
BPH	Bako Primary Hospital
BPM	Beat Per Minute
CI	Confidence Interval
CPAP	Continuous Positive Airway Pressure
COR	Crud Odds Ratio
EDHS	Ethiopian Demographic Health Survey
EMDHS	Ethiopian Mini Demographic Health Survey
EMONC	Emergency Obstetric And Neonatal Care
ETT	Endotracheal Tube
FMOH	Federal Minister Of Health
GEGH	Gedo General Hospital
GPH	Ginchi Primary Hospital
GIGH	Gindberat General Hospital
GUPH	Guder Primary Hospital
HPH	Holeta Primary Hospital
IPH	Inchini Primary Hospital
IRB	Institutional Review Board
JPH	Jeldu Primary Hospital

NICU	Neonatal Intensive Care Unit
NR	Neonatal Resuscitation
NRP	Neonatal Resuscitation Program
NRT	Neonatal Resuscitation Training
PPV	Positive Pressure Ventilation
PEEP	Positive End Expiratory Pressure
PALS	Pediatric Advanced Life Support
SD	Standard Deviation
SSA	Sub-Saharan Africa
WBO	World Bank Organization

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ABSTRACT

Background: Neonatal resuscitation is a critical intervention for newborns difficulty to breathe or circulate blood. The first month of life is particularly vulnerable, and skilled nurses and midwives can prevent around 30% of preventable newborn deaths. So, it is crucial to assess the knowledge and practical skills of nurses and midwives in neonatal resuscitation to reduce neonatal deaths. **Objective:** The study aimed to assess knowledge, practice and associated factors towards neonatal resuscitation among nurses and midwives working in government hospitals in West Shoa. **Methods:** An institutional based cross-sectional study was conducted in West Shoa, from May 1 to July 20, 2023. A total of 235 nurses and midwives who are working in ten governmental hospitals were included. Data were collected using self-administered questionnaire and observation checklist of English version. Data was verified, coded and entered to Epi-data, then exported to Statistical Package for the Social Sciences version 26 Software for analysis. Descriptive statistics such as frequency with percentage distribution for categorized variables was used. Binary logistic regression analysis method was used to identify factors associated with the nurses' and midwives' knowledge and practice of neonatal resuscitation. Those variables that had P -value $\leq$ 0.25 in logistic regression was taken to the multiple logistic regression models to adjust the possible confounder. Variables with p-value<0.05 in the multiple logistic regression analysis was considered statistically significant associations between covariates with knowledge and practice of nurses and midwives towards neonatal resuscitation at a 95% confidence interval.

Results: This study was showed that only 40.3% and 27% had good knowledge and good practice on neonatal resuscitation respectively. Factors such as age (AOR=4.936), guidelines availability (AOR=0.178), supportive supervision (AOR=0.382), and in-service training (AOR=0.411) were associated with knowledge, while being female (AOR=0.296), being single (AOR=0.18), and in-service training (AOR=0.431) were associated with practice.

Conclusion: The knowledge and practice of neonatal intensive care unit nurses and midwives towards neonatal resuscitation are inadequate. Hospital managers should provide neonatal resuscitation guidelines, supportive supervision, and in-service training to reduce neonatal deaths.

Key words: neonatal resuscitation, nurses, midwives, knowledge, practice.

INTRODUCTION

1.1 Background

Neonatal resuscitation is an intervention performed to a new born baby who has difficulty in airway breathing and circulation(Afjeh et al.,2013). The first month of life is the most vulnerable time for a child's survival(UNICEF, WHO and WBO, 2020). So, the quality of resuscitation and stabilization of a neonate immediately after birth has a significant effect on neonatal morbidity and mortality (Perlman *et al.*, 2016; Bond *et al.*, 2015).

Proper resuscitation needs crucial equipment and knowledge of necessary protocols before delivery(Afjeh et al.,2013). A qualified and equipped person should be designated to facilitate transition for each newborn baby (Aziz *et al.*, 2021). Intervention of the newborn in the delivery room in the first minutes is important in reducing neonatal deaths, and nurses and midwives working in delivery rooms and NICU pass through the neonatal resuscitation program and gain knowledge and experience in this field will be effective in reducing neonatal deaths(Cetinkaya *et al.*, 2022). Knowledgeable and skilled nurses and midwives in the first minute of life can contribute significantly to avert neonatal death.

Identification of risk factors for resuscitation may indicate the need for more staff and equipment and effective team behaviors, such as anticipation, communication, briefing, equipment inspections and assignment of roles, lead to improved team performance and newborn outcomes(Aziz *et al.*, 2021).Asphyxia is responsible for one-fourth of newborn deaths worldwide; among low- and middle-income nations, Ethiopia carries a disproportionately large share of this burden and ineffective resuscitation caused by inexperienced health personnel had a significant impact on asphyxia-related mortality and morbidity(Abebaw *et al.*, 2022).

The current simulation based neonatal resuscitation education needs resources, lab rooms, specialized equipments and trained teachers. So, frequent simulation based education opportunities are overall inaccessible by most nurses and midwives during their college and universities. Therefore, this thesis is aimed at assessing knowledge, practice, and factors affecting midwives and nurses towards neonatal resuscitation.

1.2 Statement of the problem

According to the study, birth asphyxia is when a baby is unable to start breathing on his or her own (Fabiana *et al.*,2019). About 10% of newborns need some help breathing when they are born and less than 1% of cases necessitate intensive resuscitation techniques, like cardiac compressions and drugs(Fabian *et al.*,2019; Wyckoff *et al.*, 2015).

If current trends persist, more than 60 countries will not meet the 2030 Sustainable Development Goal for reducing neonatal mortality(UNICEF, WHO and WBO, 2020), almost 26 million newborn deaths are predicted to occur between 2019 and 2030, most are preventable(UNICEF, WHO and WBO, 2020). The risk of death for children in their first month of life is the highest, with global rate of 18 deaths per 1,000 live births in 2021, (Kantorova *et al.*, 2021). Globally, 2.3 million children died in the first month of life in 2021, approximately 6,400 neonatal deaths every day (Kantorova *et al.*, 2021). Because 80% of all newborn deaths are caused by three preventable and treatable conditions: complications related to prematurity, intrapartum related deaths (including birth asphyxia), and neonatal infections, attention should be paid to inequities in nations to ensure that newborns in fragile and vulnerable settings receive the same essential interventions as all other newborns (WHO - UNICEF, 2020).

Almost two million newborn deaths occur in the first week of life in Africa, with one million occ urring on the day of birth (Liu et al., 2016;Alkema et al., 2014). Sub-Saharan Africa had the highest neonatal mortality rate in 2018 at 28 deaths per 1,000 live births(Developed *et al.*, 2019). In Africa ,evidence from several observational studies shows that facility based basic neonatal resuscitation may avert 30% of intrapartum related neonatal deaths(Developed *et al.*, 2019).

The 2019 EMDHS results show that the Neonatal mortality declined from 39 deaths per1,000 live births in 2005 to 29 deaths per 1,000 live births in 2016 and 33 deaths per 1,000 births in 2019 (Ethiopian Public Health Institute, 2021). According to study conducted on neonatal mortality in different regions showed that neonatal mortality rate is significantly higher in Oromia than in other regions(Tiruneh *et al.*, 2021). Therefore, qualified and well equipped NICU nurses and midwives are important to reach WHO target neonatal death reduction to 12 deaths per 1000 live birth by 2030.

According to the study conducted in Ghana, shows that only about 2% midwives generally have sufficient knowledge about neonatal resuscitation(Alhassan *et al.*, 2019).The study, which

examined nurses working in maternity wards for their knowledge and skill in neonatal resuscitation, found that overall; 7% of nurses had good knowledge and 9.3% of nurses had good skill in this area(Gauro *et al.*, 2018). A descriptive cross-sectional study conducted in Kenya; 2019 results showed that only 41% of participants fully practiced neonatal resuscitation (Kenneth *et al.*, 2019). And also, only 11.2% of nurses and midwives in the study on basic newborn resuscitation practice of midwives and nurses were found to have retained neonatal resuscitation skills(Sintayehu, *et al.*, 2020).

