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COLLAGE OF HEALTH SCIENCE

SCHOOL OF NURSING AND MIDWIFERY

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POSTGRADUATE PROGRAM

KNOWLEDGE, ATTITUDE, PRACTICE AND ASSOCIATED FACTORS TOWARD NEWBORN RESUSCITATION AMONG GRADUATING HEALTH SCIENCE STUDENTS OF HEALTH SCIENCE COLLEGES IN HADIYA ZONE SOUTHERN ETHIOPIA, 2023

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A RESEARCH THESIS SUBMITTED TO SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCE, SCHOOL OF NURSING AND MIDWIFERY, DEPARTMENT OF NURSING IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN PEDIATRICS AND CHILD HEALTH NURSING

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STATEMENT OF THE AUTHOR

By my signature below, I declare and affirm that this thesis is my own work. I have followed all ethical principles of scholarship in the preparation, data collection, data analysis and completion of this thesis. All scholarly matter that is included in the thesis has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every effort has been made to avoid plagiarism in the preparation of this thesis.

This thesis is submitted in partial fulfilment of the requirement for a graduate degree from the Addis Ababa University at College of Health Sciences, School of Nursing and Midwifery department of Nursing. The thesis is deposited in the Addis Ababa University Digital Library and is made available to local, national and international scientific community. I solemnly declare that this thesis has not been submitted to any other institution anywhere for the award of any academic degree, diploma or certificate.

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BIOGRAPHICAL SKETCH

I was born in south regional state Wolaita zone, Boloso Bombie Woreda, Gido Ambe kebele in 1986 E.C. I attended primary school at Ambe primary school and my elementary school in Hereje primary and elementary school, later I finished my secondary and preparatory school in Bombie and Areka secondary and preparatory school from 2002 E.C to 2005 E.C from grade 9-12 in these schools.

I was graduated from Haramaya University with BSc in nursing in 2009 E.C. I had a total of 4 years experiences with 2 years and 7 months in Wachemo University Nigist Eleni Mohammed memorial comprehensive specialized hospital as a staff nurse, and for 1 year and 5 month in Wachemo University Durame campus as Graduate Assistant two (GA-II) lecturer and as assistant lecturer for additional 5 months. Currently, I am working at Wachemo University Durame campus as instructor of assistant lecturer in nursing department.

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LIST OF ABBREVIATIONS AND ACRONYMS

AAU	Addis Ababa University
AAP	American Academy of Paediatrics
AHA	American Heart Association
APGAR	Appearance, Pulse, Grimace, Activity, Respiration
BMV	Bag Mask Ventilation
CHMS	College of Health and Medical Science
CPR	Cardiopulmonary Resuscitation
CPAP	Continuous Positive Airway Pressure
CSA	Central Statistical Agency
ECG	Electro Cardiogram
HBB	Helping Baby Breath
HCP	Health Care Provider
HR	Heart Rate
HS	Health Science
HSS	Health Science Students
ILCOR	International Liaison Committee on Resuscitation
KAP	Knowledge, Attitude and Practice
NICU	Neonatal Intensive Care Unit
NRP	Neonatal Resuscitation Program
NR	Newborn Resuscitation
OSCE	Objectively Structured Clinical Examination
PHO	Public Health Officer
PPV	Positive Pressure Ventilation
SD	Standard Deviation
SDG	Sustainable Development Goal
SPSS	Statistical Package for Social Sciences
UNICEF	United Nations International Children's Emergency Fund
WCU	Wachemo University
WUNEMMRH	Wachemo University Nigist Eleni Mohammed Memorial Referral Hospital

Table of Contents

Page Nº

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

Background: Neonatal resuscitation is a set of actions taken at the time of birth to help in the reestablishment of breathing and circulation. In the first four weeks of life, more than 2.4 million newborn babies die globally, of which newborn asphyxia is the main cause of their deaths. Poor knowledge and skill neonatal resuscitation by practitioners has a visible negative effect on neonates like bronchopulmonary dysplasia, neurodevelopmental delay and pneumothorax. But there is no evidence about health science students' competence in neonatal resuscitation.

Objective: To assess knowledge, attitude, practice and associated factors toward neonatal resuscitation among graduating students of health science college in Hadiya Zone, Southern Ethiopia, 2023.

Method: An Institution based cross-sectional design was used to conduct the study among 213 graduating health science students from February 27 to March 27, 2023. A simple random sampling technique was used and data was collected using self-administered structured questionnaire. Data entry and analysis were done with Epi-data 3.1 and SPSS 27. Frequency and percentages were expressed in texts, tables and charts whereas logistic regression was conducted to check the association of dependent variables with factors and variables. A p-value < 0.05 in the regression model was considered significant.

Result: The respondents neonatal resuscitation knowledge was 58.2%, and their attitude and practice were 53.1% and 55.9% respectively. Simulation based demonstration teaching was a single factor which has significant effect on the good knowledge and practice of the students in common with [AOR: 0.377, 95%CI: (0.19-0.73)] and [AOR: 0.28, 95%CI: (0.145-0.53)], respectively and educational level on knowledge [AOR: 3.49, 95%CI: (1.24-9.7)] and on the attitude of students towards neonatal resuscitation.

Conclusion: Knowledge, attitude and practice of graduating health science students toward newborn resuscitation were poor therefore adequate simulation-based class and demonstration in well-equipped set up was needed to improve the participant's knowledge, attitude practice toward neonatal resuscitation.

Key words: Knowledge, attitude, practice, Neonatal resuscitation.

1: INTRODUCTION

1.1 Background

Every year, 140 million babies are born in the world (1,2). According to the World Health Organization (WHO) 2.4 million newborns will die in their first month of life in 2020 and this month is the most vulnerable period for child survival (2). As quoted by WHO and the United Nations International Children's Emergency Fund (UNICEF), birth asphyxia, also known as the inability to breathe at birth, infections, and birth abnormalities are the main causes of most neonatal fatalities. Neonatal asphyxia is the leading cause of mortality and is defined as the failure to initiate and sustain breathing at birth. Therefore, a significant fraction of these deaths can be avoided with adequate resuscitation at birth (1–3).

According to the American Heart Association (AHA) 2020 guideline, it is essential that every neonate needs care giver during the time of transition from the fluid filled area of the womb to the air filled area of the environment (4). Most newborns make the transition to extrauterine life without intervention (5,6). Before birth, pulmonary blood vessels in the fetal lungs are tightly constricted, and the alveoli are filled with fluid, not air (5).

Neonatal resuscitation (NR) is a crucial intervention for birth asphyxia (1). It is the collection of interventions given at birth to aid in the development of breathing and circulation (7). In low and middle-income countries, health institution-based NR may avert 30% of intrapartum-related neonatal deaths (8). Teaching NR improves NR skills, and teaching neonatal resuscitation to undergraduate health students is part of their academic training in the last years of their studies. Continuous neonatal resuscitation training strengthens the learning of skills designed to help a newborn in its first minutes of life (9).

As mentioned by Matteo Parotto in Italy, the Neonatal Resuscitation Programme (NRP), which is widely endorsed by the AHA and the American Paediatrics Association (APA), has shown to provide good retention of knowledge in anaesthesia, paediatrics, and gynaecology residents, but data on its efficacy in relation to specialty training of participants is lacking (10).

The finding from India showed that participants had poor mean score practice in the areas of before performance steps(32.66%), initial steps(41%), chest compression(42.94%), Positive Pressure Ventilation (PPV)(46.1%), and medication administration(49.88%) (11). Study in Peru

about assessing the use of PPV in time of NR among undergraduate final year obstetrics and medical students most students had low performance since less than a one fourth of them passed both the theoretical and practical evaluations (9). This study observed that obstetrics students had better performance on the theoretical knowledge questions but lower performance on the practical assessment. In courses' reviewing syllabi, they verified that the obstetrics school practices training using the Helping Babies Breathe (HBB) strategies, which is a simplified version (9).

The successful revival of a newborn requires the fundamental elements of collaboration, guidance, and effective exchange of information (5,12). A global priority is to provide adequate NR training to frontline health care personnel (13,14). The European Resuscitation Guideline suggests that there should be more frequent scheduling of structured suggestions for NR training than once annually, though the most favourable duration is yet to be identified (12).

To prevent newborn deaths and avoid unnecessary hospitalization, it is crucial to perform neonatal resuscitation correctly. However, maintaining these skills can be challenging, especially in settings where providers attend few deliveries, have limited opportunities to resuscitate newborns, and lack access to refresher or pre-service training. This is particularly true in resource-scarce settings like Ethiopia. Studies show that NR skills deteriorate rapidly after initial training (1,15,16).

Health science graduating students who will work in the area must be well trained in the updated guidelines to perform effective practice and saves the lives of newborns in early life. Various factors, such as provider characteristics such as level of education, work experience, and field of speciality, with institutional characteristics such as pre or in-service training, presence of guidelines/manuals, and equipment, influence health professionals' competency in NR and thus with their outcome (17,18).

1.2. Statement of the problem

In 2020, around half (47%) of all under-5 deaths occurred in the newborn period, an increase from 1990 (40%), because the global level of under-5 mortality is declining faster than that of neonatal mortality (2). World-wide under-five mortality rate was 93 deaths/1000 live births in 1990 and decreased to 21-32 deaths/1000 live births in 2020(2,19).

Even with this accomplishment, newborn mortality rates remain the main contributor to <5 mortality, increasing from 41%-46% of all <5 deaths from 2000 to in 2020(2,19,20). In the first week of life, 25% of neonatal deaths take place. Nearly half of all mothers and newborns in underdeveloped nations do not receive skilled postpartum care. When given at birth and during the first week of life, known, efficient health measures can avert up to two thirds of neonatal deaths (21).

As WHO and UNICEF report, around 2.4 million of children died in the first month of life globally in 2020, with 43% of all newborn deaths occurring in sub-Saharan Africa, including Ethiopia. The region currently bears a heavy burden (2,19). Central and southern Asia come in second with 23 deaths per 1000 live births, accounting for 36% of all newborn deaths worldwide (2,19,20,22–24). Around 75% of newborn deaths are attributable to illnesses that may be prevented and treated, including premature birth, complications during labour, such as asphyxia, and neonatal infections (25,26).

Globally, asphyxia is the main leading cause of newborn death and illness (20,27,28). Based on the report of WHO in 2022, about 1/4 of worldwide newborn deaths are mainly by asphyxia. From WHO report in 2022, it is responsible for 23% of neonatal death and 11% of all <5 mortality (2,19). Asphyxia accounts for 700,000 death per year (29) according to the report of the Global Development Alliance (GDA) so it has an overwhelming effect on neonatal survival..

Other than asphyxia's had a shattering effect on newborn mortality and morbidity, skill in NR had remained a main challenge (30). Many newborns in developing countries die unreasonably by asphyxia because health care providers do not have the knowledge and skill/practice to give basic resuscitation (31). HCP had a considerable knowledge and skill gap in all areas of resuscitation (5,6,32,33). Inadequate knowledge in identifying asphyxia and poor skill in NR had contributed to major gaps in the quality of services(34). This suggested that a lack of skill in NR is one of the obstacles to saving the asphyxiated newborn.

In an experimental study conducted to assess the efficacy of the pedagogical framework in NR skill learning in a resource-limited setting in Zanzibar among 3rd and 4th year nursing students, it was found that students trained in the traditional method of teaching lack skill and have a skill gap compared with those trained in the six-step pedagogy type (Learn, See, Practice, Prove, Do, and Maintain) (35).

As quoted by Amuchou S. Soraisham about the recent update on NR, there is a knowledge gap about cord management for nonvigorous infants, the impact of routine use of the echocardiogram (ECG) during resuscitation, optimal oxygen management during and after resuscitation, optimal timing and dosing of medication and volume expanders, the role of briefing and debriefing on team performance, and exploring the factors that could optimise post resuscitation care (6).

Therefore, those who carry out NR, such as nurses/midwives, public health officers, medical interns, and anaesthetists, are expected to be competent and have the duty to acquire knowledge and skills. These skills should be learned through training during their academic courses. Despite the time, resources, and expenses allocated to such practice, little is known about the outcomes of these educational programmes and whether students' educational needs are met or not; so, further study is needed to examine obstacles contributing to these effects(1).

In accumulation, with checking literature in resource-limited country findings like Ethiopia has also encouraged the investigator to find out if the graduating health science students were actually convinced of the significance of NR. The study, therefore, targets all graduating health science students who are include in newborn care. Therefore, the main aim of this study was to assess the KAP, and associated factors towards NR among graduating HSS (health science students) in Hadiya Zone, southern Ethiopia.

1.3 Significance of the study

To achieve sustainable development goals (SDG) in 2030, all countries should reduce neonatal mortality to 12 per 1,000 live births and under 5 mortality to at least as low as 25 per 1,000 live births(36,37). NR skills is of crucial importance, along with access to basic equipment to save the life of millions of newborns (15,38,39). Improving the newborn resuscitation skills of care provider is important in addressing this challenge (40).

To have a sufficient effect on neonatal death and illness due to asphyxia, graduating health science students' are expected to have appropriate KAP towards NR and should provide successful procedure. Understanding KP of HCPs on NR is very important because KP change over time as new evidence arises. Therefore, it is important to conduct regular and continuous assessment of KP to keep them congruent with the current KP. The finding from this study have to generate information:

- **For health science students:** the findings of study will provide empirical evidence to increase quality of service and strengthen the existing intervention that improves the NR KAP with associated factors.
- **For policy makers:** Neonatal and child health program managers develop a national strategy for health science education, practice, for development of well standardized and updated guideline and training manual about NR, and for review of curriculum, for the development of pre/in-service training of health science students and for CPD (continuing professional development) in effective NR.
- **For researcher:** The result will be used as a baseline data for future research or may inspire future research into the standardization of the best NR tool for skill in health science collage of Hadiya zone, south region.

2: LITERATURE REVIEW

2.1 General summary about newborn resuscitation

As per the guidelines provided by AHA and WHO, NR is a set of actions taken to aid the respiratory, circulatory, and breathing functions of a newborn from birth up to 28 days of age. Roughly 10-15% of newborns require basic resuscitation measures that include stimulation, suctioning, and BMV (Bag Mask ventilation), while about 1% need advanced resuscitation techniques to survive (3,4,32). The process commences promptly with an evaluation of the new-born's condition and progresses to the provision of stimulation, suctioning, BMV, ventilation, chest compressions, and the administration of appropriate medication and volume expanders (5,12,32). Between 2012 and 2017, skilled health personnel assisted in nearly 80% of all live births worldwide(41).

It is estimated that approximately 10% of newborn infants need help to begin breathing at birth (32,42,43) and approximately 1% need intensive resuscitative measures to restore cardiorespiratory function (44). The neonatal mortality rate in the United States and Canada has fallen from almost 20 per 1000 live births in the 1960s to the current rate of approximately 4 per 1000 live births (45,46). In Ethiopia it was 30 deaths per 1,000 live births thus increasingly accounting for a larger proportion of the under five deaths (47). The inability of newly born infants to establish and sustain adequate or spontaneous respiration contributes significantly to these early deaths and to the burden of adverse neurodevelopmental outcome among survivors. Effective and timely NR at birth could therefore improve neonatal outcomes further (6,12,32).

Having skilled healthcare providers is extremely important in reducing neonatal mortality and morbidity caused by asphyxia. A healthcare provider who is well trained and skilled in resuscitation can successfully revive around 84% of asphyxiated neonates. While trained and skilled healthcare providers can prevent approximately 30% of all newborn deaths through resuscitation, only a small fraction of neonates have access to this intervention (48). It's crucial to have a systematic understanding of resuscitation procedures in newborns and recognize when they should be performed to minimize the possibility of complications. Neglecting to provide proper resuscitative care leads to preventable high neonatal mortality rates (49).

It's expected that all healthcare providers in birthing services have the capability to resuscitate neonates in case of an emergency. Immediate and efficient action is crucial in such situations. (50). The capacity to carry out successful NR during an emergency situation is referred to as preparedness for NR. This entails utilizing the most up-to-date scientific information to conduct resuscitation effectively. Effective resuscitation necessitates the use of both knowledge and expertise, as well as continual monitoring of the infant's condition during the incident. A strong foundation of knowledge, recent experience practicing skills, and confidence in their implementation are all required (50).

A study conducted in Nepal reported that an analysis of studies on facilities revealed that the inclusion of basic NR in addition to stimulation resulted in a 30% decrease in neonatal deaths related to childbirth, with a relative risk of 0.70 and a 95% confidence interval of 0.59-0.84 (52). The study also indicated that immediate evaluation and stimulation of newborns led to a 10% decline in intrapartum-related deaths and a 10% reduction in deaths of premature babies(51).

