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KNOWLEDGE AND PRACTICE OF NEONATAL RESUSCITATION AND ITS ASSOCIATED FACTORS AMONG HEALTH PROFESSIONALS WORKING AT SELECTED PUBLIC HOSPITALS OF ADDIS ABABA.

BY: FATUMA ARAGE (BSC)

A RESEARCH THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCE SCHOOL OF NURSING AND MIDWIFERY DEPARTMENT OF NURSING FOR THE PARTIAL FULFILLMENT OF THE REQUIREMENTS OF MASTER'S OF SCIENCE DEGREE IN NEONATAL NURSING.

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APPROVAL BY THE BOARD OF EXAMINATION

I, the undersigned MSc student, declare that I have submitted my original thesis on a title Knowledge and Practice of Neonatal Resuscitation and Its Associated Factors among Health Professionals Working at Selected Public Hospitals of Addis Ababa to the institutional review board of Addis Ababa University College of health science school of nursing and midwifery.

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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, analysis, interpretation and completion of this thesis. All the references that is included in the thesis has been given recognition through citation. I used high effort to avoid any plagiarism in the preparation of this thesis. This thesis is submitted in partial fulfilment of the requirement for the degree of masters from the School of Graduate Studies at Addis Ababa University. The thesis is accessed in the Library of Addis Ababa University and is made available to the user under the rules of the library. I strongly declare that this thesis has not been submitted to any other institution anywhere for the award of any academic certifications.

Name: Fatuma Arage (BSC).

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ACRONYMS AND ABBREVIATIONS

AAU	Addis Ababa University
ACLS	Advanced Cardiac Life Support
BLS	Basic Life Support
BMV	Bag and Mask Ventilation
CPAP	Continues Positive Air way pressure
EDHS	Ethiopian Demographic Health survey
EDHMS	Ethiopian Mini Demographic Health survey
GDA	Global Development Alliance
GMH	Gandhi Memorial Hospital
GYN-OBS	Gynecology and Obstetric
HBB	Helping Baby's Breath
HCPs	Health Care Professionals
IEC	Information, Education and Communication
MDG	Millennium Development Goal
NICU	Neonatal Resuscitation
NR	Neonatal Intensive Care Unit
SSA	Sub-Saharan Africa
TASH	Tikur Anbessa Specialized Hospital
Y-12HMC	Yekatit-12 Hospital Medical College
ZMH	Zewditu Memorial Hospital

ABSTRACT

Background: Neonatal resuscitation is an intervention performed to a new born baby who has difficulty in air way breathing and circulation. Resuscitation of the newly born infant presents a different set of challenges than resuscitation of the adult or even the older infant or child. However, we know little about the knowledge and practice of neonatal resuscitation among health professionals in Addis Ababa.

Objective: To assess knowledge and practice of neonatal resuscitation and associated factors among health professionals working in intensive care units and delivery rooms from public hospitals of Addis Ababa, 2020.

Methods: An institution-based cross-sectional study was conducted in public hospitals of Addis Ababa, Ethiopia 2020. A total of 225 nurses' midwives, pediatric residents, and obstetrics and gynecology residents working in neonatal in intensive care unit and delivery rooms were included in this study. Data was collected by using validated self-administered questionnaires. The data was presented using tables, figures and texts. Simple and multiple linear regression analysis method was used to identify factors associated with the health professionals' knowledge and practice of neonatal resuscitation.

Result: Two hundred sixteen of 225 participants were included in this study yielding a response rate of 96%. Mean knowledge score of health professionals about neonatal resuscitation was 62.7 % (±12.7%) with minimum and maximum score of 23.5% and 85.2% respectively. While overall mean practice score of participants was 59.5 % (±14.5%) with a minimum and maximum and score of 22.2% and 94.4% respectively. The findings showed that health professionals who had neonatal resuscitation training, last training time less than two years, higher educational level and attitude were significantly associated with better knowledge score. While high knowledge score, attitude, guidelines availability in working unit were significantly associated to better practice score of health professionals. Whereas higher educational level significantly associated to lower practice score of the participants.

Conclusion: The overall knowledge and practice score of health professionals was low. Continuous training, supportive supervision, participants update their knowledge and include neonatal resuscitation procedure to undergraduate and postgraduate course is encouraged.

Key words: Neonate, Resuscitation, Knowledge, Practice, Heath professionals, Ethiopia

CHAPTER I

INTRODUCTION

1. Background of the study

Neonatal resuscitation is an intervention performed to a new born baby who has difficulty in air way breathing and circulation. As the first few moments of a newborn's life is the most critical time, it needs effective emergency care to prevent lifelong consequences. Proper resuscitation requires essential knowledge of necessary protocols before delivery. Prior knowledge of the gestational age of the newborn is helpful in anticipating the need for resuscitation because low birth weight and premature delivery predispose infants to the need for resuscitative efforts(1).