Neonatal resuscitation science has advanced significantly over the past 3 decades, with contributions by many researchers in laboratories, in the delivery room, and in other clinical settings. With growing enthusiasm for clinical studies in neonatology, elements of the Neonatal Resuscitation Algorithm continue to evolve as new evidence emerges(Aziz *et al.*, 2020).Simulation is used for teaching neonatal resuscitation and procedural skill training(Aziz *et al.*, 2020). While neonatal resuscitation training programs may differ both in their content and format, they generally include a theoretical knowledge based component and a practical, skill based component, which is an evidence based educational program for low and middle-income countries and areas with limited economic resources, focused on the first minute of life or "golden minute", to teach Basic Neonatal Resuscitation with a mask bag, thermoregulation, stimulation and evaluation (Agudelo-p *et al.*, 2022).Even though a few researches were done, there is limited evidence on knowledge and practice towards neonatal resuscitation and associated factors among nurses and midwives, and neonatal mortality remains a global issue, including in our country. This is mainly due to insufficient instructions in neonatal resuscitation techniques during their diploma, under and postgraduate training and lack of tools to carry out neonatal resuscitation. In Ethiopia, nurses and midwives can attend their diploma, bachelor science degree level in different government colleges, universities, and private's colleges. And, also can get postgraduate from different government universities. These organizations might prepare in different set ups, resources, institutional characteristics and with different qualified teachers. So, the main aim of this study is to assess the knowledge and practice of midwives and nurses toward neonatal resuscitation and its associated factors. And, if there is a problem in the knowledge and practice of midwives and nurses in my study area, we must solve the problem of not prioritizing the knowledge and practice of nurses working in the NICU and midwives working in the delivery room with neonatal resuscitation in order to save neonates' lives.

1.3 Research Questions

1. What is the level of knowledge on neonatal resuscitation among nurses and midwives in West Shoa governmental hospitals?

2. What is the level of neonatal resuscitation practice among nurses and midwives in West Shoa governmental hospitals?

3. What are associated factors influencing neonatal resuscitation knowledge and practice among nurses and midwives in West Shoa governmental hospitals?

1.4 Significance of the Study

Newborn neonates are the future hope of a family and a country at large. So, they need care and attention for their health and wellbeing.

Understanding knowledge and practice of neonatal resuscitation among nurses and midwives who attend delivery of newborns, the neonatal ward, and associated factors around the working environment are very important in designing and implementing interventions at national and international levels. So, the information obtained from this study will be useful for the hospitals and decision-makers in planning, implementing, and evaluating various interventions related to neonatal morbidity and mortality rates.

This study is helpful in planning preventive measures to provide for effective neonatal resuscitation and save lives. Therefore, hospital managers, the zonal health bureau, the regional health bureau, and the ministry of health are responsible bodies. This study will also help partners such as Ambo University College of Medicine and Health Sciences, the School of Nursing and Midwifery, and nongovernmental organizations like UNICEF focus on the knowledge, practice, and associated factors of midwives and nurses towards neonatal resuscitation to reduce neonatal death. This study is also very important to improve evidence based practice of nurses and midwives towards neonatal resuscitation to reduce neonatal deaths.

LITERATURE REVIEW

2.1 Overall Prevalence of Neonatal Resuscitation

Assessment of prenatal risk, a way to assign the right staff based on that risk, a structured proced
-
ure to guarantee quick access to supplies and equipment, and standardization of behavioral skills that support efficient cooperation and communication are all necessary for neonatal resuscitation (Bond *et al.*, 2015). Every birth should be attended by at least one person who can perform the initial steps of newborn resuscitation and PPV, and whose only responsibility is care of the newborn(Bond *et al.*, 2015;Wyckoff *et al.*, 2015). In the presence of significant prenatal risk factors that increase the likelihood of the need for resuscitation, additional personnel with resuscitation skills, including chest compressions, endotracheal intubation, and umbilical vein catheter insertion, should be immediately available. Furthermore, because a newborn without apparent risk factors may unexpectedly require resuscitation, each institution should have a procedure in place for rapidly mobilizing a team with complete newborn resuscitation skills for any birth (Bond *et al.*, 2015);Wyckoff *et al.*, 2015).

A descriptive cross-sectional study conducted in Kenya, 2019 revealed that only 41% of nurses fully practiced neonatal resuscitation(Kenneth *et al.*, 2019).

2.2 Knowledge of Nurses and Midwives towards Neonatal Resuscitation

The competency of nurses and midwives is very important in the reduction of neonatal death. However, according to the study knowledge and practice of neonatal resuscitation among midwives in Tamale, Ghana, shows that 98.1% of midwives generally have insufficient knowledge about neonatal resuscitation(Alhassan *et al.*, 2019).The study conducted in Khartoum by collecting data from 96 nurse midwives and interviewed using structured questionnaire and observation check list to assess knowledge showed that the study population had a fair knowledge level (50.6%) (Suleiman *et al.*, 2015). Inadequacies in the recognition of risk situations and useful equipment were noted(Lassina *et al.*, 2017). Cross-sectional study was conducted in Ethiopia at University of Gondar in 2014 on Knowledge and skills of neonatal resuscitation showed that the knowledge of midwives and nurses about neonatal resuscitation was very low (43.7%)(Gebreegziabher *et al.*,2014).

2.3 Practice of Nurses and Midwives towards Neonatal Resuscitation

Well skilled nurses and midwives can reduce neonatal death and long term complication related to birth asphyxia. A study was conducted in Khartoum by collecting data from 96 nurse midwives and interviewed indicates that their performance was poor (41.1%) towards immediate care of the newborn (Suliman *et al.*, 2015). Inadequacies in the execution of neonatal resuscitation steps were noted(Lassina *et al.*, 2017). According to the study done on evaluating neonatal resuscitation skills of practicing nurses and midwives in Uganda, as 68.2% failed to check equipment and select the correct mask and 45.5% did not make a firm seal when applying the mask(Namuguzi and Drake, 2020). In addition, about 72% of participants did not ventilate at a rate of 40 breaths per minute, and 18.2% failed to assess chest movement(Namuguzi and Drake, 2020).

According cross-sectional study was conducted in Ethiopia at University of Gondar in 2014 showed that the skills of midwives and nurses about neonatal resuscitation were substandard (Gebreegziabher *et al.*, 2014). The overall availability of neonatal resuscitation with bag and mask in health facilities was substandard(Abrha *et al.*,2020). According to study conducted on basic neonatal resuscitation practice of midwives and nurses are not well retained only about 11.2% of nurses and midwives were found to have retention of neonatal resuscitation skills(Sintayehu, Desalew, Geda, Shiferaw, *et al.*, 2020).

2.4 Factors Associated with Knowledge of Nurses and Midwives

The study conducted on the effect of in-hospital training in newborn resuscitation on the competence of health care workers in resuscitating newborn infants at birth in Cameroon shows that in-hospital training on newborn resuscitation had a positive effect on the skills of health care workers in resuscitating newborns(Nvonako *et al.*, 2022). Midwifery training at the first-degree level, basic nursing training and work experience before midwifery training, and training midwives in neonatal resuscitation may contribute to enhanced knowledge in neonatal resuscitation, since these factors were associated with higher knowledge of neonatal resuscitation(Alhassan *et al.*, 2019).

There was no significant difference in the knowledge and skill scores of the participants in terms of sex (except knowledge), age, type of profession, qualification, year of services and previous place of work, which may be due to a small sample size but there was significant difference associated with training(Gebreegziabher *et al.*,2014). There was significant association in the

knowledge score of the participants in terms of neonatal resuscitation training (p=0.002), availability of resuscitation guideline (p=0.001) and supportive supervision (p=0.027) (Biset *et al.*, 2018).Being unmarried, holding BSc degree and above in educational status and received in-service neonatal resuscitation training had a positive influence on the knowledge of midwives and nurses about neonatal resuscitation(Sintayehu *et al.*, 2020)

2.5 Factors Associated with Practice of Nurses and Midwives

Factors that significantly influenced neonatal resuscitation practice of nurses included; availability of resuscitation equipment , place of keeping resuscitation equipment and reference to guidelines (Kenneth *et al.*, 2019).And, also type of facility, nurses and midwives with neonatal resuscitation training, and necessary equipment all had an independent impact on the practice of neonatal resuscitation (Abrha *et al.*, 2020).Being a midwife (AOR, 7.39 [95% CI: 2.25, 24.24]), ever performing neonatal resuscitation (AOR, 3.33 [95% CI: 1.09, 10.15]), bachelor sciences degree or above (AOR, 4.21 [95% CI: 1.60, 11.00]), and good knowledge of neonatal resuscitation (AOR, 3.31 [95% CI: 1.41, 7.73]) were significantly associated with skill retention of midwives and nurses (Sintayehu, Desalew, Geda, Shiferaw, *et al.*, 2020).

2.6 Institutional factors associated with knowledge and practice of nurses and midwives

Factors that significantly influenced neonatal resuscitation practice of nurses included; availability of resuscitation equipment , place of keeping resuscitation equipment and reference to guidelines (Kenneth *et al.*, 2019). And, also type of facility, and necessary equipment had an independent impact on the practice of neonatal resuscitation (Abrha *et al.*, 2020). There was significant association in the practice score of the participants in terms of availability of resuscitation guideline (p=0.028) and supportive supervision (p=0.002)(Biset *et al.*, 2018).

2.7 Conceptual Framework

Conceptual framework for this study was adapted from the literatures reviewed. As illustrated in the diagram below, knowledge and practice of nurses and midwifes towards neonatal resuscitation can be affected by different nurses and midwives, and institutional factors (Biset *et al.*, 2018).