Cross-sectional study conducted in eastern Ethiopia about skill retention of NR by nurses and midwifes working in selected health institutions described that only 48 (11.2%) had good skill retention about NR (1). Based on this and other supportive evidences about NR identifying the knowledge, skill and factors toward effective performing of NR among health science students were also important.

However NR have such very important and crucial role in saving life of newborn with complication and who needs resuscitation but also it have some negative effect in neurodevelopment, mortality and morbidity. Study done in Canada about neonatal outcomes following extensive cardiopulmonary resuscitation (CPR) in the delivery room for infants born at less than 33 weeks gestational age found that there is association between NR, birth weight, gestational age and morbidity, mortality and neurodevelopment of the newborn and described as in infants born below 1kg NR is associated with risk of mortality as 2.09 and 1.39, Broncho pulmonary dysplasia of 2.14 and 1.25, pneumothorax about 3.11 and 1.53, intestinal perforation 3.47 and 1.46 in below 1kg and above 1kg respectively all in adjusted odds ratio (52).

Experimental study about the short term outcome of neonatal resuscitation conducted in Texas with Cleveland clinic found that there is significant neonatal outcomes like respiratory support

at 28 days, days to full oral feeds and length of stay with the intensity of delivery room resuscitation among 186 (2.7%) from total of 7014 study infants (53).

Effective resuscitation involves application of knowledge and skill, including ongoing reassessment of a new-born's status in the real-time of an event. A solid knowledge base, recent practice with skills, and comfort in their application are necessary for each team member, as individual provider performance will impact the function of the overall resuscitation effort (50).

2.2. Knowledge of health science students' on newborn resuscitation

Having care providers who are competent and knowledgeable in neonatal resuscitation is essential for saving the lives of newborn babies. Unfortunately, recent studies have found that there are significant gaps in the knowledge and competency of care providers, including students, in all aspects of neonatal care and resuscitation (1,6) but some studies have identified there is no more in gap competency or have said that the health professionals knowledge and skill about NR were sub standardized (54,55).

Neonatal resuscitation knowledge needs the care giver readiness to perform the procedure and it needs the ability to perform effective neonatal resuscitation based on the best current scientific knowledge whenever a NR event occurs. Study done about the care giver readiness in rural hospital by university of Alabama in Birmingham found average Neonatal Resuscitation Index (knowledge) score of 69% and recommended that many skills needed for full resuscitation had not been performed by rural providers (50).

In congruent with readiness, preparedness of health care worker about the procedure is also main role of health professional who performs neonatal resuscitation, one descriptive study about the health care professionals preparedness for the procedure done in Nigeria, from total of 106 primary health care workers mainly doctors and nurses, described that all health care workers had resuscitated newborns but only 58 (57.4%) had ever used a bag and mask, 53(50%) used stethoscopes (56).

Study conducted in Côte d'Ivoire by Cisse Lassina found that out of 253 participants, 75% had knowledge for new-borns' care acquired during initial training and 95.6% knew about the golden minute. However, the study noted inadequacies in the recognition of risk situations, useful equipment and in the execution of NR steps among the participants (57).

A research conducted in Kenya examined healthcare providers' understanding and familiarity with NR and it found that the majority of the participants (85.4%) had some knowledge of NR, but only 23 out of 192 participants had received formal training. After a brief 3-hour training session, only 68 participants (35.4%) scored above 85%, and most of them (70%) believed that their knowledge of NR was inadequate. The inadequacy of their knowledge was attributed to insufficient medical training programs, as described by Murila and colleagues (58).

Not only knowledge of neonatal resuscitation it should be retained in for the future work. Health care workers knowledge and its retention toward neonatal resuscitation was seen in some study from them one study in Nigeria described that the mean baseline knowledge scores toward neonatal resuscitation were 35.22% SD of 12.90% before giving training and it was increased to 81.48% SD7.05% immediately after training and at three months, it decreased to 55.37% SD of 20.50% and at six months it was 55.77% SD of 14.28% with the p value of 0.0001 (59). In this study the knowledge was rechecked after six month by giving immediate training and it was increased to 94.91 with SD of 7.28% in this study (59).

There is no study done among health science students like nurses, midwifes, medical interns, anaesthesia and public health officer in common about NR but in one quasi experimental study done in third year nursing students in Pradesh India about the knowledge of neonatal resuscitation found that 46.66% of the students scored average grade in pre-test before the experiment and in the post-test 71.66% scored that they have good knowledge about NR, in this study the experiment was done via video assisted teaching about NR (21).

Another experimental study done on nurses students found that from experimental group pre-test conducted among 30 subjects, 04 (13.33%) had poor knowledge scores and 26 (86.66%) have average knowledge scores and after demonstration post-test was done and 11 (36.66%) had good knowledge scores and 19(63.33%) had average knowledge scores from total of 30 experimental group participant nurse students (60).

Similar supporting study about the knowledge and skill of health professionals done in Western Ethiopia in Gonder university found that the overall knowledge about neonatal resuscitation in health professionals was poor which is less than 80% or 19.9 with SD of 3.1 from total of 46 question about the knowledge (54). In this study pediatrics residents scored higher than midwives and nurses from total of 46 knowledge question and it 21 out of 46 whereas nurses

scored 16 and midwifes 13 out of 46. The average correct answer was 50-79% for 13 questions in this study and focused on suctioning mouth and nose, baby skin to skin contact, drying and wrapping BMV, positioning and functioning of mask and other basic knowledge questions were illustrated in this study (54).

Other study among HCW in south Wollo Ethiopia 96 (67.1%) had poor knowledge scores toward neonatal resuscitations. The minimum and maximum knowledge scores of the participants toward neonatal resuscitation were 8(29.63%) and 25(92.59%). Out of 92 midwives, more than two-thirds of 69.6% had poor knowledge score similarly out of 30 BSC nurses two-third (66.7%) had poor knowledge score toward neonatal resuscitation(61).

Pre and post study focused on final undergraduate anaesthesia students about the effect of simulation based neonatal resuscitation found that pre intervention knowledge was 90.2%, and post-intervention was 94.1% and the study recommends that students should take at least simulation based training at skill laboratory timely (62).

2.3 Attitudes of health science students' on neonatal resuscitation

Attitude can be defined as the way health science students perceive neonatal resuscitation or it can be an individual's optimistic or pessimistic belief about carrying out a specific action. This belief is influenced by the participant's thoughts about the behavior and the anticipated outcomes. Therefore, the individual's evaluation of a particular behavior shapes their attitude. Additionally, the attitude is dependent on the consequences that may follow the behavior.(63).

The subjective norm refers to the combination of normative beliefs and the willingness to conform with them. Essentially, it pertains to how societal pressures affect a person's behavior. This psychological principle showcases how an individual's convictions about a certain issue impact their motivations and actions. Moreover, how a person perceives their control of a certain behavior is largely influenced by their attitudes towards the action and the circumstances that surround it (64).

About the attitude or perception health science students, there is one qualitative study about the perception of midwifery students tailored that a significant need for simplified guidelines for midwifery students, the use of innovative methods to increase midwifery students' competency, and facilitating a supportive culture to manage newborn resuscitation (65).

This study showed that the current neonatal resuscitation standards are confusing for clinical midwives to follow methodically because they are too complex and have too much jargon. Participants in this survey also requested that the guidelines be printed as a pocket version. They were certain that these components, especially the simplification of the rules, would improve the capability of midwifery students to handle neonatal resuscitation. This study is unique and provides fresh understanding of the requirements for midwifery expertise in NR (65).

Other supporting evidence about attitude toward NR on health science students found that even when the midwives reported improved knowledge, confidence and skills, they still felt unprepared for newborn resuscitation, and requested a newborn resuscitation programme to strengthen their knowledge and confidence and moreover, in this study the authors report that there is requested active participation in simulations, to learn from each other in a collaborative approach from midwives students (66).

2.3. Practice of health science students' on neonatal resuscitation

A research study done in Iran involving 48 nursing and midwifery students used Objective Structured Clinical Examinations (OSCE) to find that 84.6% of the students had insufficient knowledge of neonatal resuscitation. Their average score was only 41%, which is less than half of the total score. According to the results, the students' skill was determined to be 38%, 39%, 20%, 72%, 45% and 29% for the fundamental steps of resuscitation, PPV, intubation, chest compression, medications, and for advanced resuscitation respectively (67).

According to a study conducted in Baghdad, it was discovered that out of 40 nurses at a delivery unit, 30% exhibited inadequate practice and 70% demonstrated acceptable practice in regards to neonatal resuscitation. However, none of the nurses showed good practice in this area (68). A study conducted in Nigeria showed that a mere 10% of nurses responsible for managing asphyxia implemented adequate high-level practices(69). It suggests that the elevated rate of newborn deaths caused by asphyxia could be linked to inadequate resuscitation techniques.

In practice issue among nursing staffs in Sri Lanka discovered that nurses have insufficient training in the preparation of resuscitation materials, with a majority (79.3%) having no knowledge of how to perform PPV or chest compressions, and the few who did, did so incorrectly. Only one or two participants demonstrated proper understanding. Additionally, it

was noted that while nurses had average knowledge from textbooks in the final two steps, they lacked practical experience in their field (55). The aforementioned studies underscore the need to provide nurses and midwives with adequate training and knowledge so that they can perform their duties up to the required standards. It is evident that there is still much to be accomplished in terms of empowering them with the necessary skills and knowledge.

A work conducted in Peru on last year medicine with midwife students about valuating their ability on how to give effective PPV in NR manikins found that 71.4% of students have good practice about how to perform and 21.28% had good knowledge and skill toward the procedure(9). About the practice of HCW in the study done in Kenya by Murilla and colleague when they asked about initial steps in NR, ventilation, chest compression, endotracheal tube(ETT) insertion and giving medicine and fluid, only 2/3rd respondents (35.4%) or obtained a score of 85% and above, the rest getting them wrong from the total of 192 participants (58).

On the other hand randomized control trail study done by Jagdeesh G Hubball in India Bharatesh College about to evaluate HBB programme knowledge and skill regarding neonatal resuscitation by nurse students shows that from the total of 30 participants in the controlled group about the skills of neonatal resuscitation all the subjects had poor skill scores on NR and after skill lab post-test was taken and found that 25 (83.33%) had adequate skill scores 5 (16.66%) attained moderate skill scores from total of thirty (60).

Another supporting study about KP of neonatal resuscitation among pediatrician from Gujarat India found that 88 (69.8%) from total of 142 reported correct KP toward effective BMV with chest compressions. Whereas about 18.3% and 30.2% of answered about use of room air for BMV during resuscitation for KP respectively in labour room. From them 27.8% reported suctioning the oral cavity before delivery in meconium stained liquor, while 38.1% cut the cord after one of birth, and based on this study paediatricians who received NRP training applied the correct technique of tracheal suction more often in instances of nonvigorous newborns compared to those who did not undergo the training(70).

Fatima and her colleagues conducted a cross-sectional study in Kano state, Nigeria that focused on health providers directly involved in neonatal care. Their study aimed to determine the readiness of facility and care providers in regards to neonatal resuscitation. Out of the 111 participants, only 9% believed they had poor knowledge while 3% believed they had excellent

knowledge. According to the study, only a small proportion of participants (5%) demonstrated adequate NR skills with a 92% level of confidence. Furthermore, no factors were found to be linked to this positive outcome (71).

After conducting a study on knowledge and skill retention in South Sudan a year after HBB training, it was discovered that there was a significant improvement in skills from 26.1% before the training to 94.4% after the training. The skills remained at 94.4% after three months but decreased to 77.0% after one year (72).

Cross sectional study in Gonder university hospital of Ethiopia assessed about skill or practice of neonatal resuscitation among nurses, midwives, pediatrics and obstetrics and gynaecology residents and found that average practice score of HCW about NR was 6.8 (SD=3.9) from total of 17 practice related question and the lowest result was 0 and the highest was 17 with the interquartile range of 6 in the 135 study participants (54).

2.4. Factors affecting knowledge, attitude and practice of newborn resuscitation

Although there is proof that NR can enhance neonatal survival rates and decrease stillbirth occurrences, the implementation of the standard NR protocol into daily routines faces difficulties and factors that need to be addressed (51,73). Various studies have demonstrated that it is influenced by diverse factors.

2.4.1 Provider (students) related factors

In the socio demographic factors which affects the neonatal resuscitation knowledge, practice and attitude includes the participants age, sex, marital status, religion and level and back ground of education, year of work or previous exposure. A quasi experimental study on 3rd year nursing students in Pradesh India via video guided study showed the significant association of knowledge of students about neonatal resuscitation with the age of students and described as 21 year old students have good and average knowledge than others but other variables were not significant in this study (21).

The finding from one study about NR training model evaluation in semi-trained birth attendants in Nigeria Oyo state described that from the total of 110 participants 7 of them were male and the rest 103 (93.6) were females and in this study the researcher quote that The profession is more female dominated, and been a community service based, culturally, community people

feel secured and can entrust their own in the hands of female than male gender. They can only allow a female health providers take delivery of pregnant woman and visit their homes and take care of their newborn (74).

Considering educational background a quasi-experimental study conducted in Sudan about training programme for nurses and midwifes regarding neonatal resuscitation found that total of 72% of the respondents had a Diploma degree, 20% had a Bachelor, 6.7% had a Master and 1.3% were Ph.D. holders and in this study the researcher described that there is no significant difference in skill and knowledge as indicated by academic qualifications as compared with other comparative study (75). Also 53.3% of respondents have <1 year of experience.

A study conducted in eastern Ethiopia Afar focused on the knowledge of immediate newborn care among nurses and midwives also looked that, socio-demographic factors that may affect NR are working in a hospital, being female, and having an interest in providing newborn care were positively associated with having adequate knowledge on immediate new-born care. However, having less than 5 years of work experience, having a heavy workload, not being interested in providing immediate newborn care, and working in a health center were negatively associated with good immediate newborn care practices (76).

From the research conducted by Gonder University on knowledge and skills, out of the total 135 participants, 5.9% had diplomas, 64.% had bachelor's degrees, 6.7% had master's degrees, and 23% were residents (54).

2.4.2 Institutional related factors

For effective neonatal resuscitation to be performed the facility should be well equipped and the health care worker should be appropriately trained and should know about the basics of resuscitation protocol. A study in India Gujarat about the equipment fulfilment about 54% of respondents were from NICU with mechanical ventilation facilities was available (70).

Not only equipping the institution but also training the worker about neonatal resuscitation brings significant change, in one meta-analysis study neonatal resuscitation training decreased about perinatal mortality by 37%, 7-day neonatal mortality by 47% and 28-day neonatal mortality by 50% all in 95% confidence interval (77). As European resuscitation council guideline recommends intermittent, infrequent training without interval refreshment leads to

skills decay in neonatal resuscitation and whereas frequent and brief, on-site simulation-based training has been shown to improve patient 24 hr survival in a low-resource setting (12).

A study conducted in Afghanistan regarding the proficiency of healthcare workers in neonatal resuscitation and related factors revealed that the majority (over 90%) of healthcare facilities possessed the necessary equipment such as a sucker, bag and mask for resuscitating newborns. Additionally, more than 80% of healthcare providers had received training on neonatal resuscitation, however, midwives (59%) were more likely to receive this training as part of their pre-service education as compared to doctors (35%) with a significant difference ($p < 0.001$). There were no noticeable differences observed in the knowledge, clinical expertise or level of confidence in performing neonatal resuscitation between doctors and midwives (78).

The study conducted in Edmonton showed that incorporating digital simulation and effective demonstration in teaching neonatal resuscitation skills to healthcare providers can significantly increase their knowledge and proficiency. 50 participants who underwent pre-test, post-test, 2-month and 5-month post-tests demonstrated an overall improvement in correct performance from 42% to 78%, 70% and 80% respectively. This supports the benefits of using digital simulation as a promising approach for frequent neonatal resuscitation training, especially for those engaged in distance-learning applications. The study recommends the use of digital simulation to enhance, retain, and transfer neonatal resuscitation knowledge and skills over time (79), and simulation based class has also main positive effect or it improves the students self-efficacy skill and clinical performance among nursing students(80,81)

Study done in Nigeria about awareness of primary health care giver described that 19(17.9%) from total of 106 participants had described that there is resuscitation protocol in their facilities. 15(53.6%) health centres had functional newborn bag and masks, 11(39.3%) had suction machines which is electronic and 5(25%) had empty oxygen cylinders (56).

A study evaluating the readiness of facilities found that 38% of respondents rated their facilities as average in terms of preparedness, while 28% rated their facilities as poorly prepared. The overall score for neonatal resuscitation preparedness was 45.8%, with each of the three domains assessed scoring below 50% on average for the measured indicators (71).

Cross sectional study in eastern Ethiopia east hararghe describing about the relationship of health institution quality with neonatal resuscitation knowledge retaining among health

professional as 97.4%, 63% and 85% of health facilities had neonatal resuscitation corners (NR area), adequate newborn resuscitation guidelines, and essential equipment for newborn resuscitation, respectively. Regarding health care provision facilities, 333 (78%) midwives and nurses were from hospitals and the remaining 94 (22%) were from health centers (1).