The goals of neonatal resuscitation are to prevent the morbidity and mortality associated with hypoxic ischemic tissue (brain, heart and kidney) injury and to re-establish adequate spontaneous respiration and cardiac output(2). Proper knowledge and practice of newborn resuscitation can prevent the consequences of perinatal asphyxia. A sufficient knowledge necessary to undertake resuscitative procedures in the newborn had an important role in proper assessment, early diagnoses, proper management and reducing complications in newborns with life-threatening conditions(3).

Resuscitation of the new born is more challenging procedure that needs sufficient skill and its dramatic change happen immediately after delivery. within the first minutes to hours after birth there is dramatic physiological changes in the infant transition from placental gas exchange in a liquid-filled intrauterine environment to spontaneous breathing of air (4). Approximately 5% to 10% of the newly born population require some degree of active resuscitation like drying and stimulation to breathe at birth, and approximately 1% to 10% new born are reported to require assisted ventilation(5).

Efforts to reduce under-five mortality across the globe are challenged by a disproportionately high rate of neonatal deaths. Asphyxia accounts about a quarter of these neonatal deaths(6). Studies showed that effective neonatal resuscitation delivered by skilled and knowledgeable health care providers can reduce neonatal mortality with a strong evidence(7). More than 2.5 million neonatal deaths occur worldwide each year and that birth asphyxia accounts for near to 35% of these deaths, while by implementation of simple resuscitative technique the outcome

might be improved for more than 1 million neonates per year through (8). Different factors including provider's characteristics like educational level, experience, specialization; and institutional characteristics like training, availability of guidelines and equipment affect health professionals competency of neonatal resuscitation and thereby neonatal outcome(9, 10).

Even if the need for resuscitation of the newly born infant often expected, there are conditions that may happen suddenly and may occur in health institutions that do not routinely provide neonatal intensive care. Thus, it is important that the knowledge and skills required for neonatal resuscitation should be possessed by all providers of neonatal care.

2. Statement of the problem

In the last decade, substantial progress has been made in the reduction of under-five child mortality worldwide. The global under-five mortality rate was 93 deaths per 1000 live births in 1990 and decreased to 21 deaths per 1000 live births in 2017(11). Despite this achievement, neonatal mortality rates remain a significant contributor to under-five mortality, increasing from 41% of all under-five deaths in 2000 to 46% in 2017(11). It has been reported that more than two and half millions of children died in the first month of life globally (11). About one million of them died on their first day of life, and the sub Saharan Africa constituted more than two thirds of the deaths. Africa continues to have a disproportionately high neonatal mortality rate of 28 per 1000 live births, compared to the global rate of 18.0 per 1000 live births in 2017(12). Among those countries that have high neonatal mortality rate, Ethiopia is the one with a rate record of 30 deaths per 1000 live births (13). Three-quarters of newborn deaths result from three preventable and treatable conditions including prematurity, events during childbirth including asphyxia, and neonatal infections(14, 15).

Around the world in 2017 alone, an estimated 6.3 million children and young adolescents died, mostly from preventable causes(16). Of all, about 2.5 million deaths occurred before celebrating their 28^{th} days. Among children and young adolescents, the risk of dying was highest in the first month of life with average rate of 18 deaths per 1000 live births.

The global burden of neonatal mortality is highest in West and Central Africa, where the risk of a baby dying within the first 28 days of life is almost 10 times higher than high-income countries(6). In developing countries, neonatal deaths accounted for 52% of all under-5 child mortality in South Asia, 53% in Latin America and Caribbean, and 34% in sub-Saharan Africa due to preventable causes including perinatal asphyxia(14, 17). Five Sub Saharan Africa countries; Nigeria, DR Congo, Ethiopia, Tanzania and Uganda accounted for 50% of the total neonatal deaths in Africa(18). In Ethiopia neonatal mortality accounts 44% of all under five deaths(19).

Neonatal asphyxia has been identified as a major cause of neonatal mortality worldwide. Globally, birth asphyxia accounts about a quarter of all neonatal deaths which is defined by the World Health Organization as the failure to initiate and sustain breathing at birth. From 2013 Report of Global Development Alliance (GDA), out of 139 million newborns;16 million babies needed help to breathe with simple resuscitation, 1 million babies needed help to breathe with

advanced resuscitation and close to 700,000 died from asphyxia (20) . A study revealed that perinatal asphyxia not only limited to death but can also lead to physical, mental and social incapability in newborns due to severe hypoxic-ischemic organ damage which are almost untreatable (21).