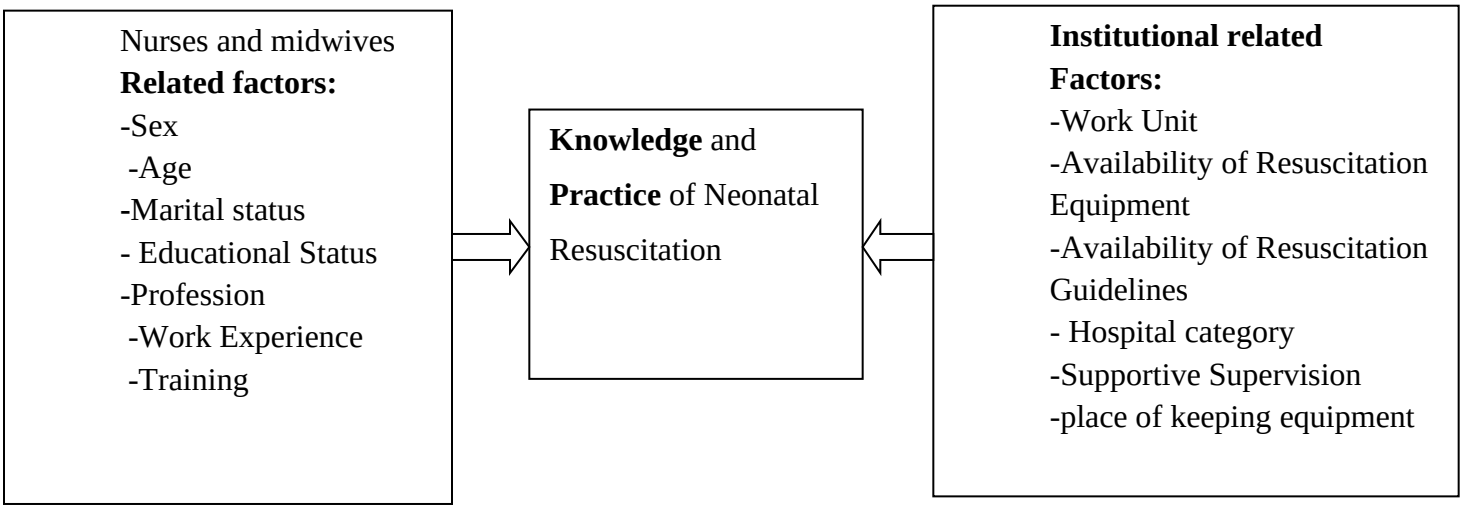

Figure 1: conceptual framework of research thesis on knowledge and practice and its association factors towards neonatal resuscitation among nurses and midwives working in West Shoa, Oromia Regional State, Ethiopia, 2023.

OBJECTIVE

3.1 General Objective

- To assess knowledge, practice and associated factors towards neonatal resuscitation among nurses and midwives working in government hospitals in West Shoa, Oromia, Ethiopia, 2023.

3.2 specific objectives

- To assess knowledge of neonatal resuscitation among nurses and midwives working in government hospitals in West Shoa, Oromia, Ethiopia, 2023.
- To assess the practice of neonatal resuscitation among nurses and midwives working in government hospitals in West Shoa, Oromia, Ethiopia, 2023.
- To identify factors associated with knowledge and practice towards neonatal resuscitation among nurses and midwives working in government hospitals in West Shoa, Oromia, Ethiopia, 2023.

METHODS AND MATERIALS

4.1 Study Area

The study was conducted in the central part of Ethiopia, in West Shoa Zone, Oromia Ethiopia. There are ten government hospitals in West Shoa. Three of them are general hospitals and one Referral teaching hospital. The rest of them are primary hospitals (6 of them). In these hospitals there are the total of 235 nurses and midwives both in NICU and labor ward. Among these 235 nurses and midwives are in those hospital, 85 are in NICU and 150 are in labor ward of hospitals according to Human resource management of each hospital.

4.2 Study Period

The study was conducted from May 1 to July 20, 2023.

4.3 Study Design

Institutional based cross sectional study was conducted in government hospitals in West Shoa, Oromia, Ethiopia.

4.4 Source Population

The source population was all staff nurses and midwives working in labor ward and NICU of governmental hospitals in West Shoa, Oromia, Ethiopia.

4.5 Study Population

The study population was NICU nurses and midwives who working in NICU and delivery room in governmental hospitals in West Shoa, Oromia, Ethiopia.

4.6 Inclusion and Exclusion Criteria

4.6.1 Inclusion Criteria

Nurses, and midwifes, who fulfill the following criteria were included in the study:

All nurses and midwives who were working in NICU and delivery ward in government hospital

4.6.2 Exclusion Criteria

Nurses and midwives who were on leave and sick during the study period were excluded from participating in the study.

4.7 Sample Size Determination and sampling Procedure

4.7.1 Sample size determination

The sample size was the entire study population, which was 235, as I had used all samples acquired from nurses and midwives working in the neonatal intensive care unit and in the delivery room of government hospitals. A purposive sample technique was applied. Therefore, all source of population was inclusive since the source of population is small and all population included in the study population. And for the observation frequency, we had used purposively 226 observation from all government hospitals that means 28 observations in AURH, 78 observations (26 for each) three general hospitals and 120 observations in six primary hospitals.

4.7.2 Sampling Procedure

The study population who were working in NICU and delivery room in government hospitals in West Shoa were selected. That means there are total of ten (10) government hospitals in West Shoa Zone and all of them were included. Samples of nurses and midwifes was taken from NICU and delivery units of each respective hospitals by using purposive method by taking NICU nurses and midwives who were working in NICU and delivery ward.

Table 1: Number of nurses and midwives who are working in government hospitals in West Shoa, Oromia, Ethiopia, 2023.

Serial Number	Name of hospitals	Departments	
		NICU nurses	Midwives
1	Ambo general hospital	10	13
2	Ambo university referral hospital	15	30
3	Bako primary hospital	5	12
4	Gedo general hospital	10	14
5	Gindiberat general hospital	9	15
6	Ginchi primary hospital	6	12
7	Guder primary hospital	6	11
8	Holeta primary hospital	7	14
9	Inchini primary hospital	7	11
10	Jeldu primary hospital	6	13
Total		81	145
		226	

4.8 Study Variables

4.8.1 Dependent Variables

Knowledge toward neonatal resuscitation and

Practice toward neonatal resuscitation.

4.8.2 Independent Variables

Nurses and midwives related factors:

Sex

Age

Marital status

Profession

Level of education

Training

Work experiences

Institutional related factors:

Hospital category

working unit

Availability of resuscitation equipment

Availability of resuscitation guideline

Supportive supervision

Place of keeping equipment

4.9 Data Collection procedure

The data was collected by four BSc Nurses supervised by two BSc midwives. The data collectors and supervisor received a one-day training on the data collection process, including information on the study's purpose, how to administer self-administered questionnaires, how to obtain consent, maintain confidentiality, and respect participant rights. The questionnaires are prepared by English version. Nurses working in the NICU and midwives working in the delivery ward got self-administered questionnaires from data collectors who have been allocated to each of the hospitals. 40 minutes was given to complete all of the questions. When a certain amount of time had passed, data gatherers had observed the participants and had collected the answer papers. The observational checklist had statements to capture information on assessing the practice of neonatal resuscitation among nurses and midwives using English version checklist during observation which was prepared from WHO guidelines and Ethiopian pediatric guideline. The observational checklist had fourteen item with the responses yes (correctly done) and no (not correctly done).

4.10 Data quality control

Prior to the actual data collecting period, the tool was pretested on 5% (12 study participants and 10 observations) of the overall sample size in Woliso General Hospital in South West Shoa. The unclear items in the questionnaire and checklist was changed for clarity based on the results of the pretest. To avoid social bias, data collectors was chosen from other hospitals. Every day, the supervisor checked on the data collection process, provide the instrument, and assess the readability of the collected data. The questionnaire has four parts including socio-demographic data, institutional related data; knowledge related and observational checklist on practice.

4.11 Data Analysis

Data was verified, coded and entered to Epi-data version 4.6, then exported to SPSS version 26 Software for analysis. Descriptive statistics such as frequency with percentage distribution for categorized variables. Binary logistic regression analysis method was used to identify factors associated with the nurses' and midwives' knowledge and practice of neonatal resuscitation. Those variables that had P value $\leq$ 0.25 in logistic regression was taken to the multiple logistic regression models to adjust for possible confounder. Significance level was declared at a 95% confidence

interval. Variables with p <0.05 in the multiple logistic regression analysis was considered to declare statistically significant associations between covariates with knowledge and practice of nurses and midwives towards neonatal resuscitation.