2.5 Conceptual framework

Diagram describing about the conceptual frame work which relates neonatal resuscitation knowledge, attitude and practice with the associated factors which was collected from many literatures described above (1,51,82,56,70,71,73,76–79).

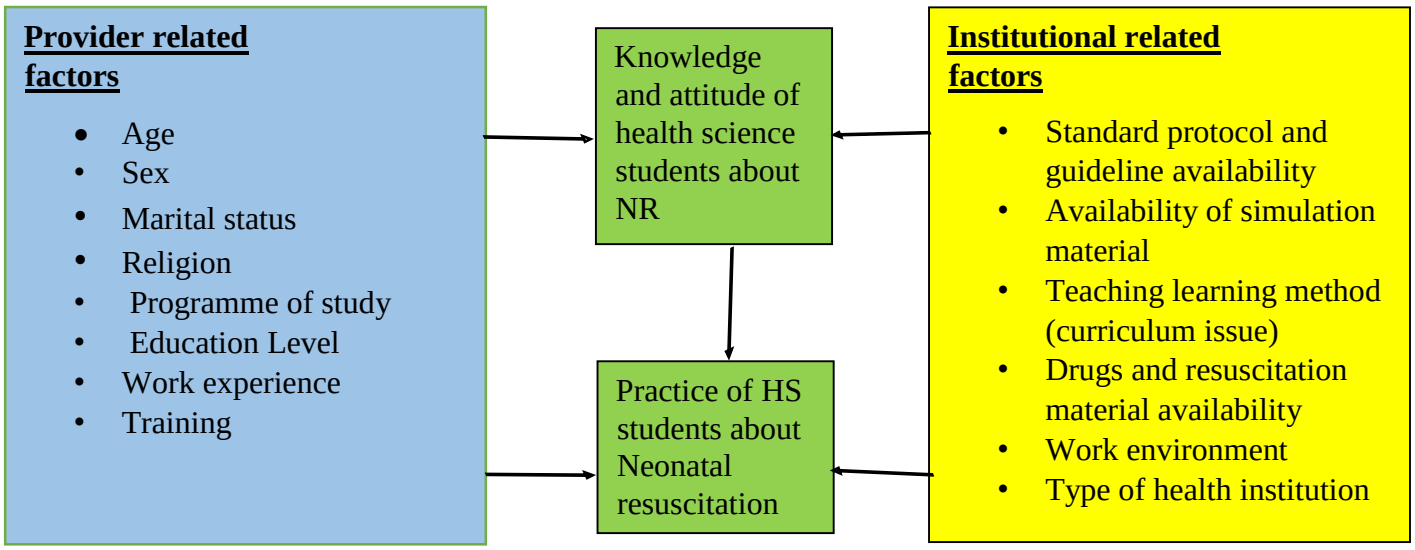

Figure 1: Conceptual framework; reflecting relationship among KAP and associated factors concerning NR among graduating class health science students developed by reviewing several literatures.

3: OBJECTIVES

3.1 General objective

- To assess the knowledge, attitude, practice and associated factors about neonatal resuscitation among graduating health science students of health science colleges in, Hadiya Zone Southern Ethiopia 2023.

3.2 Specific objectives

- To describe the graduating health science students' knowledge toward neonatal resuscitation among graduating health science students of health science colleges in, Hadiya Zone Southern Ethiopia 2023.
- To explore the graduating health science students' attitude toward neonatal resuscitation among graduating health science students of health science colleges in, Hadiya Zone Southern Ethiopia 2023.
- To determine the graduating health science students practice toward neonatal resuscitation among graduating health science students of health science colleges in, Hadiya Zone Southern Ethiopia 2023.
- To identify associated factors of knowledge, attitude and practice toward neonatal resuscitation among graduating health science students of health science colleges in, Hadiya Zone Southern Ethiopia 2023.

4: METHODS AND MATERIALS

4.1 Study area

The research was conducted in health science collages in Hadiya Zone, Southern Ethiopia. Hadiya Zone is surrounded by on the north by Gurage Zone, on the northeast by Silte Zone, on the east by Halaba Zone and Wolaita Zone, Kembata Tembaro Zone on south, on south west by Dawro Zone, and on the west by Omo river which separates it from Oromia region and Yem special Woreda. Hadiya Zone has 9 districts and 2 administrative cities named as shone and Hossaena town. In geographical coordinate the Zone lies between 7° 39' 59.99" N latitude and 37° 44' 59.99" E longitude. Hossaena is 191km away from Addis Ababa capital city of Ethiopia and 148km far from Hawassa capital city of south nation nationality and people's regional state. According to 2007 Population and housing census projection result and their progression, the total population of the Zone in 2014 was 1,231,196, of whom 612,026 are men and 619,170 women (83). Hadiya Zone has one University with Collage of Medicine and Health Science named Wachemo University (WCU) and one Health Science Collage in Hossaena town.

Wachemo University which was established in 2003/2011 and know it is giving multiservice to the community also have three campuses main campus and Wachemo University Nigist Eleni Mohamed Memorial Comprehensive Specialised Hospital (WUNEMMCSH) in Hossaena town and its third campus in Durame town. The WCU have seven collages and under these have respective schools and departments. From this CMHS (College of Medicine and Health Science) is the one and has four school and seven departments (Nursing, Medical laboratory, Midwifery, Medicine, Pharmacy, Anaesthesia, Public health officer).

Hossaena Health Science College was established in 1999 E.C and know it is giving service to the community by producing educated personnel and puts its part in increasing health quality system of Ethiopia. The college has six departments in diploma level I-level IV in Nursing, Midwifery, Pharmacy, Medical Laboratory, Emergency medical technician and Health extension worker and have also degree in nursing and midwifery.

4.2 Study design and period

Institutional based cross sectional study was used and study was conducted from February 27-March 27 2023 at Wachemo University College of medicine and health science and Hossaena Health Science College.

4.3 Population

4.3.1 Source population

All health science students from five departments in health science colleges of Hadya zone

4.3.2 Study population

The graduating students of midwife, nurse, medical intern, public health officer and anaesthesia in health science colleges of Hadiya Zone Southern Ethiopia, 2023

4.3.3 Sample population

Each randomly selected graduating health science students of Hadiya Zone Health Science Colleges who meets the criteria of inclusion.

4.4. Eligibility criteria

4.4.1. Inclusion criteria

All graduating students from medicine, nursing, public health officer, midwifery and anaesthesia and avialable during data collection time.

4.4.2. Exclusion criteria

Students who were not registered for their final class in the included departments and health science students from other department who was not fulfilled inclusion criteria and absent/ not available during data collection time.

4.5 Sampling method

4.5.1 Sample size determination

Single population proportion formula was used to calculate the sample size (84). Since, no study was conducted in anywhere on KAP of graduating health science students toward NR, 50% of proportion was used in significance level of 5% or α of 0.05), in 95% confidence interval or $Z_{(\alpha/2)}$ of 1.96 with 0.05(5%) margin of error or absolute precision is assumed. The sample size

was determined by using the formula for calculating a single proportion formula as $n_i = \frac{(Z(_a/_2)^2 \times P\,(1-P))}{d^2}$.

Where n_i = initial estimated sample size

Z = standard score corresponding to 95% confidence interval 1.96

P = proportion/prevalence of KAP of health science students on neonatal resuscitation

d =the margin of error (precision) 5%

$$n_i = = \frac{(Z(_a/_2)^2 \times P\,(1-P))}{d^2} = \frac{(1.96)^2 \times 0.5\,(1-0.5))}{0.05^2} = \mathbf{384}$$

Since the total population (health science students learning in Hadiya zone health science colleges) WCUCHMS and Hossaena health Science College were **392** which was less than 10,000, the adjustment formula was used**:**

$$n_f = \frac{ni}{1+ni/N} = \frac{384}{1+\frac{384}{392}} \approx \mathbf{194}$$

Where n_f= final sample size

n_i=initial sample size

N = total population

Considering 10% of non-response rate, a total sample size (n_f) is ≈**213**

4.5.2 Sampling procedure

The number of study participants to be sampled from each department was determined by using proportional site allocation formula from the two health science colleges WCUCHMS and Hossaena health science college and: described by the formula= $\frac{nf \times ni}{N}$ and the samples was taken from seven department by simple random sampling method

Where: n_i =number of students in each department that are selected.

n_f = the sample size finale

N= the total n^{o} of students from the selected department =15+71+130+50+31+53+42=**392**

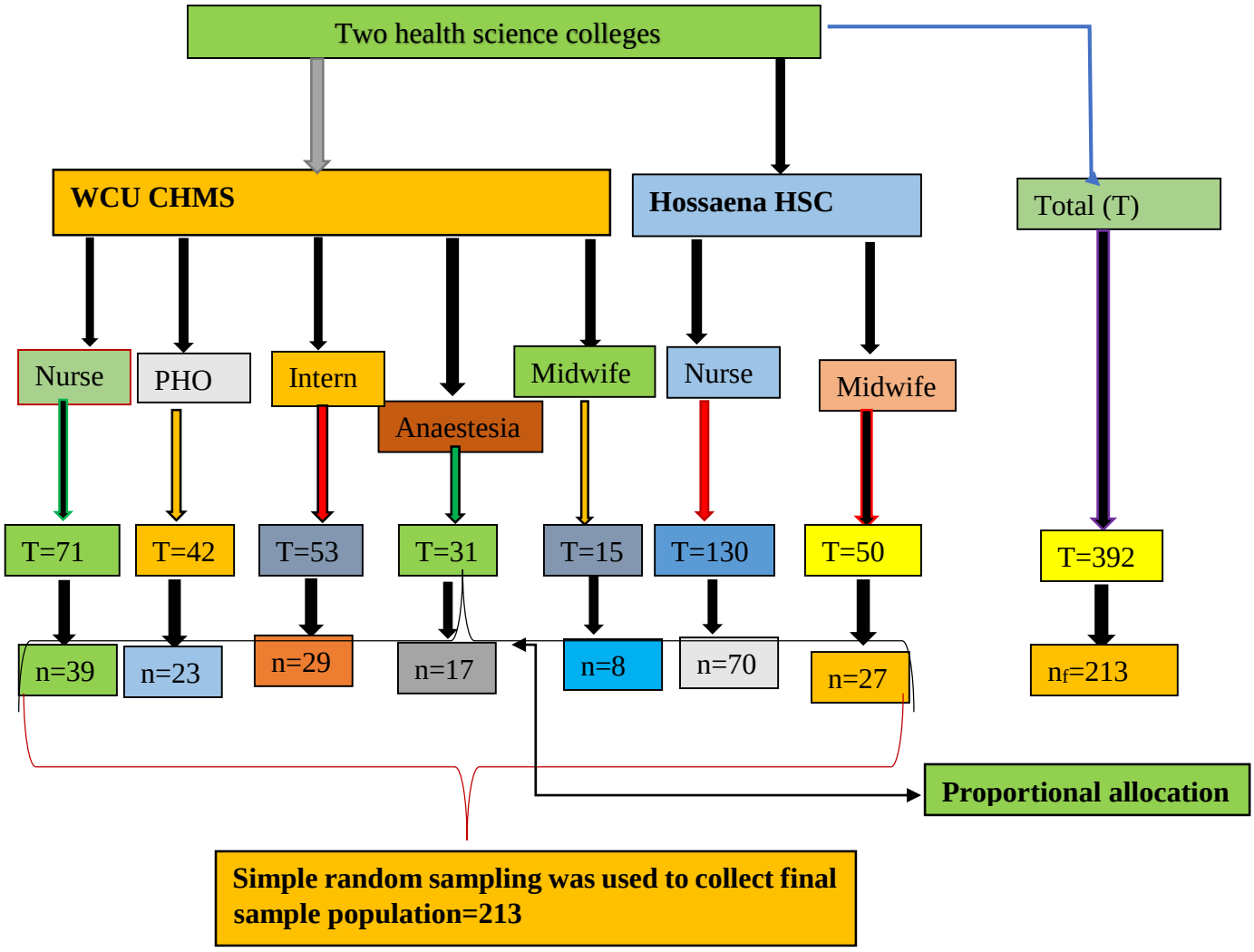

Figure 2: Diagrammatic presentation of sampling procedure for assessment of knowledge, attitude, practice and associated factors toward NR among graduating health science students of Health Science Colleges in Hadiya Zone southern Ethiopia 2023.

- ➔ Nurses from WCU $= \frac{213\times71}{392}$=39 and Midwife from WCU$= \frac{15\times*213}{392}$=8
- ➔ PHO from WCU$= \frac{42\times213}{392}$ =23 and Medical interns from WCU$= \frac{53\times213}{392}$ =29
- ➔ Anaesthesia from WCU$= \frac{31\times213}{392}$ =17 and Nurses from HHSC $= \frac{130\times213}{392}$ =70
- ➔ Midwifes from HHSC $= \frac{50\times213}{392}$ =27

Whereas HHSC---Hossaena health science college
PHO-----Public health officer
WCUCHMS----Wachemo university college of health and medical science

4.6. Variables

4.6.1. Dependent variable

- Knowledge, attitude and practice of neonatal resuscitation

4.6.2. The independent variables

- ***Provider related factors:*** Socio demographic factors and background of education (age, sex, marital status, religion, education level, work experience if any, department or programme of education), knowledge and attitude

- ***Institutional factors:*** Presence of resuscitation tool like warmer/radiant type, BMV tool in diverse size, sucker material with tube, suction bulb of single/multi use type, stethocope, pulse oximetry, oxygen with cylinder, standardized protocol or guideline and drugs, pre-service training of the practitioners, standard of curriculum and well-designed skill lab room with equipments, resuscitation corner, teaching learning method

4.7. Operational definition

Graduating health science students: are under graduate last year students from five departments as anaesthesia, medicine, midwifery, nurse and public health officer.
Knowledge: A know-how (familiarity, awareness or understanding) of students about neonatal resuscitation gained through work in the area or learning (85).
Good and poor knowledge:-Those students who answered ≥ 73.77% (mean) of 24 structured type tool for knowledge were considered having good knowledge the one who scored below 73.77% (mean) were considered poor knowledge (1,54,61)
Attitude: Is views or perceptions of health science students towards neonatal resuscitation.
Participants with score of mean or above the mean finding were took as having positive attitude or and those whose finding was < mean score were considered as with negative attitude for NR.
Practice: Students' activities or skill in relation to neonatal resuscitation.
Good and poor practice:-Those students who answered ≥ 69.95%(mean) of 21 structured type tool for practice were considered having good practice the one who scored below 69.95% (mean) were considered poor practice were considered as having good practice of NR (1,54,61).
Neonate: Newly delivered alive human being with in first 28 days of life.

4.8. Data collection tools with procedures

4.8.1. Data collection tools

A structured questionaries' with self-administered type was used for data collection. Was from a past study conducted on similar title and updated guidelines from AHA, APA and ILCOR (1,3,4,32,33,61) and which are valid as well as reliable material and adapted type. After testing the tool for validity and reliability by experts, it fit with the aim of this work and also matching with the health care educational strategy of our country.

The tool consists of five areas. The 1st part was about data concerning sociodemoghraphic characteristics of students like: religion, sex, training, age, work experience and field of study.

The 2nd part is regarding Knowledge of students' about neonatal resuscitation and was composed interrogative knowledge questions, whereas the third part contains students Attitude toward neonatal resuscitation and it was made from words in Likert Scale. The fourth part was regarding students practice toward neonatal resuscitation which was prepared from checklist and guidelines from above sources, collection was through self-administered question and in last whereas the fifth part was regarding about associated factors toward neonatal resuscitation.

4.8.2. Data collection procedure

Collection date was held on from February 27-March 27, 2023, after permission from the two institutions or WUCHMS and HHSC by letter of ethical issue obtained from AAU, nursing school with clearance letter of Ref./CHS/NSG/155/2014/22. The data collected by technical assistant nurses, were 4 in number, trained for 1 day, from both colleges & were appointed in both colleges and was supervision was by the researcher.

The researcher makes the overall daily based supervision. The aim and the training part of the data collectors was the aim and methods of the study, way of collection. All data collectors check the questionnaire from the individual sample for wholeness on daily. Checking of all the questionnaires on each day morning was also done by the researcher for the neatness, completeness and then correction was also done, necessary comments and feedbacks was also given to the data collectors in coming day early morning. During the data collection process, unique codes were assigned to questionaries' and this allowed for easily identification and tracing of any errors that were identified in the data, using the assigned codes.