4.12 Ethical Considerations

Ethical clearance was obtained from Hawassa University College of Medicine and Health Sciences Institutional Review Board (IRB). Permission was also obtained from Oromia Health Bureau IRB, then from West Shoa zonal health bureau and government hospitals. Permission was also obtained from each head of respective ward. Study participants was asked for their willingness to participate in the study, was explained why the participants was chosen, no possible risks rather the time needed to complete the questionnaire, why the research was being conducted, obtaining informed consent from each participant verbally and written was done to the study subjects. The researcher explained the right not to participate in the study, to stop at any time in between or not to answer any questions that they were not willing to answer was also tasks of data collector. Name and personal identifiers was not recorded on the questionnaire to maintain confidentiality of the participants.

4.13 Result Dissemination

The result of the study was submitted and presented to the School of Nursing, College of medicine and Health Sciences at Hawassa University as partial fulfillment for the requirement of master's degree in pediatrics and child health nursing. The final result of this thesis was accessed from Hawassa University, College of Medicine and Health Science library as the source for future learning. It was also disseminated to West Shoa zonal health bureau, regional health bureau, ministry of health which can provide basic information about the nurses' and midwives' knowledge and practice towards the delivery of quality health service for neonates. One hard copy and soft copy were submitted to OHB IRB. It will also be submitted to national or international peer review Journals for possible publication.

4.14 Operational Definition

Knowledge: correct response from nurses and midwifes about neonatal resuscitation through the structured knowledge questionnaires and those who scored 80% and above was considered having good knowledge and those below 80% was poor(AHA PALS accreditation criteria, 2018).

Practice: correct practice from nurses and midwifes about neonatal resuscitation through observational checklist and those who was scored 80% above was considered having good practice and those below 80% was poor (AHA PALS accreditation criteria, 2018).

Full equipment for resuscitation: Hospitals with the minimum of the following materials according WHO 2016 Technical Specifications of Neonatal Resuscitation Devices: Radiant warmer, bag with mask, suction machine & catheter, single/multi use suction bulb, stethoscope(World Health Organization, 2016).

RESULTS

5.1 Socio-Demographic Characteristics of Participants

Among the total number of 235 distributed questionnaires, 226 were filled completely and consistently making a response rate of 96.2%. Regarding the age of participants 167(73.9 %) were between 25-35 years old and more than half of participants, 128 (56.6%) were females. Nearly three fourth of respondents were married and majority (92.5%) of participants were bachelor degree holders. In terms of profession of participants 145(64.2%) were midwives and the rest of them 81(35.8%) were neonatal intensive care unit nurses. Nearly two third of the respondents 136(60.2%) had 1-5years work experiences. Regarding currently working department of participants 145(64.2%) were delivery ward and 81 (35.8%) of them were neonatal intensive care units (Table 2).

Table 2: Socio-demographic characteristics of NICU Nurses and Midwives, working in West Shoa, Oromia, Ethiopia, 2023.

Variables	Category	Frequency (N=226)	Percent (%)
Age	Less than 25	48	21.2
	25-35	167	73.9
	35 and above	11	4.9
sex	Male	98	43.4
	Female	128	56.6
Marital status	Married	164	72.6
	Single	60	26.5
	Divorced	2	0.9
Profession	NICU nurses	81	35.8
	Midwives	145	64.2
Level of education	Diploma	10	4.4
	Degree	209	92.5
	Masters	7	3.1
Work experiences	1-5 years	136	60.2
	6-10 years	85	37.6
	11-15 years	0	0
	16 and above	5	2.2
Working department	Delivery room	145	64.2
	Neonatal intensive care unit (NICU)	81	35.8

5.2 Institutional Characteristics of participants

In this study, majorities of the participants 110(48.7%) were from primary hospitals and the rest of them; 71(31.4%) from general hospitals and 45(19.9%) from referral hospital. In terms of previous work unit of participants 140(61.9%) were delivery ward. A three fourth of participants 165(73%) had delivery ward and neonatal intensive care units in the same floor in their hospitals. Almost all of participants' hospital 221(97.8%) had neonatal resuscitation corner and only 5 (2.2%) of respondents answered there was no neonatal resuscitation corner. Nearly half of participants 101(44.7%) answered there was incomplete with neonatal resuscitation equipment and the rest of them answered; 63(27.9%) no neonatal resuscitation equipment and 62(27.4%) fully equipped with neonatal resuscitation. Regarding neonatal resuscitation equipment store of participants answered 133(58%) in the locked cupboard, 126(55.8%) on the resuscitation tray and corner, 125 (55.3%) in the equipment store and 125 (55.3%) anywhere (no specified place). Problems faced participants during neonatal resuscitation were more than half of respondents answered lack of equipment 127(56.1%), absence of guidelines 123(53.1%), and lack of trained assistant 117(51.8%) (Table 3).

Table 3: Institutional characteristics of NICU nurses and midwives working in government hospital in West Shoa, Oromia, Ethiopia, 2023.

Variables	Category	Frequency (N=226)	Percent (%)
Category of hospital	Primary	110	48.7
	General	71	31.4
	Tertiary	45	19.9
Previous work unit	NICU	54	23.9
	Delivery unit	140	62.0
	Pediatrics ward	24	10.6
	Other	8	3.5
Current working unit	NICU	79	35.0
	Delivery unit	141	62.4
	Other	6	2.6
Fully equipped resuscitation materials	Yes	62	27.4
	No	63	27.9
	Incomplete	101	44.7
Where resuscitation equipment kept	In locked cupboard	59	26.1
	On the resuscitation tray and corner	111	49.1
	Anywhere (no specified place)	20	8.8
	In the equipment store	36	16.0
Resuscitation guidelines availability	Yes	168	74.3
	No	46	20.3
	Unsure	12	5.3
Provision of supportive supervision	Yes	44	19.5
	No	175	77.4
	Unsure	7	3.1
In-service training taken	Yes	129	57.1
	No	97	42.9

5.3 Resuscitation knowledge of midwives and NICU nurses

In this study more than half of the respondents 135 (59.7%) had poor knowledge scores towards neonatal resuscitations. Out of 145 midwives, more than half of 86(59.7%) had poor knowledge scores, similarly out of 81 NICU nurses, nearly two-third of 49(60.5%) had poor knowledge scores towards neonatal resuscitations. In terms of educational status from a total of 209-degree holders, nearly two-thirds 126(60.3%) had poor knowledge scores towards neonatal resuscitation and from 10 diploma holders 7(70%) of them had poor knowledge towards neonatal resuscitation. This study revealed the majority of the participants in all governmental hospitals had poor knowledge scores towards neonatal resuscitation in primary hospitals 70(63.6%) and in general hospitals 43 (60.6%). However, in tertiary hospital more than half of respondents 23(51.1%) had good knowledge towards neonatal resuscitation. Out of 226,198 (87.6%) participants replied birth asphyxia was immediate problem for newborn baby and nearly half of 90(45.5%) them had good knowledge towards neonatal resuscitation.

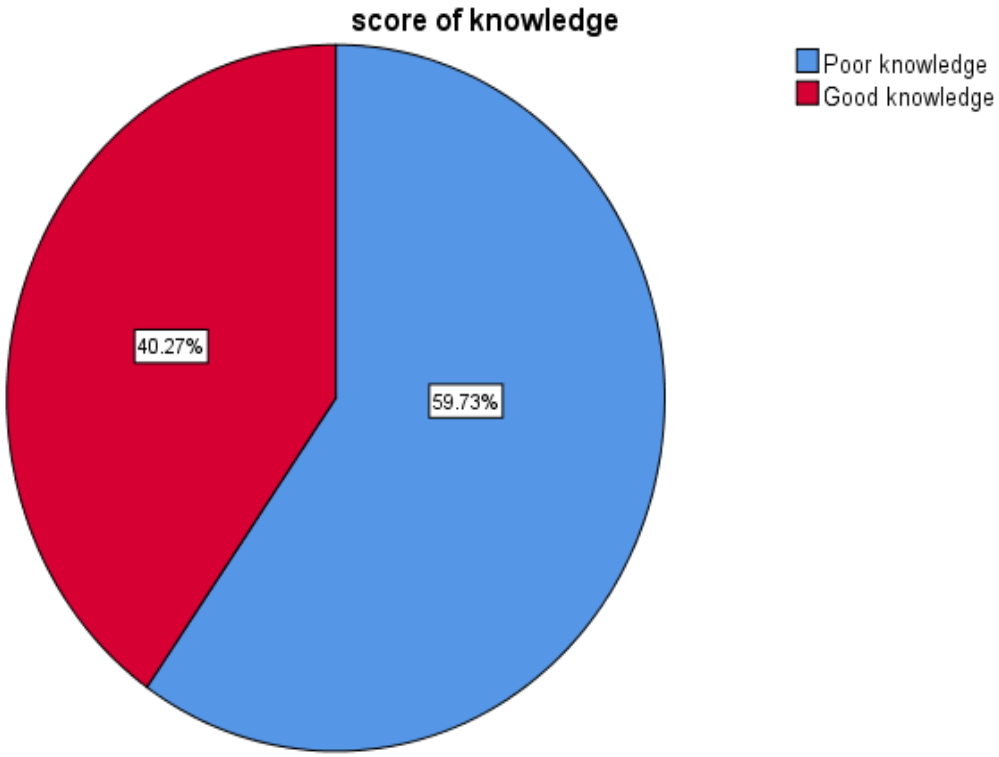

Figure 2: Knowledge score of NICU nurses and midwives towards neonatal resuscitation who were working in government hospitals in West Shoa, Oromia, Ethiopia, 2023.

5.4 Factors affecting knowledge of NICU nurses and midwives towards neonatal resuscitation

After bivariate logistic regression was done; age, sex, fully equipped with resuscitation material, availability of guidelines in neonatal resuscitation room, supportive supervision, and in-service training were the candidates for multiple logistic regression by using p-value $\leq$ 0.25. However, in the final model of multivariate logistic regression age (p-value=0.006), availability of guidelines in neonatal resuscitation room (p-value=0.0001), supportive supervision (p-value=0.047) and in-service training (p-value=0.033) were statistically significant with good knowledge of NICU nurses and midwives towards neonatal resuscitation.

In this study being age between 25-35 years of NICU nurses and midwives were 5 times more knowledgeable than other age group towards neonatal resuscitation(AOR=4.936,95% CI=1.597-15.255). Nurses and midwives who had no guidelines in neonatal resuscitation room had 0.18 times less knowledge than who had guidelines in neonatal resuscitation room (AOR=0.178, 95% CI=0.047-0.427). Respondents who had no supportive supervision had 0.38 times less knowledge than who had supportive supervision in their hospital (AOR=0.382, 95% CI=0.148-0.988).

Untrained nurses and midwives had 0.4 times less knowledge than trained nurses and midwives towards neonatal resuscitation (AOR=0.411, 95% CI=0.182-0.929) (Table 4).

Table 4: Bivariate and multivariate results showing association of independent variables with the knowledge scores of Nicu nurses and midwives working in government hospitals of West Shoa, Oromia, Ethiopia, 2023.

Variables	Category	Knowledge level		COR (95% CI)	AOR(95% CI)
		Poor	Good		
Age	<25	37	11	1	1
	25-35	93	74	**2.676(1.278-5.605)***	**4.936(1.597-15.255)****
	>35	5	6	4.036(1.031-15.796)	1.769(0.312-10.024)
Sex	Male	49	49	1	1
	Female	86	42	0.285(0.15-0.528)	1.028(0.428-2.471)
Does your hospital is fully equipped with resuscitation material?	Yes	58	33	1	1
	No	106	29	2.08(1.15-3.76)*	1.774(0.726-4.336)
Does your hospital have neonatal resuscitation guidelines?	Yes	34	57	1	1
	No	82	53	**0.386(0.223-0.667)***	**0.178(0.074-0.427)****
Does your hospital provide you supportive supervision?	Yes	62	29	1	1
	No	115	20	**0.372(0.194-0.711)***	**0.382(0.148-0.988)****
Did you receive in-service training on neonatal resuscitation Care?	Yes	64	65	1	1
	No	71	26	**0.361(0.205-0.635)***	**0.411(0.182-0.929)****

Key:*=significant for bivariate, **=significant for multivariate, target reference group was first for example age <25 was reference group.

5.5 The Practice of the Respondents towards Neonatal Resuscitation

This study revealed that the majority of respondents 165(73%) had poor practice towards neonatal resuscitation. In terms of profession NICU nurses 74.1 %(60) and midwives 72.4 %(105) had poor practice towards neonatal resuscitation. The majority of diploma holders 80 %(8) and degree holders 75.1 %(157) had poor practice towards neonatal resuscitation. But master degree holders 100 %(7) had good practice towards neonatal resuscitation. In terms sex male 59.2 %(58) and female 83.6 %(107) had poor practice towards neonatal resuscitation. Regarding hospital category majority of respondents primary hospital 77.3 %(85), general hospital 71.8 %(51) and tertiary hospital 64.4 %(29) had poor practice towards neonatal resuscitation (Table 5).

From practice checklist observed majority of respondents were fully practiced 77.4 %(175) regarding assessing equipment for neonatal resuscitation, 74.8 %(169) of respondents were done correctly placing the baby on radiant warmer and performing initial steps of resuscitation as required. But majority of respondents 99.1 %(224) failed to intubate if heart rate less than 60bpm and around 88.1 %(199) of respondents failed to administer epinephrine (Table 6).

5.6 Factors affecting practice of NICU nurses and midwives towards neonatal resuscitation

In bivariate logistic regression age, sex, marital status, fully equipped with resuscitation material, work experiences, supportive supervision, and in-service training were the candidates for multiple logistic regression. However, in the final model of multivariate logistic regression sex (p=0.004), marital status (p=0.001) and in-service training (p=0.001) were statistically significant with good practice of NICU nurses and midwives towards neonatal resuscitation.

The study revealed that from respondents were being female sex had 0.3 times less good practice than counterparts towards neonatal resuscitation (AOR=0.296(95% CI; 0.128-0.683) p=0.004). In terms marital status the respondents were being single had 0.18 times less good practice than married respondents towards neonatal resuscitation (AOR=0.180(95% CI; 0.067-0.482) p=0.001). NICU nurses and midwives who had no in service training on neonatal resuscitation had 57% less practice neonatal resuscitation when compared with who had got in service training on neonatal resuscitation (AOR=0.431(95% CI; 0.191-0.974) p=0.001) (Table 5).

Table 5: Bivariate and multivariate results showing association of independent variables with the practice score of Nicu nurses and midwives working in government hospitals in West Shoa, Oromia, Ethiopia, 2023.

Variables		Practice score		COR (95% CI)	AOR (95% CI)
		Poor	Good		
Age	<25	43	5	1	1
	25-35	115	52	**3.889(1.456-10.385)***	1.212(0.233-4.379)
	>35	7	4	**4.914(1.055-22.887)***	1.459(0.232-9.179)
Sex	Male	58	40	1	1
	Female	107	21	**0.285(0.153-0.528)***	**0.296(0.128-0.683)****
Marital status	Married	109	55	1	1
	Single	54	6	**0.220(0.089-0.544)***	**0.180(0.067-0.482)****
	Divorced	2	0	0	0
Work experience	1-5years	93	43	1	1
	6-10years	69	16	**0.502(0.261-0.964)***	0.683(0.296-1.577)
	>11years	3	2	1.442(0.232-8.947)	2.728(0.258-28.85)
NR materials fully availability	No	130	34	1	1
	Yes	35	27	**2.95(1.574-5.528)***	1.621(0.749-3.509)
	Yes	76	34	1	

Availability of guidelines in room	No	89	27	0.678(0.378-1.224)	
Supportive supervision		29	20	1	1
Yes					
No		136	41	**0.437(0.224-0.853)***	0.632(0.285-1.145)
Availability of in service training	Yes	82	47	1	1
	No	83	14	**0.294(0.151-0.575)***	**0.431(0.191-0.974)****

Key: *=significant for bivariate and **=significant for multivariate, target reference group was first.

Table 6: Practice sore of NICU nurses and midwives were observed on neonatal resuscitation practice using observation checklists who were working in government hospitals in West Shoa, Oromia, Ethiopia, 2023.

Serial Number	Item	Practice score,N=226	
		Yes, n (%)	No, n (%)
1	Assess newborn corner should be equipped with resuscitation kit, suction catheter, Oxygen, laryngoscope, ETT, Adrenaline	175(77.4%)	51(22.6%)
2	Place the baby on radiant warmer (already switched on), inform Doctor and helper.	169(74.8%)	57(25.2%)
3	Quickly assess for breathing/ Crying, If answer is NO, Start initial steps	158(69.9%)	68(30.1%)
4	Perform the initial steps of resuscitation as required ▪ Position the baby in slight neck extension using a shoulder roll	169(74.8%)	57(25.2%)
5	▪If required, clear the airway. First suction the mouth and then suction the nose using a mucus extractor. ▪Dry the baby ▪ Stimulate by Gently rub the newborn's back, trunk, or extremities▪ Reposition and reassess breathing	169(74.8%	57(25.2%)
6	Assess for breathing, heart rate and color If breathing is normal, provide Observational care with mother: • Provide Warmth and support breastfeeding • Monitor temperature, HR, breathing and color every 30 minutes for first 2 hours.	124(54.9%)	102(45.1%)
7	If not breathing well (apnea, gasping)/ HR<100bpm.Initiate bag and mask ventilation using	108(47.8%)	118(52.2%)