4.8.3. Data quality control

To ensure the quality of the tool, a group of five expert clinicians, researchers, and academics examined and evaluated its content for validity. This resulted in a content validity index of 0.79, and their valuable suggestions and recommendations were incorporated. During the data collection period, the completeness of the data was checked daily by the data collector, their supervisor, and the principal investigators. Prior to the actual data collection, a pre-test was performed on 5% of the students who qualified, to ensure data quality, and it was taken out in Wolaita Sodo University and the questionnaire was made clearer and more consistent based on the results of the pre-test. The reliability of the tool was also evaluated and resulted in a Cronbach's alpha of 0.79. Data collectors were chosen from two colleges and were assigned in reverse order to collect data.

4.9 Data analysis

Following the collection of data, every survey was reviewed to ensure its completeness and assigned a code before entering the data. The information was organized, refined, scrubbed for incomplete (missed) values, and then recorded (entered) into Epi data version 3.1. Finally, the recorded data was exported to SPSS version 26(86) for further analysis. Categorical variables were analysed using frequencies and percentages, while continuous variables were analysed using means and standard deviations. Likert scale was used to analyse attitude question.

The normality of continuous variables was tested using the Shapiro-Wilk test, and all variables had P values > 0.05, indicating that the null hypothesis could not be rejected.

A logistic regression model was used to determine factors associated with the outcome variables. Bivariable analysis was conducted to identify variables associated with the dependent variable individually, with variables having a p-value < 0.25 being moved to multivariable logistic regression to control for potential confounders. Finally, variables with a significant association with the KAP of health science students on neonatal resuscitation were identified using Adjusted Odds Ratio (AOR), 95% Confidence Interval (CI), and a p-value < 0.05.

Multicolinearity was assessed through variance inflation factor (VIF) and tolerance tests after regression analysis, with VIF (variance inflation factor) values close to 1 and tolerance values above 0.1 indicating the absence of confounding among variables. The Hosmer and Lemeshow

goodness of fit test was conducted to evaluate model fitting, with p-values greater than 0.05 (0.43, 0.613, 0.15) for knowledge, attitude, and practice, respectively, indicating good model fitness for the variables

4.10. Ethical consideration

The research study obtained ethical approval from the Institutional Research Ethical Review Board (IRERB) of the Health Science College of Addis Ababa University, specifically from the School of Nursing and Midwifery. Following the ethical clearance, the researchers obtained a permission letter from the same school of Nursing and Midwifery to CHMS in Hadiya Zone as of WCUCHMS and HHSC before the data collection period for acceptance.

The purpose of the study was explained in order to obtain agreement and cooperation to college dean and head of the department. Once permission was granted by the colleges to participate, both verbal and written consent was obtained from the participants, who were also informed that there were no incentives or harms associated with their involvement in the study. Additionally, the participants' identities remained anonymous during the data collection and analysis process

4.11. Result Dissemination with utilization

The study's results will be presented and submitted to the Department of Nursing at the School of Nursing, CHS, AAU as partial fulfilment for a master's degree in pediatric and child health nursing. Additionally, efforts were made to inform federal institutions such as the Ministry of Health and Ministry of Education, as well as staff, authorities, and officials in HSC in Hadiya Zone to improve intervention and teaching learning processes. The findings were presented at appropriate seminars, conferences, and workshops, and will be accessed through scientific publications for other researchers in scientific journals

5. RESULT

5.1. Students socio demographic with institutional characteristics

5.1.1 Students socio demographic characteristics

The study comprised of 213 individuals who were selected from two different colleges as WUCHMS and HHSC with 100% response rate. Majority of the participants 116 (54.5%) were learning in Wachemo university and their level of education was degree and the rest were diploma from HHSC. From the total participants 100 (46.9%) were male and the remaining 113 (53.1%) were females. Regarding age category the average age of the respondents was 23.70 with the standard deviation of 2.266 and the higher and lower age of the respondents were 30 and 21 years old respectively, **Table1** below.

Table 1: Socio demographic characteristics of participants among graduating health science students in health science colleges of Hadya zone, southern Ethiopia 2023

Variables	Categories	Frequency(n=213)	Percentage
Sex	Male	100	46.9
	Female	113	53.1
Age in years	21-24	150	70.4
	25-30	63	29.6
Marital status	Single	187	87.8
	Married	26	12.2
Religion	Orthodox Tewahido	74	34.7
	Muslim	34	16.0
	Protestant	76	35.6
	Catholic	18	8.5
	Other	11	5.2
Level of education	Diploma	97	45.5
	Degree	116	54.5

Regarding department or programme of study from five departments selected 213 students were involved and they anaesthesia 17(8%), Medical interns 29 (13.6%), Midwifery's 35(16.4%), Nurses 109(51.2%) and Public health officers 23(10.8%) and described **figure 3** below. From total of 213 participants around half or 109 (51.2%) were nurses and from these 70(64.2%) were level IV diploma nurses, 21(19.3%) were Bsc comprehensive nurses and the remaining 18(16.5%) were Bsc in pediatrics and child health nursing students

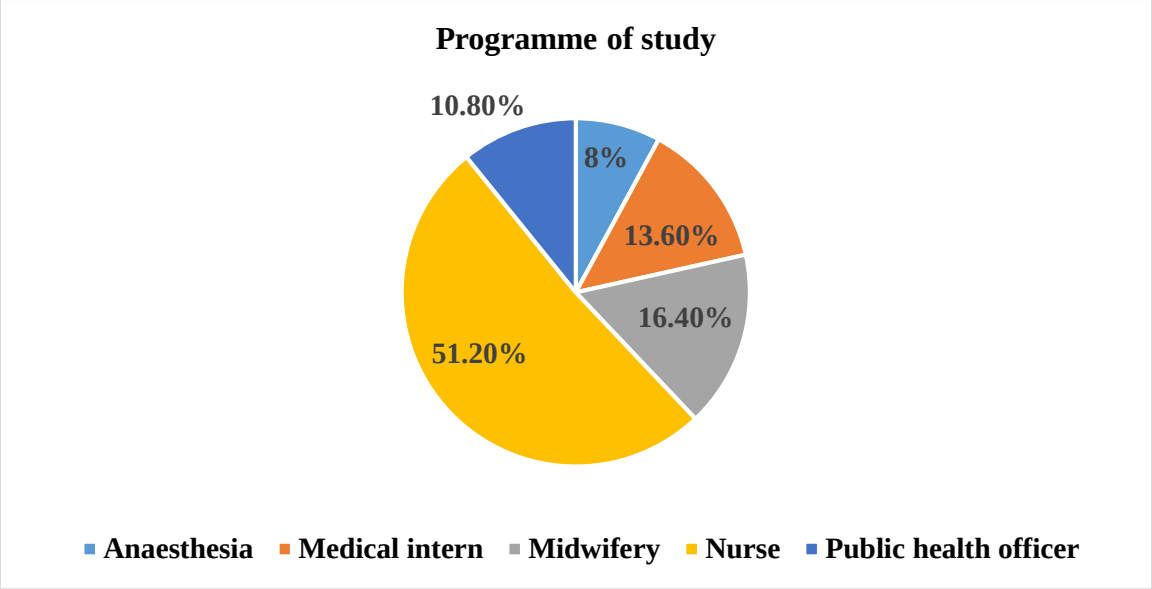

Figure 3 Graduating health science students in their programme of study in health science colleges of Hadiya zone, southern Ethiopia 2023

On the question about year of experience 35(16.4%) from the total participants had any experience which is from three month to 3 year experience, from these participants 27(77.1%) had 1-3 year of experience and the remaining 8(22.9%) had <1 year of experience in the area of neonatal resuscitation. On the other hand about the participants took the training of NR procedure 24 (11.3%) of the participants ever took neonatal resuscitation training procedure. The finding of other participants character about amount of neonate resuscitated by respondents described that the mean neonate resuscitated by the participants was 7.79 (SD=7.242) and the minimum number of neonate resuscitated by respondents was 1 and maximum was 26 and the remaining were described in **Table 2** below.

Table 2: Participants year of experience and training about NR among graduating HSS in health science colleges of Hadya zone southern Ethiopia 2023

Variables	Categories	Frequency(n=213)	Percentage
Year of Experience	Yes	35	16.4
	No	178	83.6
Experience in year category	Less than 1 year	8	22.9
	1 year-3 year	27	77.1
Ever took NR training	Yes	24	11.3
	No	189	88.7

5.1.2 Participants institutional characteristics

In institutional characteristics of participants that describes the level of hospitals that participants were practicing and or had worked/practiced before, from total of 213 participants the highest number of participants were in comprehensive hospital which is 122(57.3%), and the others were in primary and referral hospital level as of 78(36.6%) and 13(6.1%) respectively. The other institutional characteristics were described in the table 3 below, which describes about the institutions or the hospitals were well fitted out with NR material in minimum of the equipments as warmer, bag and mask, machine for suction, single/multi use suction bulb, stethoscope, pulse oximetry, ECG machine, CPAP and needed neonatal resuscitation medications like epinephrine and other volume expanders, presence of guideline, supportive supervision, method teaching learning performing simulation based class before attachment to the hospital was described below in **Table 3**

From the 87 participants who doesn't practiced NR procedure in demonstration which lacks simulation base and full equipments 22 (25.3%) of the respondents said that the problem is due to lack of time and the others 36 (41.4%) and 29 (33.3%) are due to course overload and method of teaching was the main cause of the problem for unable to take simulation based neonatal resuscitation class respectively.

From total participants 187 (87.8%) claimed that there were supportive supervision from institution was present during their hospital practice and the remaining 26 (12%) said no supervision was presented during their practice time.

Table 3:Institutional characteristics of participants toward NR among graduating health science students in health science colleges of Hadya zone southern Ethiopia 2023

Variables	Categories	Frequency(n=213)	Percentage
Level of hospital	Primary hospital	78	36.6
	Comprehensive	122	57.3
	Referral hospital	13	6.1
Hospital fully equipped with the material	Yes	116	54.5
	No	97	45.5
Practiced demonstration or simulation based class before hospital practice	Yes	126	59.2
	No	87	40.8
Hospital have updated neonatal guideline	Yes	139	65.3
	No	74	34.7

5.2 Knowledge level of graduating health science students toward NR

5.2.1 Knowledge level of the students towards NR.

This research had found that above half of the respondents 124 (58.2%) had knowledge score of ≥ mean or good knowledge score towards NR and remaining 89 (41.8%) had poor knowledge. The participants' knowledge scores towards NR ranged from 7 (29.17%) to 24 (100%), with a standard deviation of 3.16. The minimum and maximum scores show a significant difference in the participants' level of knowledge about NR. The standard deviation indicates that the scores were spread out, suggesting a diverse range of knowledge levels among the participants.

The mean knowledge score of graduating health science students of health science colleges in Hadya zone 2023 toward neonatal resuscitation was 17.7(73.77%, SD=13.17%), and based on department level their knowledge score toward neonatal resuscitation was described as: Anaesthesia 18.588 (77.45%), Medical Intern 19.58 (81.6%), Midwifery 17.43 (72.62%), Nurses 17.36 (72.32%) and Public health officer 16.74 (69.74%).

From nurses classification Level IV nurses scored mean score of 16.6 (69.1%), Bsc comprehensive nurses 18.38(76.6%) and Bsc pediatrics and child health nurse 19.16 (79.83%) were the mean score of participants based on their field. Their mean score based on their level of education from total of 213 participants' degree were 116 were degree follow and their mean score was about 18.46 (77.04%) and diploma were 97 and their mean score was 16.76 (69.84%).

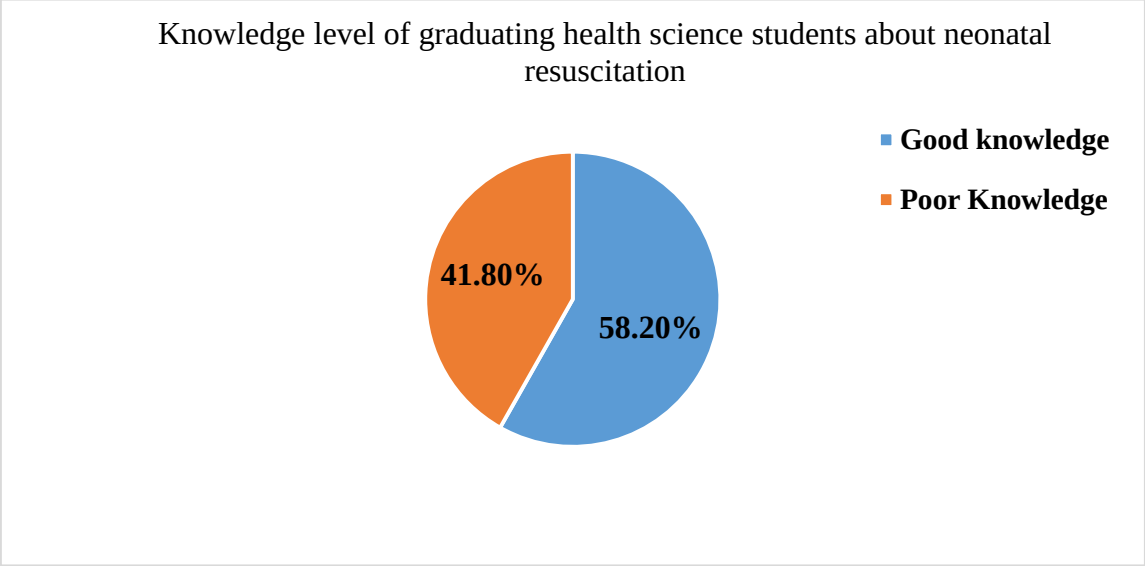

Figure 4: Knowledge level of graduating health science students about neonatal resuscitation in Health science colleges of Hadiya zone southern Ethiopia 2023

5.2.2 Knowledge of graduating health science students about neonatal resuscitation based on their department level.

Based on their response the finding was described as follow. From the total participants around half or 109 (51.2%) were nurses from both degree and diploma from them 49 (45.5%), 60 (55.5%) scored below their mean score or had poor knowledge and mean/above mean or good knowledge score respectively toward neonatal resuscitation.

In addition to the knowledge score described below in table 4, from nurses in their respective classification as Level IV diploma nurses, Bsc. comprehensive nurses and Bsc in pediatrics and child health nurses from total of 70 level IV nurses scored knowledge level of 34.9% and 29.4% as poor and good knowledge respectively. From the total of 21 Bsc comprehensive nurses their knowledge score was 7.3% and 11.9% respectively as poor and good knowledge. The remaining part was from Bsc in pediatrics and child health nursing they are 18 in total and from them 3 have poor knowledge score which is about 2.8% and the remaining 15 had good knowledge score of about 13.8% from the participants and the others were described below in the **Table 4**

Table 4: Knowledge level of participants toward NR among graduating HSS in health science colleges of Hadiya zone, southern Ethiopia with their programme of study, 2023

Field of study/programme	Knowledge level				Total
	Poor Knowledge		Good Knowledge		
	Frequency	Percentage	Frequency	Percentage	
Anaesthesia	5	2.3%	12	5.6%	17(7.9%)
Medical Intern	6	2.8%	23	10.8%	29(13.6%)
Midwifery	17	8.0%	18	8.5%	35(16.5%)
Nurse	49	23.1%	60	28.1%	109(51.2%)
Public Health Officer	12	5.6%	11	5.1%	23(10.8%)
Total	**88**	**41.8%**	**125**	**58.2%**	**213(100.0%)**

5.2.3. Knowledge of graduating health science students about NR based their educational level

In this study total respondents was also included with 100% response rate out of 213 participants 97 were diploma and from them 53 scored poor knowledge score of about 24.9% and good knowledge score of about 20.7% was from 44 students. From total of 116 degree students 36 scored poor knowledge level about 16.9% and 80 scored good knowledge of about 37.60%.