	room air *(≥ 35weeks & 21-30% < 35 weeks) for 30 seconds		
8	If labored breathing and persistent cyanosis, Position and clear airway.SpO2 monitor. Supplemental O2 as needed.	89(39.4%)	137(60.6%)
9	For PPV, after 5-10 inflation look for chest rise. If chest is not rising, follow MR SOPA: • Mask adjustment, reposition of head, suction if required, Open mouth, increase pressure and alternate airway.• Consider ETT or Laryngeal mask if needed	118(52.2%)	108(47.8%)
10	Continue bag and mask ventilation for 30 seconds Reassess the baby for breathing after 30 seconds of bag and mask ventilation by checking for umbilical pulsations for heart rate.	137(60.6%)	89(39.4%)
11	a) If HR > 100/ minute continue bag and mask ventilation till the baby starts breathing spontaneously and bilateral chest rise is seen, Wean off bag and mask ventilation b) If HR <100/ minute, continue bag and mask ventilation and connect oxygen	100(44.2%)	126(55.8%)
12	If HR < 60/ minute, Intubate if not already done. Chest compression ,Coordinate with PPV with 100% Oxygen	2(0.9%)	224(99.1%)
13	If HR continue to be <60/ minute Consider Epinephrine (1:10000) 0.1 to 0.3ml/kg IV, If endotracheal route, give 0.5- 1.0 ml/kg	27(11.9%)	199(88.1%)
14	At any point if baby starts breathing spontaneously and bilateral chest rise is seen, wean off bag and mask ventilation and give post-resuscitation care	124(54.9%)	102(45.1%)
15	If baby is not breathing, continue bag and mask ventilation for maximum 20 minutes	82(36.3%)	144(63.7%)

DISCUSSION

In this study the overall knowledge and practice score of NICU nurses and midwives towards neonatal resuscitation were substandard. This study revealed that only 40.3% and 27% of NICU nurses and midwives had good knowledge score and practice score towards neonatal resuscitation respectively. The study showed that regarding profession 60.5 %(49) of Nicu nurses and 59.3 %(86) of midwives had poor knowledge towards neonatal resuscitation and also 74.1 %(60) of Nicu nurses and 72.4 %(105) of midwives had poor practice towards neonatal resuscitation.

In this study the overall knowledge score of NICU nurses and midwives toward neonatal resuscitation were 40.3%. This finding was almost consistent with two studies done in Gondor, Ethiopia (Gebreegziabher, *et al.*, 2014) (Asmamaw, *et al.*, 2021). This low good knowledge of neonatal resuscitation could be due to inadequate training, lack of supportive supervision and shortage of neonatal resuscitation guidelines.

This finding was higher than study done in Eastern Ethiopia (Sintayehu, *et al.*, 2020). This difference might be due to their study had high sample size, multifacilities including rural health centers with low supplies and no in-service training. Similarly, this study was higher than study done on knowledge and experience of neonatal resuscitation among Midwives in Tamale, Ghana (Alhassan *et al.*, 2019). This discrepancy might be due to one specific hospital, specific department, and small sample size and in service training.

However, this finding was lower than study done in Khartoum (Suliman *et al.*, 2015). This difference might be due to small sample size and specific setting of service.

This study revealed that overall respondents had 27% good practice toward neonatal resuscitation. This finding was higher than study done in Eastern Ethiopia (Sintayehu *et al.*, 2020) and study done in Nepal (Gauro *et al.*, 2018).This difference might be due to small sample size and they applied on anatomical model simulation for practice observation neonatal resuscitation, specific profession and specific delivery service.

However, this study finding was lower than study done in Kenya (Muli *et al.*,2020)and in Khartoum Sudan (Suliman *et al.*,2015). This discrepancy might be due to they done only on specific urban hospitals and in service training difference, so quality of practice was different.

This study revealed that age being between 25 and 35 4.936((95% CI: 1.597-15.255) p=0.006), non-availability of guidelines of NR in the room 0.178((95% CI: 0.074-0.427) p-v=0.0001), lack of supportive supervision 0.382((95% CI: 0.148-0.988)P=0.047) and lack of in service training 0.411((95% CI:0.182-0.929)p=0.033) were associated with the good knowledge of NICU nurses and midwives toward neonatal resuscitation. Regarding in service training this finding was consistent with study done in Gondor(Gebreegziabher *et al.*, 2014),study done in Eastern Ethiopia (Sintayehu *et al.*, 2020;Abrha *et al.*, 2020),study done in Ghana (Alhassan *et al.*, 2019) and study done in Nepal(Gauro et al., 2018).

This study showed that being female sex AOR=0.296((95% CI: 0.128-0.683) p-value=0.004), being single in marital status AOR=0.180(0.067-0.482) p-value=0.001) and lack of in service training AOR=0.431(0.191-0.9740 p-value=0.001) were associated with good practice of NICU nurses and midwives toward neonatal resuscitation. From above factors lack of in service training was the most important factor for both good knowledge and good practice for NICU nurses and midwives toward neonatal resuscitation. This finding was in line with study in Mekele ,Ethiopia(Abrha *et al.*, 2020), in Gondor (Gebreegziabher et al., 2014)in Eastern Ethiopia (Sintayehu *et al.*, 2020),in Nepal(Gauro et al., 2018).

Strength and Limitation of the study

The major limitations of this study were short time, nonprobability sample technique and for observation there was no chance during night shift because a lot of cases were managed during night. The strength of this study were done by using direct observation and self-administered questionnaire for assessing practice and knowledge of NICU nurses and midwives respectively .

CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

Improving the quality of neonatal resuscitation services is just one way to reduce neonatal deaths from intrapartum hypoxia to during 28 days in Ethiopia.

In our study Nicu nurses and midwives had substandard level of good knowledge and good practice towards neonatal resuscitation according to AHA pediatrics advanced life support accreditation criteria, 2018, scoring ≥ 80% for good knowledge and good practice based on questionnaires for knowledge and observational checklists for practice.

Regarding factors that were affecting Nicu nurses' and midwives' knowledge were age being between 25 and 35, non-availability of guidelines of NR in the room, lack of supportive supervision and lack of in service training were associated with good knowledge toward neonatal resuscitation.

And also being female sex, being unmarried and in service training were factors that affecting good practice of Nicu nurses and midwives toward neonatal resuscitation.

7.2 Recommendations

Ministry of health Ethiopia, Oromia health bureau, West Shoa health bureau, Ambo University College of medicine and health sciences, and all government hospital managers in West Shoa are responsible bodies to reduce neonatal deaths.

According to our study Oromia health bureau, West Shoa health bureau, Ambo University and all hospital managers should:

- ✓ Give in service training and mentorship for fresh employees
- ✓ Avail guidelines for neonatal resuscitation
- ✓ Prepare supportive supervision for both NICU and delivery room at all service settings

REFERENCE

Abebaw, M., Tesfaye, A. and Godie, Y. (2022) 'Magnitude and associated factors of neonatal resuscitation among health care providers in selected public hospitals of Addis Ababa , Ethiopia , 2022 . Multi center cross-sectional stu ... Magnitude and associated factors of neonatal resuscitation among he', (December).

Abrha, M.W. *et al.* (2020) 'Exploring factors influencing practice of neonatal resuscitation with bag and mask in Ethiopia: Analysis from 2016 national emergency obstetric and newborn care survey', *Journal of Multidisciplinary Healthcare*, 13, pp. 471–476. Available at: https://doi.org/10.2147/JMDH.S246347.

Afjeh, S., Sabzehei, M. and Esmaili, F. (2013) 'Neonatal Resuscitation in the Delivery Room from a Tertiary Level Hospital : Risk Factors and Outcome Findings Subjects and Methods', 23(6), pp. 675–680.

Agudelo-p, S. *et al.* (2022) 'Effect of the Helping Babies Breathe Program on Newborn Outcomes : Systematic Review and Meta-Analysis'.

Alhassan, A. *et al.* (2019) 'Knowledge and Experience of Neonatal Resuscitation among Midwives in Tamale', *Nursing Research and Practice*, 2019, pp. 1–8. Available at: https://doi.org/10.1155/2019/3652608.

Alkema, L. *et al.* (2014) 'Child Mortality Estimation 2013 : An Overview of Updates in Estimation Methods by the United Nations Inter-Agency Group for Child Mortality Estimation', 9(7). Available at: https://doi.org/10.1371/journal.pone.0101112.

Asmamaw Bekele, F., Tezera Assimamaw, N. and Seid Ali, M. (2021) 'Knowledge and associated factors towards neonatal resuscitation among nurses and midwives at the University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia', *International Journal of Africa Nursing Sciences*, 15, p. 100365. Available at: https://doi.org/10.1016/j.ijans.2021.100365.

Aziz, K. *et al.* (2020) 'Part 5: Neonatal Resuscitation: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care', *Circulation*, 142(16 2), pp. S524–S550. Available at: https://doi.org/10.1161/CIR.0000000000000902.

Aziz, K. *et al.* (2021) *Part 5: Neonatal resuscitation 2020 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care*, *Pediatrics*.

Available at: https://doi.org/10.1542/PEDS.2020-038505E.

Biset, G. (2018) ‘Knowledge , Practice and Associated Factors Toward Neonatal Resuscitation Among Nurses and Midwifes in South Wollo Governmental Hospitals , Northeast Ethiopia’, pp. 1–49.

Bond, D.M. *et al.* (2015) ‘Planned early delivery versus expectant management of the term suspected compromised baby for improving outcomes’, *Cochrane Database of Systematic Reviews*, 2015(11), p. CD009433. Available at: https://doi.org/10.1002/14651858.CD009433.pub2.

Cetinkaya, S. *et al.* (2022) ‘Examining the Knowledge Level of the Nurses and Midwives Had Neonatal Resuscitation Program (NRP) Practitioner Training Course’, *Journal of Multidisciplinary Healthcare*, 15(February), pp. 281–288. Available at: https://doi.org/10.2147/JMDH.S352677.

Developed, E. *et al.* (2019) ‘Child Mortality 2019’.

Ethiopian Public Health Institute (EPHI) and ICF (2021) *Ethiopia Mini Demographic and Health Survey 2019: Final Report*. Available at: https://dhsprogram.com/pubs/pdf/FR363/FR363.pdf.

Fabiana Meijon Fadul (2019) ‘済無No Title No Title No Title’.

Gauro, P., Saha, A. and Adhikari, B. (2018) ‘Knowledge and Skill of Newborn Resuscitation among Nurses Working in Maternity Ward’, *International Journal of Health Sciences and Research*, 8(2), pp. 149–154. Available at: https://www.ijhsr.org/IJHSR_Vol.8_Issue.2_Feb2018/IJHSR_Abstract.019.html.

Gebreegziabher, E., Aregawi, A. and Getinet, H. (2014) ‘Knowledge and skills of neonatal resuscitation of health professionals at a university teaching hospital of Northwest Ethiopia’, *World Journal of Emergency Medicine*, 5(3), p. 196. Available at: https://doi.org/10.5847/wjem.j.issn.1920-8642.2014.03.007.

Health, B. and Education, C.M. (2018) ‘Pediatric Advanced Life Support Provider & Provider Renewal Courses’.

Kantorova, V. *et al.* (2021) *Levels & Trends in*.

Lassina, C. *et al.* (2017) ‘Knowledge and Practices of Neonatal Resuscitation by Health Providers in Côte d’Ivoire’, *Open Journal of Pediatrics*, 07(03), pp. 149–155. Available at: https://doi.org/10.4236/ojped.2017.73018.

Liu, L. *et al.* (2016) ‘Global, regional, and national causes of under-5 mortality in 2000–15: an

updated systematic analysis with implications for the Sustainable Development Goals', *The Lancet*, 388(10063), pp. 3027–3035. Available at: https://doi.org/10.1016/S0140-6736(16)31593-8.

Mm, D., Joseph, T. and Kenneth, R. (2019) 'Health System Factors Influencing Practice of Neonatal Resuscitation among Nurses in Machakos Level 5 Hospital', *Public Health Open Access*, pp. 1–9. Available at: https://doi.org/10.23880/phoa-16000147.

Muli, D.M. (2020) 'Assessment of Newborn Resuscitation Practice By Nurses in', p. 95.

Namuguzi, M. and Drake, K. (2020) 'Evaluating Neonatal Resuscitation Skills of Practicing Nurses and Midwives in Selected Hospitals in Central Uganda ', pp. 1–16.

Nvonako, H. *et al.* (2022) 'Effect of in-hospital training in newborn resuscitation on the competence of health-care workers in resuscitating newborn infants at birth at Mboppi Baptist Hospital, Douala, Cameroon', *Pan African Medical Journal*, 42. Available at: https://doi.org/10.11604/pamj.2022.42.169.32816.

Perlman, J. *et al.* (2016) 'Designing and Implementing the Helping Babies Breathe Program in Tanzania', *Journal of Pediatric Intensive Care*, 06(01), pp. 028–038. Available at: https://doi.org/10.1055/s-0036-1584674.

Sintayehu, Y., Desalew, A., Geda, B., Tiruye, G., *et al.* (2020) 'Basic neonatal resuscitation skills of midwives and nurses in Eastern Ethiopia are not well retained: An observational study', *PLoS ONE*, 15(7 July), pp. 1–12. Available at: https://doi.org/10.1371/journal.pone.0236194.

Sintayehu, Y., Desalew, A., Geda, B., Shiferaw, K., *et al.* (2020) 'Knowledge of basic neonatal resuscitation and associated factors among midwives and nurses in public health institutions in Eastern Ethiopia', *International Journal of General Medicine*, 13, pp. 225–233. Available at: https://doi.org/10.2147/IJGM.S255892.

Suliman, A. and Ahmed, M. (2015) 'Assessment Knowledge and Practice of Nurses Midwife Regarding Immediate Health New Borne Care in Khartoum and Khartoum North Teaching Hospital (Labour Room)', 4(2), pp. 47–48. Available at: https://doi.org/10.9790/1959-04224748.

Tiruneh, G.T. *et al.* (2021) 'SYSTEMATIC REVIEW NEONATAL MORTALITY IN NEONATAL INTENSIVE CARE UNIT HOSPITALS IN ETHIOPIA REMAINS HIGH : A SYSTEMATIC REVIEW AND SYSTEMATIC REVIEW NEONATAL MORTALITY IN NEONATAL INTENSIVE CARE UNIT HOSPITALS IN ETHIOPIA REMAINS HIGH : A

SYSTEMATIC REVIEW', (March).
UNICEF, WHO and WBO (2020) *Levels & Trends in Child Mortality Report 2020, UN Inter-agency Group for Child Mortality Estimation (UN-Igme)*. Available at: https://www.unicef.org/media/79371/file/UN-IGME-child-mortality-report-2020.pdf.pdf.
WHO - UNICEF (2020) 'Ending preventable newborn deaths ans stillbirths. Moving faster towards high-quality universal in 2020-2025.', (July). Available at: https://www.unicef.org/media/77166/file/Ending-preventable-newborn-deaths-and-stillbirths-by-2030-universal-health-coverage-in-2020–2025.pdf.
World Health Organization (2016) 'WHO Technical specifications of Neonatal Resuscitation Devices', *WHO Library Cataloguing-in-Publication Data WHO*, 3(4), p. 80.
Wyckoff, M.H. *et al.* (2015) 'Part 13: Neonatal resuscitation: 2015 American Heart Association guidelines update for cardiopulmonary resuscitation and emergency cardiovascular care', *Circulation*, 132(18), pp. S543–S560. Available at: https://doi.org/10.1161/CIR.0000000000000267.

ANNEXES

Annex 1: Information Sheet

Name of the investigator: **Urgessa Chala** (BSc, MSc candidate) Research title**: knowledge and practice of nurses working in neonatal intensive care unit and midwives working delivery room towards neonatal resuscitation at government hospitals** such as Ambo University Referral Hospital, Ambo General Hospital, Bako Primary Hospital, Gedo General Hospital, Gindiberat General Hospital, Ginchi Primary Hospital, Guder Primary Hospital, Holeta Primary Hospital, Inchini Primary Hospital And Jeldu Primary Hospital in West Shoa, Oromia, Ethiopia.

Research objective: the aim of this study is to assess knowledge and practice of NICU nurses and midwives towards neonatal resuscitation at government hospitals such as Ambo University Referral Hospital, Ambo General Hospital, Bako Primary Hospital, Gedo General Hospital, Gindiberat General Hospital, Ginchi Primary Hospital, Guder Primary Hospital, Holeta Primary Hospital, Inchini Primary Hospital And Jeldu Primary Hospital in West Shoa, Oromia, Ethiopia.

Study procedure: All ten government hospitals in West Shoa will be included.

Confidentiality: the collected information will be kept confidential and used only for research purposes. No one except the members of the research team will have access to the information collected. The personal information of the respondents will not be notified.

Benefits of the study: For your participation in the study no payment will be granted or has no any special privilege to you. But, participating in the study and giving your genuine information will provide great input to bring change in quantity of health service to neonatal resuscitation. **Risks of the study**: The procedure does not bear any physical or psychological trauma. Furthermore, you will not be forced to respond to information you do not know.

Consent: Your participation in the study will be totally based on your willingness. You have the right not to participate from the beginning, or you may stop participating at any time after starting the participation.

Rights as a participant: If you have any questions about the study, please be free to ask and contact me. Your participation in this survey is voluntary and you can choose not to answer.

Do you want to continue? Yes---------- No----------

Thank you in advance for your help!