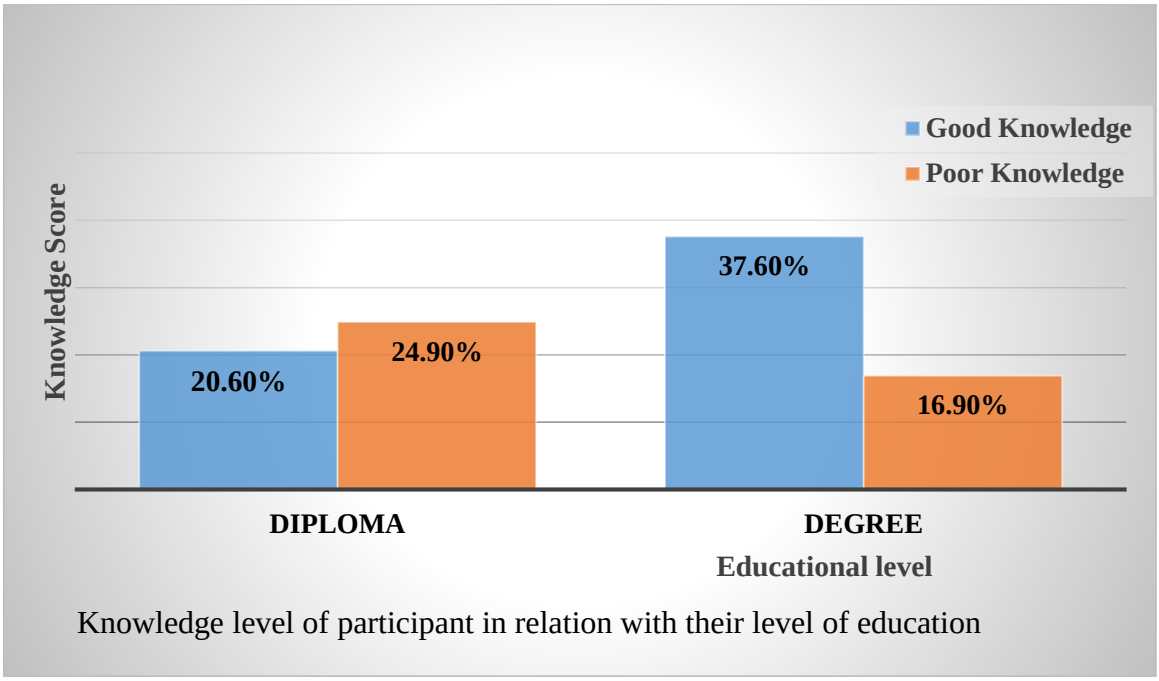

Figure 5: Knowledge level of participants toward NR among graduating HSS in health science colleges of Hadiya zone, southern Ethiopia with their education level, 2023

5.2.4. Students' knowledge level about NR on basic different NR procedures

In this contents students were assessed for their knowledge level about basic steps in neonatal resuscitation procedure. They were evaluated for giving appropriate answer based on the question. From the participants the highest score were the participants that know about recommendation needed for care providers about post NR care and around 193 (90.6%) appropriate answer were given by the participants, and the least were 122 (57.3%) scored appropriate result about the effect of frequent suctioning of neonate during NR procedure. Among different steps of NR procedure knowledge questions above 80% of correct response were given for only 8 out 24 knowledge questions and others are described in **Table 5** below with their frequency distribution and percentages.

Table 5: Knowledge score of participants for basic knowledge questions toward NR by graduating health science students in HS colleges in Hadya zone, southern Ethiopia 2023

Questions	Responses	
	Yes	No
Dry, stimulate and reassess and then suction for limped baby	172 (80.8%)	41(19. 2%)
Sign of shock and history of blood loss for volume expander indication	172 (80.8%)	41(19. 2%)
Slightly extended neck position for resuscitation	160 (75.1%)	53(24.9%)
One min after delivery with no breathing best time to start ventilation	160 (75.1%)	53 (24.9%)
Slapping or flicking the sole of the feet	164 (77%)	49 (23%)
Reapply mask to get better seal when giving BMV if no chest rise	159 (74.5%)	54 (25.4%)
HR<60BPM after BMV indication to start chest compression	174 (81.7%)	39 (18.3%)
Preterm neonate highly develops complication after extensive resuscitation	177 (83.1%)	36 (16.9%)
Dry stimulate before suctioning mouth & nose for apneic baby after birth	170 (79.8%)	43 (20.2%)
Raising HR & audible breath sound as best indicator of effective BMV	147(69%)	66(31%)
10-15 sec expected time that CPR be continued before checking pulse	128(60.1%)	85(39.9%)
Epinephrine as preferred drug during resuscitation	161(75.6%)	52(24.4%)
0.9%NaCL as preferred volume expander	162(76.1%)	51(23.9%)
Tactile stimulation for persistent apnea	159(74.6%)	54(25.4%)

5.2.5 Knowledge level of students about NR among hospital they practice

From this finding from total of 213 (100%) participants were involved and from the total of 78 who were ever practiced in primary hospital 43 had poor knowledge score 20.2% and the remaining 35 had scored good knowledge score of 16.4%. Students who ever practiced and are practicing in comprehensive specialized university hospital scored that 40 (18.8%) and 82 (38.5%) scored below mean and mean or above mean or poor or good knowledge respectively. From total students in referral hospital 7 (3.3%) and 6 (2.8%) scored good and poor knowledge score respectively and their total knowledge score was 58.7% for good knowledge scorer and 41.3% for poor knowledge scorer and it is also described in bar chart below.

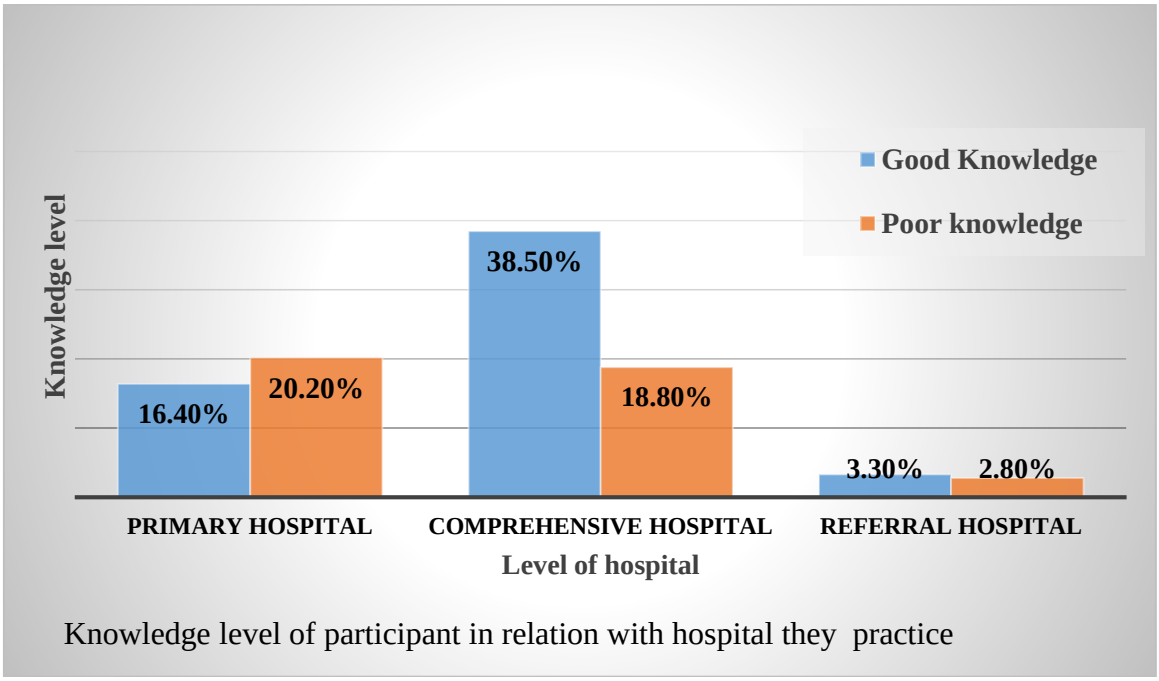

Figure 6: Knowledge level of participants toward NR among graduating health science students in health science colleges of Hadiya zone based on level of hospital, 2023

5.2.6 Factors associated with participants knowledge about NR

According to the bivariable logistic regression analysis, the study found no significant association between the participants' knowledge score and their religion, gender, equipment availability in the hospitals, and attitudes.

In bivariable analysis there were significance association with age, level of education with level of hospital and participants learning through simulation based demonstration and students department were also associated with knowledge of graduating health science students of health science colleges in Hadya zone southern Ethiopia 2023.

Participants' knowledge scores in neonatal resuscitation were significantly associated with their level of education (p=0.012, [AOR: 3.64, 95% CI (1.33-9.9)], age (p=0.002, [AOR: 5.01, 95%CI:(1.83-12.01)], and performing pre-practice classes through simulation-based demonstration (p=0.004, [AOR: 0.377, 95%CI: (0.19-0.73)] in multivariable analysis. Students who did not learn their NR class in the skill lab room without simulation were 62.3% less likely to have good knowledge toward neonatal resuscitation than students who learned by simulation.

Table 6 below describes an analysis of the relationship between independent variables and a dependent variable or "knowledge". The analysis includes both bivariate and multivariate approaches, and the significance of the results is described using crude odds ratio and adjusted odds ratio within 95% confidence interval

Table 6: Bivariable and multivariable analysis for factors associated with knowledge level of participants toward NR among graduating HS students in Hadya zone HS colleges in 2023						
Variables with categories		Knowledge level		COR(95%CI)	AOR(95%CI)	P-Value
		Poor N(%)	Good N(%)			
Age	21-24years	78(36.6%)	72(33.8%)	1		1
	25-30 years	11(5.2%)	52(24.4%)	5.12(2.5-10.6)*****	5.01(1.83-12.01)*	0.002
Sex	Male	48(22.5%)	52(24.4%)	1		1
	Female	41(19.2%)	72(33.8%)	1.62(0.94-2.8)*	1.37(0.7-2.65)	0.36
Programme of study	Anaesthesia	5(2.3%)	12(5.6%)	1		1
	Med intern	6(2.8%)	23(10.8%)	1.6(0.4-6.33)	0.7 (0.15-3.2)	0.66
	Midwifery	17(8%)	18(8.5%)	0.44(0.13-1.5)*	1.07(0.21-5.02)	0.93
	Nurse	49(23%)	60(28.2%)	0.51(0.17-1.5)*	1.04(0.26-3.93)	0.95
	PHO	12(5.6%)	11(5.2%)	0.38(0.1-1.43)*	0.38(0.077-1.86)	0.23
Education level	Diploma	53(24.9%)	44(20.7%)	1		1
	Degree	36(16.9%)	80(37.6%)	2.67(1.5-4.7)*	3.64(1.33-9.9)*	0.012
Supervision	Yes	73(34.3%)	114(53.5%)	1		1
	No	16(7.5%)	10(4.7%)	0.4(0.17-0.93)*	0.84(0.31-2.28)	0.74
Experience	Yes	8(3.8%)	27(12.7%)	1		1
	No	81(38%)	97(45.5%)	0.35(0.15-0.83)*	0.32(0.08-1.33)	0.11
Training	Yes	5(22.5%)	19(22.5%)	1		1
	No	84(39.4%)	105(49.3%)	0.33(0.12-0.92)*	0.82(0.40-9.8)	0.42
Guideline	Yes	51(23.9%)	88(41.3%)	1		1
	No	38(17.8%)	36(16.9%)	0.55(0.31-0.97)*	0.54(0.27-1.06)	0.07
Hospital Level	Primary	43(20.2%)	35(16.4%)	1		1
	CSH	40(18.8%)	82(38.5%)	2.52(1.40-4.52)*	1.73 (0.67-4.4)	0.25
	Referral	6(2.8%)	7(3.3%)	1.43(0.44-4.65)	1.6(0.33-7.67)	0.56
Simulation	Yes	40(18.8%)	86(40.4%)	1		1
	No	49(23%)	38(17.8%)	0.36(0.2-0.64)**	0.377(0.19-0.73)**	0.004

***Key**: *=Significant, **=Highly significant, 1=reference, COR=Crude odds ratio, AOR=Adjusted odds ratio, N (%) = number (knowledge level in percentage, P value<0.05,* CSH=Comprehensive specialized hospital

5.3 Attitude of graduating health science students toward NR

From this study finding participants attitude toward NR was evaluated by 8 attitude question variables which graded from higher to lower as strongly agree (5) to strongly disagree (1) and their mean score was 3.4114 with the SD of 0.54608 and after recoding the participants attitude score was described as 53.1% of participants had good or positive attitude toward neonatal resuscitation and 46.9% was recorded as negative attitude from participants.

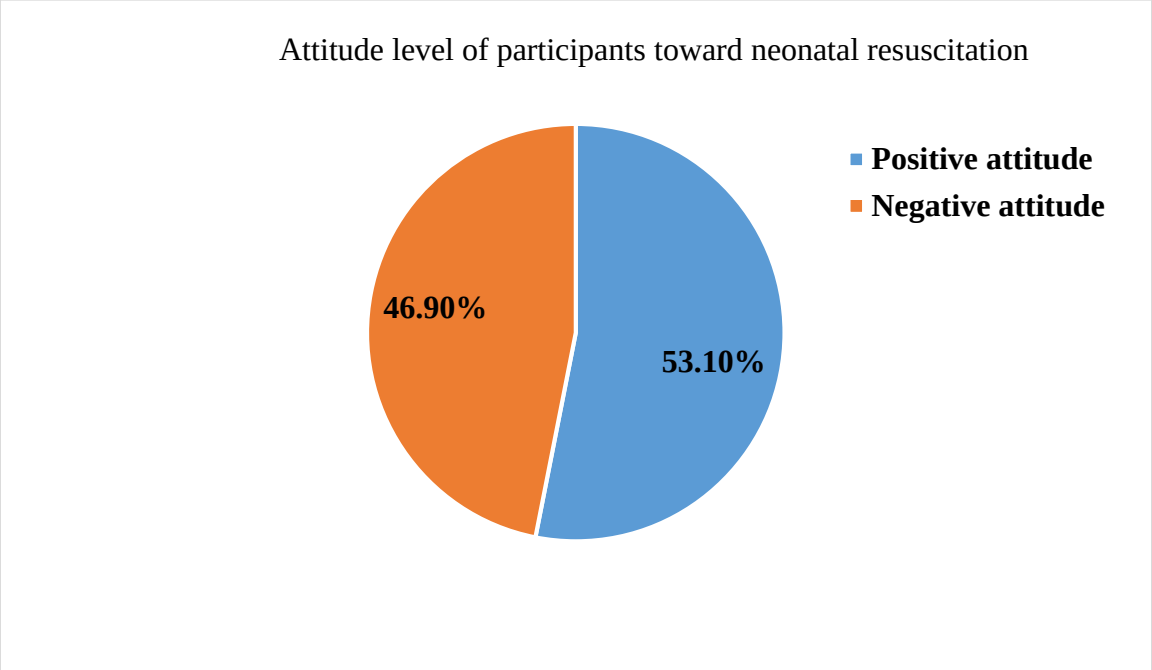

Figure 7: Attitude level of participants toward NR among graduating health science students in HS colleges of Hadya zone, southern Ethiopia 2023

From the study 48 (22.5%) and 52 (24.4%) of males have negative and positive attitude toward NR respectively and 52 (24.4%) and 61 (28.6%) of females had negative and positive attitude toward neonatal resuscitation respectively.

Regarding the participant level of education participants with diploma level has attitude score of 60 (28.2%) and 37 (17.4%) had negative and positive attitude respectively while in the degree students 40 (18.8%) and 76 (35.5%) had negative and positive attitude toward NR among graduating health science students of health science colleges in Hadya zone 2023.

5.3.1 Factors associated with participants attitude towards neonatal resuscitation

In the analysis of how health science students feel about neonatal resuscitation, the logistic regression looked at various factors. The factors examined were sex, age, marital status, work

experience, training in neonatal resuscitation, hospital guidelines, practicing through simulation-based classes, and supportive supervision. However, the results revealed that none of these factors had a significant association with the students' attitudes towards NR.

Other independent variables as religion Protestant and Muslim have no effect on attitude while with or Catholic P=0.147, Other P=0.068, in field of study (Medical intern; P=0.069), level of hospital they ever practiced (Primary P=0.002, CSH P= 0.00, Referral=not significant), education level (Degree, P=0.00) and knowledge (Good, P= 0.084) of participants toward NR were have significant effect on positive of attitude students in bivariable logistic regression

In multivariate logistics only two variable had significant association with attitude of participants, they are from field of study midwifery with P= 0.015 and Nurses with P= 0.01 and level of education as degree level participants with P value of 0.004

Table 7: Bivariable and multivariable analysis for factors associated with attitude level of participants toward NR among graduating HS students in Hadya zone HS colleges in 2023

Variables with categories		Attitude level		COR(95%CI)	AOR(95%CI)	P-Value
		NegA N(%)	PosA N(%)			
Programme of study	Anaesthesia	10 (4.7%)	7(3.3%)	1		1
	Med. Intern	9 (4.2%)	20 (9.4%)	3.17(0.91-11.0)*	3.1(0.88-10.9)	0.078
	Midwifery	18(8.5%)	17(8%)	1.35(0.42-4.35)	5.9(1.4-24.8)*	0.015
	Nurse	52(24.4%)	57(26.8%)	1.56(5.5-4.4)	5.0(1.48-17.3)*	0.01
	PHO	11(5.2%)	12(5.6%)	1.55(0.44-5.5)	1.67(0.4-6.8)	0.476
Religion	EOTC	31(14.6%)	43(20.2%)	1		1
	Protestant	33(15.5%)	43(20.2%)	0.94(0.49-1.79)	1.13(0.56-2.3)	0.72
	Muslim	17(8%)	17(8%)	0.72(0.32-1.63)	0.93(0.37-2.3)	0.87
	Catholic	11(5.2%)	7(3.3%)	0.46(0.16-1.13)*	0.82(0.26-2.56)	0.73
	Other	8(3.8%)	3(1.4%)	0.27(0.066-1.1)*	0.43(0.097-1.9)	0.43
Hospital Level	Primary	49(23%)	29(13.6%)	1		1
	CSH	45(21.1%)	77(26.2%)	2.89(1.6-5.2)**	1.66 (0.72-3.8)	0.23
	Referral	6(2.8%)	7(3.3%)	1.97(0.6-6.4)	1.4(0.33-6.1)	0.63
Education level	Diploma	60 (28.2%)	37 (17.4%)	1		1
	Degree	40(18.8%)	76(35.7%)	3.08(1.7-5.4)**	4.1(1.57-10.7)*	0.004
Knowledge	Poor	48(22.8%)	41(19.2%)	1		1
	Good	52(24.4%)	72(33.8%)	1.62(0.94-2.8)*	1.16(0.63-2.15)	0.63

***Key**: *= Significant, **= Highly significant, 1=reference, COR= Crude odds ratio, AOR= Adjusted odds ratio, N (%) = number (attitude level in percentage, NegA= Negative attitude, PosA= Positive attitude, P value<0.05*, CSH= Comprehensive specialized hospital

5.4. Practice level of graduating health science students toward NR

From the computed result the mean score was 14.69 with the maximum and minimum of the score was 21 (100%) and 6 (28.57%) respectively in the SD of 3.306 (15.74%).