Person to contact: if the data collectors or other hospital administrative staffs have any question regarding the study, they are free to contact me in person or by the following addresses: URGESSA CHALA

Tel.: 0912130032

Email: urgchala2020@gmail.com

Annex 2: Hospital Consent Form

This study will be conducted in government hospitals such as AURH, AGH, BPH GeGH, GiGH, GPH, GuPH, HPH, IPH and JPH. The main objective of this study is to assess knowledge and practice of nurses who are working in NICU and midwives who are working in delivery room towards on neonatal resuscitation. In this study data will be collected from the nurses who are working in NICU and midwives who are working in delivery room. Any personal information will be maintained throughout the study process and no unauthorized access to the information is allowed. Finally, the hospital has all the right to refuse to participate in this study at any time. If you have any questions or need further information regarding the planned study you are free to get clarification from the principal investigator or from the institution or through the following address: **URGESSA CHALA**, Tel.: **0912130032** (the principal investigator). Therefore, if you would like to participate in this study, would you please confirm it by signing here?

Thank you very much!

Participant---------- principal investigator----------

Annex 3: Questionnaire

Hawassa University

College of medicine and health sciences

School of nursing

Department of pediatrics and child health nursing

Date _____

Code number of checklist _____

My name is **URGESSA CHALA** and second year Msc in pediatrics and child health nursing student. This study will be conducted in government hospitals such as AURH, AGH, BPH GeGH, GiGH, GPH, GuPH, HPH, IPH and JPH hospitals. The main objective of this study is to assess knowledge and practice of nurses who are working in NICU and midwives who are working in delivery room towards on neonatal resuscitation. The hospital has all the right to refuse to participate in this study at any time. If you have any questions or need further information regarding the planned study you are free to get clarification from the principal investigator or from the institution or through the following Address: **Urgessa Chala**, Tel.: **0912130032** (the principal investigator). Therefore, if you would like to participate in this study would you please confirm it by signing here?

Thank you very much.

Participant Signature_____

Principal Investigator Signature_____

Part one: Socio-demographic Data

1) Age _____

2) Sex: 1) Male 2) Female

3) Marital Status: 1) Married 2) Single 3) Divorced 4) Widowed

4) Profession: 1) NICU Nurse 2) Midwife

5) Level of education: 1) Diploma 2) Degree 3) Masters

6) Work experience: 1) 1-5year 2) 6-10years 3) 11-15 years 4) 16years and above

7) Working department: 1) Delivery room 2) Neonatal Intensive Care Unit (NICU)

Part Two: institutional related Factors

8) Name of Hospital where you work: 1) AURH 2) AGH 3) BPH 4) GeGH 5) GiGH 6) GPH 7) GuPH 8) HPH 9) IPH 10) JPH

9) At which unit you have worked before you start to work in this unit now? 1. NICU 2. Delivery unit or maternity 3. Pediatric unit 4. Other (specify) _____

10) Which unit are you working currently? 1. NICU 2. Labor ward. 3. Other (specify) _____

11) Is NICU and delivery room in the same floor of your (now) hospital? 1. Yes 2. No

12) Does your hospital have resuscitation corner in your unit? 1. Yes 2. No

13) Does your hospital is fully equipped with resuscitation material? (A minimum of the following materials: Radiant warmer, bag with mask in different size, suction machine & catheter, single/multi use suction bulb, stethoscope, pulseoxymetry). 1. Yes 2. No 3. Incomplete equipment

14) If your answer is yes for question no 12, where is those materials kept? 1. in the locked cupboard. 2. on the resuscitation tray and corner. 3. Anywhere (no specified place). 4. in equipment store.

15) What problems have you faced during neonatal resuscitation? (More than one answer is possible) 1. Lack of equipment. 2. Lack of trained assistant 3. Lack of oxygen 4. Absence of guideline. 5. Others (specify) _____

16) Does your hospital (now) have neonatal resuscitation guidelines? 1. Yes 2. No 3. Unsure

17) Does your hospital provide you supportive supervision? 1. Yes 2. No 3. Unsure

18) On average, for how many neonates (newborns) you serve per a day? 1. 0– 5 2. 5-10 3. >10

Part Three: Questionnaires on Knowledge

1) Did you receive in-service training on neonatal resuscitation care? 1) Yes 2) No

2) If yes, how many times have you got in-service training? 1) One 2) Two 3) Three 4) Zero

3) Do you know the immediate problem of new born baby? 1) Yes 2) No

4) If yes, what are the problems? (More than one answer is possible) 1) Hypothermia 2) Asphyxia 3) Infection

5) Where do you keep the baby immediately after delivery? 1) In the mother's abdomen 2) Clean and separate place/table 3) Put simply on any place 4) Others specify_____

6) What do you do if the baby did not cry immediately after delivery? 1) Suction if there is secretion 2) Stimulating the baby 3) Call help and start cardiopulmonary resuscitation 4) Others specify_____

7) If a newborn baby has persistent apnea what is the immediate action to be done? 1) Continue tactile stimulation a little bit more vigorously 2) Give positive pressure ventilation quickly 3) Give free flow oxygen 4) Other _____

8) The best indicator of effective bag and mask ventilation is? 1) Rising heart rate and audible breath sounds 2) Rise in oxygen saturation 3) Chest movements symmetrically 4) 2 &3

9) During chest compression how much pressure do you use?

1) Depress the sternum to 1/3rd to ½ diameter of the chest 2) There is no strict guideline; it varies depending upon the weight of the baby 3) Go on increasing pressure still there is no response

10) For term babies born through meconium-stained liquor, one of the following is to be done? 1) Suction of oral cavity and nose after delivery 2) Endotracheal suction of active baby vigorous 3) Endotracheal suction of no vigorous baby 4) Endotracheal suction of all babies born through meconium-stained liquor

11) Where do you resuscitate high-risk/unstable newborn baby after delivery? 1) In the dedicated newborn corner in the delivery room 2) In a separate room near the delivery room 3) In the NICU or separate adjacent room 4) Anywhere

12) What is the basic equipment for neonatal resuscitation? More than one answer is possible 1) Heat source 2) Suction 3) Bag and mask 4) Oxygen lines

13) What is initial step of neonatal resuscitation? 1) Provide warm environment 2) head position "neutral position" 3) clear airway and drying baby stimulation for breathe 4) All

14) Resuscitation should be started? 1) After 1st minute Apgar score 2) After 5th minute Apgar score 3) Immediately

15) When do you stop resuscitation? (More than one answer is possible) 1) When baby is cried 2) When breathing rate (BR) < 30 beat per minute (BPM) 3) When the bay is gasping 4) When heart rate (HR) > 100 beat per minute (BPM)

Part Four: Newborn Resuscitation Observation Checklist from WHO

The following are the basic steps in neonatal resuscitation to be followed as needed by WHO guidelines. Tick once as appropriate on column 1 or 0 as achieved by the NICU nurses and midwives in delivery ward.

KEY:

Yes (1) = done

No (0) = not done

Serial Number	Item	Practice score,N=226	
		Yes, n (%)	No, n (%)
1	Assess newborn corner should be equipped with resuscitation kit, suction catheter, Oxygen, laryngoscope, ETT, Adrenaline		
2	Place the baby on radiant warmer (already switched on), inform Doctor and helper.		
3	Quickly assess for breathing/ Crying, If answer is NO, Start initial steps		
4	Perform the initial steps of resuscitation as required ▪ Position the baby in slight neck extension using a shoulder roll		
5	▪If required, clear the airway. First suction the mouth and then suction the nose using a mucus extractor. ▪Dry the baby ▪ Stimulate by Gently rub the newborn's back, trunk, or extremities▪ Reposition and reassess breathing		
6	Assess for breathing, heart rate and color If breathing is normal, provide Observational care with		

	mother: • Provide Warmth and support breastfeeding • Monitor temperature, HR, breathing and color every 30 minutes for first 2 hours.		
7	If not breathing well (apnea, gasping)/ HR<100bpm.Initiate bag and mask ventilation using room air *(≥ 35weeks & 21-30% < 35 weeks) for 30 seconds		
8	If labored breathing and persistent cyanosis, Position and clear airway.SpO2 monitor. Supplemental O2 as needed.		
9	For PPV, after 5-10 inflation look for chest rise. If chest is not rising, follow MR SOPA: • Mask adjustment, reposition of head, suction if required, Open mouth, increase pressure and alternate airway.• Consider ETT or Laryngeal mask if needed		
10	Continue bag and mask ventilation for 30 seconds Reassess the baby for breathing after 30 seconds of bag and mask ventilation by checking for umbilical pulsations for heart rate.		
11	a) If HR > 100/ minute continue bag and mask ventilation till the baby starts breathing spontaneously and bilateral chest rise is seen, Wean off bag and mask ventilation b) If HR <100/ minute, continue bag and mask ventilation and connect oxygen		
12	If HR < 60/ minute, Intubate if not already done. Chest compression ,Coordinate with PPV with 100% Oxygen		

13	If HR continue to be <60/ minute Consider Epinephrine (1:10000) 0.1 to 0.3ml/kg IV, If endotracheal route, give 0.5- 1.0 ml/kg		
14	At any point if baby starts breathing spontaneously and bilateral chest rise is seen, wean off bag and mask ventilation and give post-resuscitation care		
15	If baby is not breathing, continue bag and mask ventilation for maximum 20 minutes		