From the study over all participants practice level about neonatal resuscitation procedure was 119 (55.9%) of the participants scored good practice and 94 (44.1%) of participants score poor practice score. Overall result was described in the **Figure 8** below:

The mean practice score of graduating health science students of health science colleges in Hadya zone 2023 toward neonatal resuscitation was 14.69 (69.95%, SD=15.74%), from total participants only 65(30.5%) scored good practice score of above 80% and based on department level their practice score toward neonatal resuscitation was described as:

Anaesthesia 14.47 (68.9%), Medical Intern 16.38 (78.0%), Midwifery 14.3 (68.09%), Nurses 14.54 (69.24%) and Public health officer 13.78 (65.63%). From nurses classification Level IV nurses scored mean score of 13.54 (64.49%), Bsc comprehensive nurses 15.38 (73.24%) and Bsc pediatrics and child health nurse 17.44 (83.06%) were the mean score of participants based on their field. Their mean score based on their level of education from total of 213 participants' degree were 116 were degree follow and their mean score was about 15.27 (72.7%) and diploma were 97 and their mean score was 14.2 (67.65%).

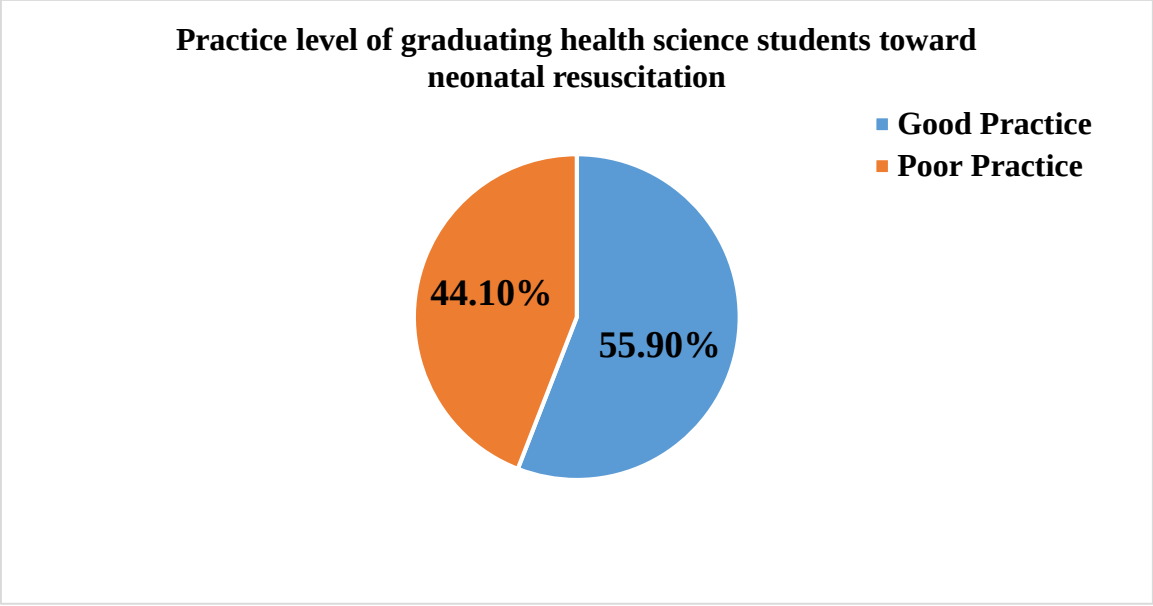

Figure 8: Practice level of participants toward NR among graduating health science students in health science colleges of Hadya zone southern Ethiopia, 2023

5.4.1 Practice level about neonatal resuscitation of participants based on gender

From 213 participants with 100% response rate about the practice of neonatal resuscitation male scored that 48(22.6%) and 52(24.4%) was scored poor and good practice respectively and from participants 46(21.6%) and 67(31.5%) had scored poor and good practice level respectively.

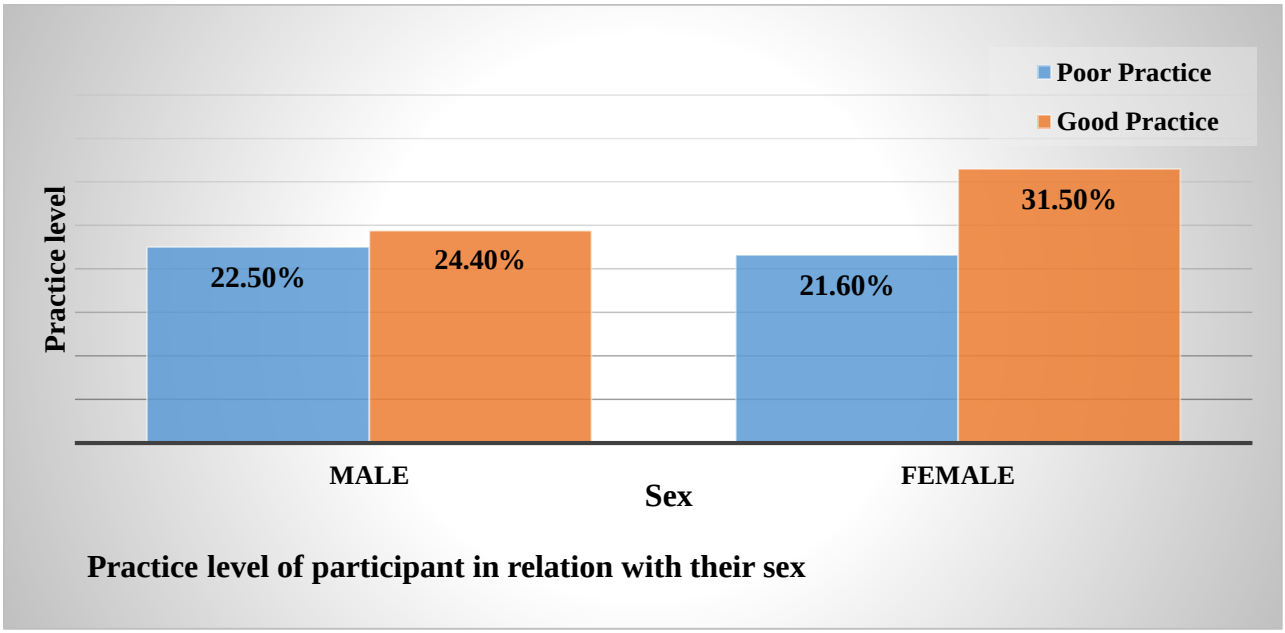

Figure 9: Practice level of participants toward NR among graduating health science students in health science colleges of Hadiya zone, southern Ethiopia with their sex, 2023

5.4.2. Practice level of participants in relation with their level of education

Total of the participants had responded and from the participants there are total of 97 diploma level participants and from them 52 scored poor practice of about 24.4% and 45 scored good practice score of about 21.1% and from the degree participants out of 116 participants 42 scored poor practice score of about 19.7% and 74 scored good practice score of about 34.8% and their total was described as poor practice or 45.1% and good practice was 54.9% in relation with their level of education as degree and diploma and is described in **Table 8** below:

Table 8: Practice level of participants toward NR among graduating HSS in health science colleges of Hadiya zone, southern Ethiopia with their education level, 2023

Variables		Diploma	Degree	Total
Practice score	Poor	52(24.4%)	42(19.7%)	44.1%
	Good	45(21.1%)	74(34.8%)	55.9%

5.4.3. Practice level of participants in relation with their level programme of study about neonatal resuscitation

The finding from study describes about the practice score of graduating health science students depending on their department or programme of study. Based on this from total of 213 participants anaesthesia were 17 in number and from them 8 scored poor practice score about neonatal resuscitation and 9 scored good practice score as 3.8% and 4.2% respectively the others were described in **table 9** below.

Table 9: Practice level of participants toward NR among graduating HSS in health science colleges of Hadiya zone, southern Ethiopia with their programme of study, 2023

Field of study/programme	Practice level				Total
	Poor Practice		Good Practice		
	Frequency	Percentage	Frequency	Percentage	
Anaesthesia	8	3.8%	9	4.1%	17(7.9%)
Medical Intern	6	2.8%	23	10.8%	29(13.6%)
Midwifery	19	8.9%	16	7.6%	35(16.5%)
Nurse	49	23.0%	60	28.2%	109(51.2%)
Public Health Officer	12	5.6%	11	5.2%	23(10.8%)
Total	**88**	**44.1%**	**125**	**55.9%**	**213(100.0%)**

Other than the above from nursing department level IV or diploma nurses score as 40 (36.7%) and 30 (27.5%), Bsc comprehensive 8 (7.3%) and 13 (11.9%) and Bsc Pediatrics 1 (0.9%) and 17 (15.6%) as poor and good practice toward neonatal resuscitation respectively.

5.4.4. Practice level of participants in relation hospital they practice

In this finding the participants practice score about neonatal resuscitation based on hospital level they have practice was scored as: from total of 78 participants from primary hospital 40 (18.8%) and 38 (17.8%) had poor and good practice respectively and from comprehensive hospital 49 (23%) and 73 (34.3%) and from referral 5 (2.3%) and 8 (3.8%) had poor and good practice toward neonatal resuscitation.

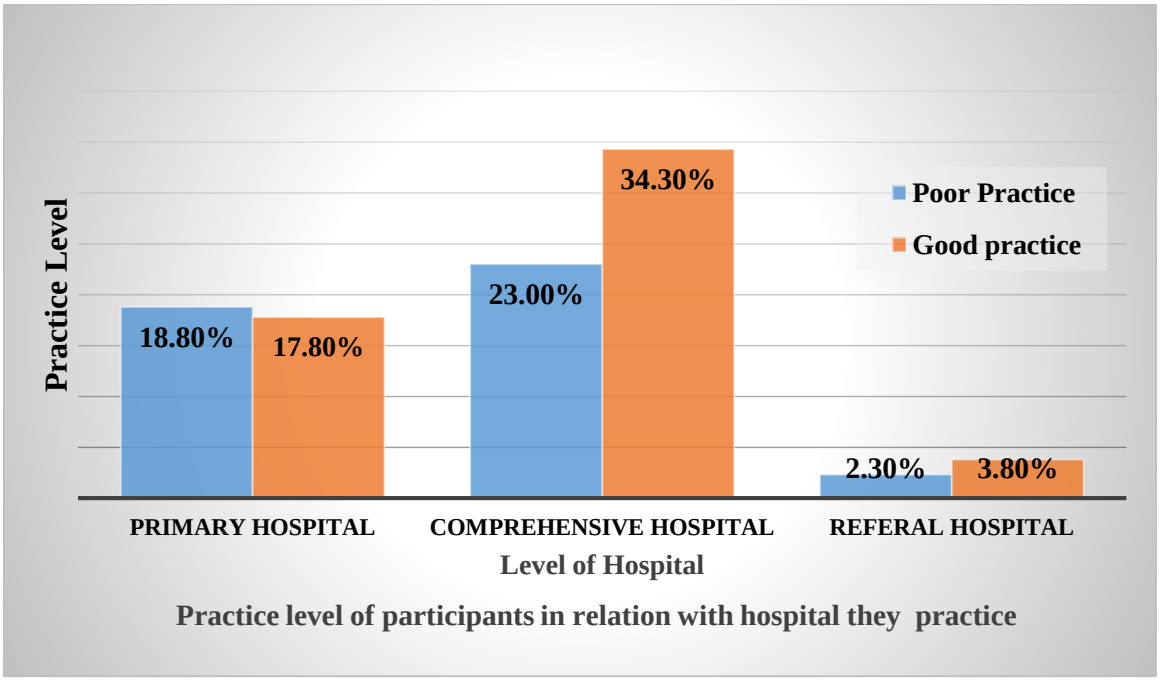

Figure 10: Practice level of participants toward NR among graduating health science students in health science colleges of Hadiya zone, southern Ethiopia with level of hospital, 2023

5.4.5 Practice level of students toward basic neonatal resuscitation procedures

For practice question from the give participants scored more than 80% for 4 questions and from them 165 (77.5%) refer guideline during resuscitation by picture and 48(22.5%) not refer guideline from them participants who refer guideline for practicing scored the practice level of about 28.6% and 48.8% of poor and good practice respectively. From the total of participants 144 (67.6%) appropriately uses CPAP in delivery room and NICU and 69 (32.4%) doesn't uses CPAP and from total participants 95 (44.6%) correctly uses CPAP in 5cmH_2O in the beginning of pressure for the neonate who needs during resuscitation and 118 (55.4%) don't practice in appropriate level of CPAP in the recommended pressure level. see **table 10** below.

Table 10: Practice score of participants about basic steps in neonatal resuscitation among graduating HSS in HS colleges of Hadya zone southern Ethiopia 2023		
Variables	Response	
	Yes	No
Using 2 thumbs and 2 finger for chest compression	182 (85.4%)	31 (14.6%)
Covering mouth, nose & tip of chin not eye by mask	134 (62.9%)	79(37.1%)
Correct sequence in performing neonatal resuscitation	108(49.8%)	107(52.2%)
Dry and stimulate initially	154 (72.3%)	59 (27.7%)
Preforming compression to ventilation in 3:1	159(74.5%)	54(25.4%)
$1/3^{rd}$ of AP diameter of chest to depress for compression	149 (70%)	64 (30%)
Using CPAP in delivery room	144 (67.6%)	69 (32.4%)
Resuscitating 15-20min for neonate who have no heart rate	145 (68.1%)	68(31.9%)

In addition to the above practice score to basic steps from 167(78.4%) of participants correctly reported that they resuscitate the neonates in dedicated neonatal resuscitation corner where as 46 (21.6%) reported inappropriate area of resuscitating neonates who are unstable and needs resuscitation. From total participants 172 (80.8%) of participants recommends checking neonatal resuscitation equipments every time before starting procedures and the remaining 41(19.2%) choices inappropriate answers as occasionally and some time.

From total participants 171 (80.3%) of participants reported using appropriate device to resuscitate neonate during bag and mask ventilation and the remaining 42(19.7%) reported inappropriate devices for giving positive pressure ventilation during BMV of neonates.

5.4.6 Factors associated with practice level of students toward NR

For describing factors affecting the practice level of neonatal resuscitation among graduating health science students from health science colleges of Hadya zone first variables were checked for multicolinearity and the variables who passed the test were entered into bivariate logistic regression analysis and variables with ***p*** value of ≤0.25 were entered in to multivariate analysis.

In this study there was no association of NR practice with sex, religion and marital status of participants whereas the independent variables like knowledge, attitude, age, department or programme of study, level of education, training, experience, level of hospital they have attached and practicing demonstration based on simulation has significant association in bivariable regression model.

In this finding from the listed variables knowledge of toward NR and learning through simulation in their skill lab were significantly associated with dependant variable in multivariable regression model. The finding is supported with the *P value* of 0.029, [AOR: 3.52, 95%CI: (0.145-0.53)] for effect of knowledge on practice of participants toward neonatal resuscitation and simulation based skill lab with the *P value* of 0.00 [AOR: 0.28, 95%CI: (0.145-0.53)], from this health science students who haven't practiced in their skill lab were 0.28 (72%) less likely to have good practice toward NR than the students practiced or demonstrated through simulation based class in their clinical lab practice.

Table11: Bivariable and multivariable analysis for factors associated with practice level of participants toward NR among graduating HS students in HS colleges of Hadya zone, southern Ethiopia 2023						
Variables with categories		Practice level		COR(95%CI)	AOR (95%CI)	P-Value
		Poor N(%)	Good N(%)			
Age	21-24years	78(36.6%)	72(33.8%)	1	1	
	25-30years	16(7.5%)	47(22.1%)	3.18 (1.66-6.1)*	1.79 (0.696-4.6)	0.22
Field of study	Anaesthesia	8(3.8%)	9(4.2%)	1	1	
	Med. intern	6(2.8%)	23(10.8%)	3.4(0.9-12.6)*	2.2(0.51-9.55)	0.14
	Midwifery	19(8.8%)	16(7.5%)	0.748(0.23-2.34)	0.85(0.19-3.89)	0.86
	Nurse	49(23%)	60(28.2%)	1.08(0.39-3.03)	1.79(0.49-6.48)	0.35
	PHO	12(5.6%)	11(5.2%)	0.815(0.23-2.86)	0.70(0.15-3.282)	0.63
Education level	Diploma	52(24.4%)	45(21.1%)	1	1	
	Degree	42(19.7%)	74(34.7%)	2.03(1.17-3.53)*	2.38(0.84-6.75)	0.09
Knowledge	Poor	55(25.8%)	34(16%)	1	1	
	Good	39(18.3%)	85(39.9%)	3.52(1.99-6.24)*	2.09 (1.08-4.07)*	0.029
Experience	Yes	10(4.7%)	25(11.7%)	1	1	
	No	84(39.4%)	94(44.1%)	0.45(0.2-0.98)*	0.89 (0.27-3.99)	0.7
Training	Yes	4(1.9%)	20(9.4%)	1	1	
	No	90(42.3%)	99(46.5%)	**0.22(0.07-0.67)****	0.295(0.054-1.61)	0.09
Supervision	Yes	78(36.6%)	109(51.3%)	1	1	
	No	16(7.5%)	10(4.7%)	0.447(0.19-1.03)*	0.73(0.276-1.95)	0.53
Guideline	Yes	56(26.3%)	83(39.0%)	1	1	
	No	38(17.8%)	36(16.9%)	0.64(0.36-1.13)*	0.69(0.35-1.37)	0.29
Hospital Level	Primary	40(18.8%)	38(17.8%)	1	1	
	CSH	49(23%)	73(34.3%)	1.57(0.88-2.78)*	0.83 (0.33-2.1)	0.75
	Referral	5(2.3%)	8(3.8%)	1.68(0.5-5.6)	1.64(0.32-8.5)	0.52
Simulation	Yes	38(17.8%)	88(41.3%)	1	1	
	No	56(26.3%)	31(14.8%)	**0.24(0.13-0.43)****	**0.28(0.145-0.53)****	0.00
Attitude	Negative	49(23%)	51(23.9%)	1	1	
	Positive	45(21.1%)	68(31.9%)	1.45(0.84-2.5)*	0.97(0.49-1.93)	0.93

Key: **=Significant, **=Highly significant, 1=reference, COR=Crude odds ratio, AOR=Adjusted odds ratio, N (%) = number (practice level in percentage), P value<0.05,* CSH=Comprehensive specialized hospital

6. DISCUSSION

This study was focused on assessing the knowledge, attitude, practice level, and associated factors toward neonatal resuscitation among graduating health science students in health science colleges in Hadya Zone, southern Ethiopia. Skill and knowledge of neonatal resuscitation care givers play an important and crucial role in stopping early neonatal death due to a lack of skillful and knowledgeable application of the procedure. For the caregivers, graduating health science students are the last year students and have a duty to perform the procedure in a skilled and knowledgeable way.

Since neonatal resuscitation is a single intervention to stop neonatal death due to asphyxia, it needs skilled manpower and a well-equipped setup to be performed. Investigating the KP level of participants performing the NR procedure with their determinant factor may provide a foundation for policy making and planning, with the implementation of necessary interventions. In the study population above half or 213 (54.33%) from the total health science students were involved from five departments. From the study, the participants' mean age category was 23.7 years and this is slightly in contrast with the study done in Pradesh India among nursing students with their mean age group of 23years (21), but in this study participants with the age 25-30years old had a significant association with the knowledge of participants toward neonatal resuscitation in the p- value of 0.002 as age with 25-30 years of individuals are 5 times more likely to have good knowledge than the participants from of 21-24 years old age group.

The finding from this study indicated that the good knowledge level of the participants was 58.2%, in this study the participants had greater knowledge scores than the study conducted in south Wollo among health care professionals with their good knowledge score of 32.9% (61). Their mean score of knowledge was 73.77% and which was higher than an experimental study done on nursing students and their mean score was 63.33%, another cross sectional study done on health professionals working in selected hospitals in south Wollo Ethiopia with their mean score is 68.56% (60,61). The difference in the score might be due to study period, and participants in this study were recent to take their course and most of them are in attachment time in the pediatrics unit.

From department aspects medical intern scored higher than other departments 81.6% and it was above expected mean value 80% and the least score was from level IV or diploma nurses 69.1%,

and this knowledge difference might be due their method of teaching standard, course issue. Comparing with result from other study the result was lower than research conducted on final undergraduate anaesthesia students about effect of simulation based class on knowledge toward neonatal resuscitation and their pre-test knowledge was 90.2% (62).

On the other hand among nurse participants their mean score knowledge which was 72.32% is lower than a quasi-experimental study conducted in India Pradesh among 3rd year nursing students and their score was pre-test knowledge about neonatal resuscitation and it was 13.33% had poor knowledge scores and 86.66% had average knowledge score (75), the reason for the difference in the result was might be due to study area, method and standard of teaching and the quality and concern of the teachers to the course matters.

In this work 16.4% and 30.5% of participants had year of experience in the area of neonatal resuscitation and ever performed neonatal resuscitation procedure respectively this finding is lower than the study done among health professional in eastern Ethiopia about NR skill retention among nurses and midwives (1), this deviation might be due to the participants in this study are more of new undergraduate students and the one with experience were post basic professionals.

In factors associated with the knowledge of graduating health science students toward NR age, educational level and learning neonatal resuscitation procedure through simulation based class and use of manikins were significantly associated with the participant's knowledge in the P value of 0.002, 0.012 and 0.004 respectively. The findings were age between 25-30 years have more knowledge than 21-24 years age group, and this may be due to age groups b/n 25-30 years are more of experienced and participants from medical interns since their mean knowledge score were adequate, and it was more than Indian study finding (21).

On other hand degree participants have more knowledge than diploma level and participants who learn without simulation have less likely gained knowledge toward neonatal resuscitation than the one who were learned through simulation and this finding is congruent with that study of Gonder university about effect of simulation based class increases knowledge of neonatal resuscitation among students(62). Simulation based demonstration has significant effect on knowledge of participants and the study was in contrast with study done among nursing students about the effect of simulation on bringing self-efficacy in skill and clinical performance with the p- value of <0.05 and increased mean score after intervention (80,81).

In the attitude score being nurse, midwife and degree have positive attitude toward neonatal resuscitation than being anaesthesia, medical intern and public health officer this may be due to their educational background and work area. Level of education or being degree had 4 time more likely positive attitude than being diploma and being nurse and midwife has around 5 times more likely positive attitude than anaesthesia. To compare with other finding there is no supportive literature to compare with attitude of graduating health science students toward neonatal resuscitation. Participants positive attitude was lower than the good practice of them and the reason might be due to since they are students and have skill to practice but were not willing to and have less attitude about the procedure.

The practice score of participants were 55.9% of good practice score and 44.1% poor practice score and this finding is higher than finding from India on nursing students (60), Kano state Kenya among health care worker (71). It was greater than other interventional survey conducted in Peru among last year medical students and midwifery students about effective use of PPV in neonatal manikins during neonatal resuscitation on midwifes concern found that 8.3% and 91.7% from midwife and 54.8% and 45.2% had good and poor skill practice toward use of PPV in neonatal manikins among medicine students and it was comparable with finding of medicine students (9), this difference was might be due to curriculum and work load difference between the participants and also study setting has also its own effect

Over all mean practice score of the participants was 69.95% (SD=15.74%) and it was sub standardized and less than 80% of expected practice score from participants, and it was comparable with study conducted in south Wollo among nurses and midwifes which was 60.11% (61) and the small gap between the participants skill was might be due to the study period and area of study since the participants in this study were more from teaching hospitals and they are in active teaching learning process and most of them are on preparation for their OSCE and exit exam this may made a little discrepancy.

From this study the average practice score of anaesthesia was 68.9% which was comparable with the interventional study conducted in Gonder University which was 73.4% (62), the minor discrepancy may due to the study period and quality of institution might be considered. The mean practice score of midwifes was 68.09% and it was more than survey conducted in Gonder university on health care worker from them mean practice score of midwife was 59.2%(54) and

it was also in line with study done in Peru among last year midwifes and medical interns which was 71.4% and it was aimed to study effective use of PPV in neonatal manikins during NR(9).

The mean practice score of Medical interns 78.0% which was higher than the study conducted in Gonder university among both pediatrics and obstetrics and gynaecology residents with their mean score of 47.5% and 55% respectively (54) and the discrepancy might be due to study period, teaching learning method and standard of institutions, and it was inline with finding from Peru as the last year medical students mean practice toward effective use of PPV that more than 71.4% of students passed all skill performance criteria accordingly(9).

The mean practice score of score of nursing students were 14.54 (69.24%) and from nurses students Bsc. Pediatrics and child health nursing students scored above the expected mean value of 83.06% which was greater than 80% this finding was higher than study done in eastern Ethiopia about skill retention among health workers, in that study there was 11.8% has mean skill retention which was good (1), the score of Bsc pediatrics nurse were comparable with study done in south Wollo selected hospitals among health care workers with the score of 82.5% of pediatrics nurse had good practice neonatal resuscitation initial step (61).

The study showed as that age, programme of study, educational level, presence of training and experience, level of hospitals, simulation based demonstration, supportive supervision and presence and absence of guideline in the hospitals, knowledge and attitude toward neonatal resuscitation were significantly associated with the practice of participants in Bivariable logistic regression analysis from this simulation based demonstration in their skill lab time and knowledge toward neonatal resuscitation had highly significant association with the practice score of participants.

Simulation based skill lab had highly significance effect on the practice score of participants in the p value of ***0.000*** this finding was in consistent with finding from study in Edmonton study found that effect of digital simulation based demonstration and clinical lab had increased the skill from 42% to 78% and recommended that digital simulation improved, maintained neonatal resuscitation skill and knowledge over time (79).

This study encourages the use of adequate simulation based skill lab, pre-service training during their class, adequate timely supervision, using updated guidelines and training manual in time neonatal resuscitation to increase knowledge and practice of graduating health science students toward neonatal resuscitation.

7: STRENGTH, LIMITATION, CONCLUSION AND RECOMMENDATION OF STUDY

7.1: Strength

This study has some strengths and limitations based on its findings which are described here. The strengths are that the study measured the aimed objectives to be studied, guided to make recommendations based on the findings and used the recommendations as the input for baseline data for policy makers, researchers and health sectors.

7.2. Limitation of Study

The challenges of this study were that the design couldn't effectively measure the association between the variables. Due to the following issues: unpredictable and unknown cases of neonatal asphyxia, and the main issue that since students are in their last year and most of them have finished their clinical practice time and are in community work, only medical interns were in their clinical practice, another issue is that since they are students, it is hard to find cases in the determined time for assessing practice.

Also, assessing knowledge through a self-administered questionnaire may create information bias. One obstacle faced was the limited amount of health science colleges in the area, resulting in a shortage of study participants. As such, the sample size may not be large enough to accurately determine any statistical differences between the outcome variables and the independent or explanatory variables being studied. Furthermore, evaluating personal beliefs and attitudes of the participants proved challenging and may not yield accurate responses. A qualitative approach would be necessary in order to measure participant attitudes more effectively.

To decrease the limitation, future studies should focus on experimental or interventional studies, observational studies should be considered, as should other designs to effectively measure the effects of or association of independent variables with dependent variables.

7.3. Conclusion

To sum up, the graduating health science students had low or poor scores in terms of their knowledge, attitude, and practice concerning neonatal resuscitation. Only a few of the participants demonstrated sufficient knowledge and practice in this area.

Simulation-based demonstration in clinical skill practice, needs for training, educational level, presence of guidelines and adequate equipment, and level of hospitals were significantly associated with the good knowledge score of the participants. However, educational level or having a degree was positively associated with positive attitude, and field of study, such as being a nurse or midwife, was also associated with the attitude of participants.

Lack of simulation based demonstration in the skill lab and knowledge toward neonatal resuscitation were associated with the low performance of graduating health science students toward neonatal resuscitation. So adequate simulation, maintaining the standard of the institution in a good manner (making them equipped), promoting participants educational level, and giving training to participants before hiring were considered to gain good KAP toward neonatal resuscitation.

7.4. Recommendation

Based on the finding from this study following recommendations were made:

➔ **For Ministry of health and Ministry of education**.

- ☞ Strengthen the pre-service training for health science students toward neonatal resuscitation before joining the neonatal resuscitation unit like neonatal intensive care unit and delivery room,
- ☞ To focus on the joint work to strengthen the specialization fields like pediatrics nurses and nurses working in neonatal resuscitation areas,
- ☞ To prepare curriculum as accordingly

➔ **For Universities, Colleges and Hospitals**

- ☞ Work to increase pre-service training before assigning newly graduated health science students in the area of neonatal resuscitation,
- ☞ To strength the practical skill session to be based on simulation based type in manikins and effective video teaching and should periodically assessed for their knowledge and skill before their clinical practice,
- ☞ To assign clinical coordinator from hospitals where the students practice and hospitals should work on it by assigning clinical coordinator,
- ☞ To be with updated guidelines and manuals, materials to perform the procedure.

➔ **For future researcher**

- ☞ Consider to do observational study to assess the knowledge and practice of students like during the time of comprehensive exam and exit exam time,
- ☞ To consider interventional study on the basis of effect of simulation based skill lab on the knowledge and practice of last year health science students,

➔ **For health science students**

- ☞ Graduating health science students should update and strengthen their knowledge and practice toward neonatal resuscitation through progressive and effective reading and watching video on how to perform the procedure.

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9: APPENDIXES

Appendix. I. Participant Information Sheet/ Consent form for the Study

Dear Madam, Miss, Sir,

My name is Woldetsadik Oshine. Currently I am a candidate in Pediatrics and Child Health nursing graduate at AAU, College of Health Science, and Department of Pediatrics and Child Health nursing. And kindly I request for your participation in this study titled "Knowledge, Attitude, Practice and associated factors in neonatal resuscitation among graduating health science students of health science collage in Hadiya Zone, South region, Ethiopia with the aim of assessing the health science students' knowledge, attitude, practice and associated factors regarding neonatal resuscitation.

Objective: This study is aimed to identify graduating health science students' knowledge, attitude, practice and associated factors towards neonatal resuscitation in health and medical science collage of Hadiya Zone, south region

Participants: Randomly selected graduating health science students who fulfil inclusion criteria in the health and medical science collage in Hadiya Zone, South region.

Potential Risks: There is no foreseen risk by being participating in this study.

Benefits: No financial benefit will be related with this study.

If you would take a few minutes out of your busy schedule and fill out this attached questionnaire it would be of a great help to me. Choose the response which you feel reflects your insights.

The total confidentiality of your voluntary participation in this study is guaranteed and the information you provide will be kept unnamed. Your participation in this study is highly appreciated and is for invaluable contribution in the improvement of the quality of care in regard to neonatal resuscitation. No attempt will be made to link you with the answers. You can also choose not to participate in this study if you become uncomfortable during this study, you will be allowed to leave the study at any time.

Will you willing to participate in the study? Yes/ No (Circle their response).

Yes = continue and thank you very much for taking part in this study. If no, stop and thanks

In signing this document, I am giving my consent to participate in the study entitled "Knowledge, attitude, Practice and associated Factors in neonatal resuscitation among

graduating health science students of health science collage in Hadiya Zone, south region, Ethiopia with the aim of assessing the health science students' knowledge, attitude, practice and associated factors regarding neonatal resuscitation. I have been informed that the purpose of this research project and I understand that I am selected to participate in this study randomly. I have been informed that my participation in this study is willing full and voluntary even I have right to refuse or interrupt the filling of questionnaire and my name will not be mentioned on the questionnaire. I undersigned, have understood the purpose of the study & fully agree to participate in the study.

I have assured that the right to ask for information that is not clear about the research before and or during the research work and to contact:

Principal Investigator's Name: Woldetsadik Oshine Email: woldetsadikoshine@gmail.com
Cell phone: +251925347118 Telegram: t.me/@woldish
Data collector's Name and Address: _____

Signature of the participant_____ Date _____
Thank you and has a nice day!

Appendix II: Questionnaire

Date of collection_____ Code_____

Instruction: Read each question carefully and circle or tick **[√]** from the options that the best suits your response.

Self-administered questionaries'			
Part I: Demographic Data or provider characteristics			
№	**Variables**	**Possible Answers**	
101	Sex	1. Male ☐ 2. Female ☐	
102	Religion	1. Orthodox Tewahido ☐ 2. Protestant ☐ 3. Muslim ☐ 4.Catholic ☐ 5. Other_____	
103	Age in years	_____	
104	Marital status	1.Single 2.Married 3.Divorced 4.Widowed	
105	Field of study/programme	1. Anaesthesia 2. Medical interns 3. Midwifery 4. Nurse 5. Public Health Officer	
106	For **Q#105** if your programme is in **Nurse**, what is qualification?	1. Level IV 2. Bsc Comprehensive Nursing 3. Bsc Pediatrics and Child Health Nursing	If not nurse Skip to 107
107	Education Level	1. Diploma ☐ 2. Degree ☐	
108	Did you have any experience before in your field?	1. Yes ☐ 2. No ☐	
109	If yes, how many month of experience do you have?	_____	
110	Have you ever taken any NR training before?	1. Yes ☐ 2. No ☐	

PART II: Knowledge Questionnaire related to Neonatal Resuscitation

Read each questions carefully and circle the option in the column that the best suits your response.

№	Variables	Answer
201	When do you prepare the resuscitation for the newborn?	1. At every birth. 2. If we are sure that resuscitation is needed. 3. If there is anticipated risk only. 4. I don't know
202	Do you know the immediate problem of newborn baby?	1. Yes 2. No
203	If **yes** to **Q#202**, what are the problems? (More than one answer is possible)	1. Hypothermia 2. Asphyxia 3. MAS 4. Infection
204	How would you identify birth asphyxia? (More than one answer is possible)	1.Depressed breathing 2. Heart rate<100bpm 3.Floppiness 4. Blue tongue (central cyanosis)
205	What type of babies can receive Newborn resuscitation care after birth? (choosing more than one answer is possible)	1. A baby who is not breathing. 2. A baby who is gasping. 3. A baby who is crying and/or breathing well. 4. A baby who is limp.
206	What is the correct methods of stimulating the newborn?	1. Slapping/flicking the soles of the feet. 2. Slapping the back. 3. Squeezing the rib cage. 4. Holding upside down and shaking
207	What would be the initial step you will do if the baby is not breathing after delivery?	1. Nose only should be wiped or suctioned before drying and stimulating. 2. Dry, stimulate before suction the mouth and nose. 3. Ventilation before suctioning the mouth and nose. 4. None
208	When do you do suctioning after birth to the baby?	1. When a baby is crying at birth. 2. A baby is crying but there was meconium in the amniotic fluid. 3. The secretions blocking the mouth and nose. 4. Before drying the baby.
209	What is the importance of wiping meconium from face and nose of the neonates immediately after delivery?	A. To prevent aspiration B. To treat hypoglycaemia C. To increase weight for Low birth weight baby D. None
210	What are the correct action to be taken for the baby with meconium stained amniotic fluid, depressed respirations, decreased muscle tone, and/or a HR<100 bpm?	1. Dry, stimulate and reassess. 2. Suck with manual sucker and ventilation. 3. Immediately start ventilation. 4. Intubation and direct suctioning of the trachea soon and ventilation.

211	What will happen if you do frequent suctioning of the baby afterbirth?	1. Cause a baby to stop breathing. 2. Make a baby start coughing and breathing. 3. Stimulate a baby to cry. 4. Increase the baby's heart rate.
212	When do you start the ventilation to the baby? time period after birth)	1. One minute for newborns who have no breathing efforts immediately after delivery 2. After 1 minute Apgar score for newborn who have breathing. 3. After 5 minutes Apgar score 4. After 10 minutes of Apgar score
213	What is the correct position of the neck during resuscitation of the baby?	1. Slightly extended 3. Hyper extended 2. Flexed. 4. No answer
214	When you are bagging or ventilating you don't found chest movement for the baby what is your next step?	1. Stop ventilation. 2. Reapply the mask to get a better seal. 3. Slap the baby's back vigorously. 4. Give medicine to the baby.
215	What is needed action for persistent apnea, just after birth?	1. Continue tactile stimulation a little bit more vigorously. 2. Give positive pressure ventilation promptly. 3. Give free flow of O_2. 4. Nothing
216	What is the best source of air for resuscitation?	1. Room air 2. O_2 with cylinder 3. O_2 in concentrator. 4. O_2 in concentrator and blender.
217	Which neonate may develop complication after extensive resuscitation?	1. Term 2. Post-Term 3. Pre-Term
218	What is the best indicator of effective bag and mask ventilation?	1. Raising HR and audible breath sounds. 2. Raising oxygen saturation. 3. Chest movements. 4. Crying
219	What are the indications to start chest compressions during neonatal resuscitation?	1. HR< 60b/m after bag & mask ventilation. 2. HR<100b/m after bag and mask ventilation. 3. Persistent cyanosis after initial resuscitation. 4. Apnoeic after initial resuscitation.
220	For how long does CPR should continue before reassessing heartbeat?	1. 10-15 sec. 2. 15-20 sec. 3. 30-60 sec. 4. >60 sec
221	What is the preferred medication during resuscitation of neonates?	1. Epinephrine 2. Naloxone 3. Steroids 4. Not needed
222	When does volume expander needed during neonatal resuscitation period? (More than one answers is possible).	1. If there is sign of shock/no response. 2. If there is history of blood loss. 3. To all resuscitated babies. 4. No indication of fluid
223	What is the preferred volume expander during resuscitation? (More than one answers is possible).	1. 0.9% NaCl 2. Unmatched type O Rh- packed RBC 3. Ringer lactate 4. Breast milk

224	What are the recommendation the health care provider must know about post resuscitation care? (more than one answer is possible)	1. Needs close monitoring. 2. Give to mother to breastfed. 3. Always needs advanced care. 4. Should immediately receive antibiotics. 5. Offering therapeutic hypothermia 6. Not necessarily needed

Part III: Students Attitude toward Neonatal Resuscitation (sign (X))

Nº	Variables	Possible Responses				
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
301	I think delay to NR may be related to the role of senior staff					
302	It is necessary to prepare the resuscitation irrespective of the presence or absence of risk factor.					
303	It is important that hospitals have NR team in NICU & delivery room.					
304	I think provider's motivation toward neonatal resuscitation may be related with incentives/benefits					
305	I think if I had good knowledge and practice toward resuscitation, I could not hesitate to use it whenever needed.					
306	Do you think you are confident in performing newborn resuscitation?					
307	I know that neonatal resuscitation is the major role of my profession.					
308	Resuscitating (ventilating) a non-breathing baby often leads me anxious and stress full as well as fear to do it.					

Part IV: Self-reported Practical related questions regarding neonatal resuscitation

Nº	**Variables**	**Possible Responses**
401	Have you ever performed or participated in the neonatal resuscitation procedure?	1. Yes 2. No
402	If **ye**s for **Q Nº. 401** is, how many time?	Specify in exact or near number_____?
403	If the answer for **Q Nº. 401 is yes**, what was the step? (More than one answer is possible).	1. Chest compression 2. Endotracheal tube insertion 3. Bag and mask ventilation 4.Other(specify)_____
404	Which technique of chest compression is recommended during neonatal resuscitation? you can choose more than one option	1. Two thumbs 2. Two fingers 3. One hand 4. Two hands
405	Two finger technique is recommended for how many rescuer?	1 For two 2 For one 3 For three 4 For four
406	How frequently you check required equipment for neonatal resuscitation?	1. Every time 2. Occasionally 3. Not at all
407	Where do you resuscitate high risk/unstable neonate after delivery?	1. In the dedicated NR corner 2. In a separate room near delivery/NICU room. 3. In the NICU or separate adjacent room. 4. Anywhere
408	Which device you use when giving bag and mask ventilation in the delivery room or NICU?	1. Self-inflating resuscitation bag. 2. Anaesthesia bag adult size. 3. Ambu bag adult size. 4. No need to use
409	What are the area covered by mask during resuscitation of the neonate by bag and mask ventilation?	1. Mouth, nose & tip of chin not the eyes. 2. Part of chin, mouth, nose and eyes. 3. Part of nose, mouth not eyes and chin. 4. Parts of mouth, nose & chin not the eyes
410	Which one is correct sequence for steps of newborn resuscitation? A. Call for help B. Explain to mother condition of baby C. Place newborn face up D. Wrap or cover baby, except face and upper portion of chest E. Position head so neck is slightly extended F. Aspirate mouth then nose G. Check the ambu-bag to be functional H. Start ventilation using bag and mask	1. B,A,H,G,C,D,E,F 2. B,A,D,C,E,F,G,H 3. A,B,C,D,E,F,G,H 4. B,A,C,D,E,F,G,H
411	What are the step to follow the resuscitation practice to the baby with meconium-stained amniotic fluid, poor muscle tone and presents with and inadequate breathing efforts?	1. Dry and stimulate initially. 2. Intubation for tracheal suction. 3. Placed under a radiant warmer and PPV should be initiated if needed.

		4. None	
412	How do you perform ventilation of the term neonate with bag and mask during resuscitation?	1. Oxygen attached to bag and mask but without reservoir. 2. Oxygen attached to bag and mask with reservoir. 3. Only bag and mask without any reservoir or oxygen.	
413	If, a newborn baby is quiet, limp and not crying after breathing stimulation. What is the next step you will do?	1. Slap the baby's back. 2. Hold the baby upside down. 3. Squeeze the baby's ribs. 4. Begin ventilation.	
414	Do you use oxygen saturation monitor in the resuscitation area of delivery room or NICU?	1. Yes 2. No	If Yes to **415** skip to **417**
415	If your answer is **no** for **Q nº, 415** why?	1. No guidelines. 2. No supervision. 3. Guidelines not in front. 4. No need to use	
416	Do you use CPAP in delivery room or NICU for resuscitation?	1. Yes 2. No	
417	What level of pressure you use in the beginning of CPAP?	1. 4 cm 2. 5 cm 3. 6 cm 4. 7 cm	
418	Which diameter of chest is best recommended during chest compression?	1. Depress the sternum to 1/3rd Anterior Posterior diameter of chest. 2. Depress the sternum to 1/2 to 1 of AP diameter of chest. 3. There is no strict guide line. 4. Go on increasing pressure till there is no response.	
419	What is the ratio of neonate chest compression to ventilation?	1. 3:1 2. 4:1 3. 2:15 4. 5:1	
420	Do you refer guidelines during NR?	1. Yes 2. No	
421	How do you resuscitate spontaneously breathing preterm infants with respiratory distress initially?	1. With intranasal oxygen. 2. Bag and mask ventilation with 100% oxygen. 3. With CPAP initially rather than routine intubation for administering PPV. 4. Intubation and air way clearance.	
422	How long do you resuscitate a neonate who has no heart rate and not improving with all measures?	1. 5 minutes 2. 10 minutes 3. 10-15 minutes 4. 15-20 minutes 5. >20 minutes	

Part V. Associated Factors regarding neonatal resuscitation

Nº	Variables	Possible options
501	What level of hospital you practiced before /currently?	1. Primary hospital. 2. Comprehensive. 3. Referral hospital

502	Does that hospital is fully equipped with NR equipment? (A minimum of the f.f materials: radiant warmer, bag with mask, suction machine, single/multi use suction bulb, stethoscope, pulse oximetry, ECG machine, CPAP, medications).	1. Yes 2. No	
503	Did you practiced NR in demonstration room with simulation based on the curriculum before attach to the hospital?	1. Yes 2. No	If yes to Q#503 skip to Q#505
504	If no for Q# 503 what is the reason?	1. Lack of time 2. Course over load 3. Method of teaching	
505	The hospitals have neonatal resuscitation guidelines in Delivery room /NICU?	1. Yes 2. No	
506	During your clinical practice your institution does provides supervisors for you?	1. Yes 2. No	

Appendix III: Training module for data collectors and supervisors

I.Instruction

- ♣ Identify target subjects to be interviewed
- ♣ Procedures to be followed during interview of subjects, care of use of non-leading questions
- ♣ When to interview/convenient time
- ♣ When to start data collection and when to end

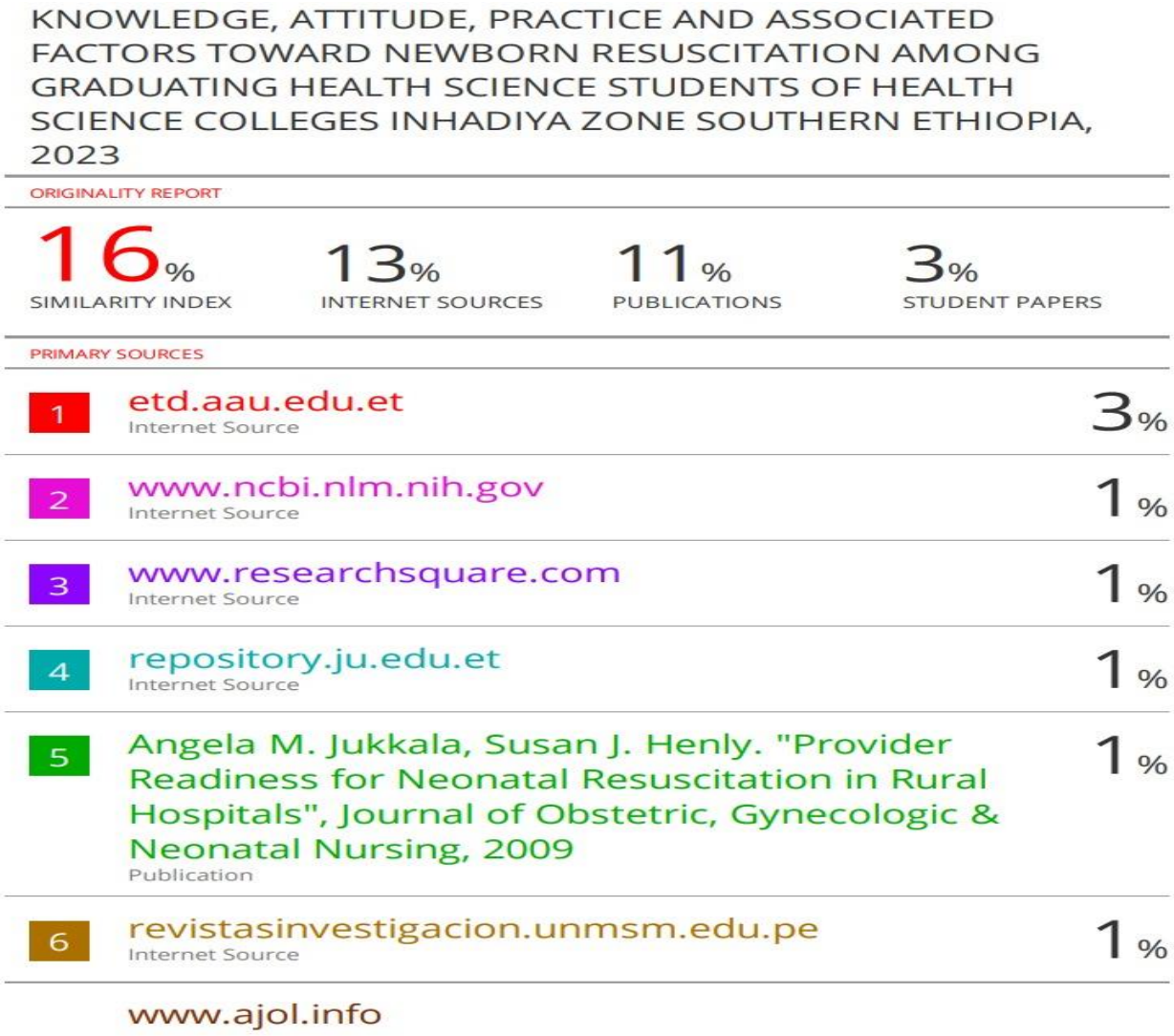
II. Methods of training

- ♣ Pass through the instrument or data collection tool with data collectors to point out specific instructions
- ♣ Provide an example of a completed instrument or an interview transcript for the data collectors
- ♣ Allow data collectors to practice with the tool

Table: Training module manual

Data collection method Or instruction	Data collector	Training needs	Training activities
Graduating Health science students in health science colleges in Hadya zone southern Ethiopia	Technical assistant Nurses	Introduce GCP (good clinical practice) How to approach respondents How to distribute instrument	Overview of study Brief revision on GCP Participant selection procedure Role play on all procedure

Appendix IV: Plagiarism report



KNOWLEDGE, ATTITUDE, PRACTICE AND ASSOCIATED FACTORS TOWARD NEWBORN RESUSCITATION AMONG GRADUATING HEALTH SCIENCE STUDENTS OF HEALTH SCIENCE COLLEGES INHADIYA ZONE SOUTHERN ETHIOPIA, 2023

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