In Ghana, intrapartum events including birth asphyxia accounts about 27% of neonatal deaths (22). In Ethiopia, perinatal asphyxia is one of the leading causes of neonatal deaths, constituting 31.6% of all neonatal mortality causes(23). A study done in Southern Ethiopia indicates the prevalence of prenatal asphyxia was 32.8% (24). Another study done in Debra Tabor also shows the prevalence of birth asphyxia was near to thirty percent (25). This figure had suggested that asphyxia had an overwhelming effect on neonatal survival and therefore, health care providers need to be proficient in resuscitation technique to avert asphyxia related morbidities and mortalities.

Effective resuscitation at birth may avert 5–10% of deaths due to complications of preterm birth and can prevent about 30% of neonatal deaths(26). Research evidence show that the risk of death increases by 16% for every 30 seconds delay in initiating ventilation up to six minutes and 6% for every minute of delay applying bag and mask ventilation(27). Therefore, it is clear that the first few minutes after birth are critical to reducing neonatal mortality. Studies shows that successful neonatal resuscitation by well – trained health care providers has the potential to decrease perinatal mortality two million babies caused by intrapartum related asphyxia annually(7).

A Tanzanian study conducted in 2013 by Msemo et al (9) revealed that resuscitation provided by specifically by skilled birth attendants trained in Helping Babies Breathe can reduce nearly half (47%) of neonatal mortality. As a reason of about 10 million babies require assistance to initiate breathing, competence in neonatal resuscitation among healthcare providers, particularly birth attendants, is very crucial (26).

Studies generally suggest that asphyxia had an overwhelming effect on neonatal survival and therefore, health care providers providing service for the neonate need to be proficient in resuscitation technique to avert asphyxia related morbidities and mortalities. Despite asphyxia had a devastating effect on neonatal mortality and morbidity, competency towards resuscitation had remained a significant challenge and poor resuscitation had persisted (7).

Knowledge and skills of health professionals regarding neonatal resuscitation is very crucial to ensure better immediate neonatal outcome. Enhancing the competence of health care

professionals in neonatal resuscitation techniques is therefore essential to reduce neonatal deaths. Understanding the knowledge and skill levels of heath care professionals with regard to neonatal resuscitation is the first to in place training and policy-related interventions. However, little is known concerning the knowledge and practice of neonatal resuscitation among health care professionals in Ethiopia so far. Even if there are some studies that focuses on neonatal resuscitation, but did not include important health care professionals involved in neonatal care and attending birth. This study, therefore, targets all health professionals involved in neonatal care. Thus, the main aim of this study, therefore, is to assess the knowledge and practice of health care professionals in neonatal resuscitation, and associated factors with their knowledge and practice.

3. Significance of the study

For a country and family, newborns are future hopes so that they need attention and care. Studies have shown that timely provided resuscitation by a competent health professional significantly reduce the enormous burden of asphyxia including mortality and lifelong morbidities of newborns that also affects the country economy and productivity of the society.

This study is therefore provides data that helps to understand the neonatal resuscitation knowledge and practice of health professionals involved in neonatal care and associated factors with it.. The data generated in this study will serve as evidence base for future research, decision-making, and to develop and implement training packages and policy-related interventions. The findings of this study will also have paramount importance to leaders in both health and education sectors.

CHAPTER II

LITERATURE REVIEW

2.1. Overview of neonatal resuscitation.

The quality of neonatal resuscitation (NR) and initial stabilization of newborn during first few minutes of birth has a significant effect on neonatal morbidity and mortality especially in high risk newborns like premature and low birth weight babies(28). NR begins immediately with newborn assessment and proceed with stimulation, suctioning, bag and mask ventilation(BMV),chest compression and administration of medication and volume expander(29). Brand new in the world, a newborn's needs may not seem to matter as much as the mother and such a mindset may subtly contribute to a birth attendant's decision to delay newborn resuscitation in order to respond to the needs of its mother. However, the available evidence shows that even short delays in resuscitation can have a significant impact on whether a neonate lives or dies (30).

Evidence around the world also show that for every 30 seconds delay in initiating ventilation up to six minutes the risk of neonatal death increases by 16% and every 6% for every minute of delay applying bag and mask ventilation(27). Improper NR steps or suboptimal resuscitation causes millions of neonatal deaths and almost 99% of these deaths occur in resource limited countries(31). A large number of these affected newborns develop long-term complications such as cerebral palsy and cognitive impairment. Evidence suggests that with successful application of appropriate and adequate neonatal resuscitation by trained health care providers likely prevents almost two million babies perinatal mortality caused by intrapartum related asphyxia annually (7).

An observational study conducted in Kenya showed that removing the wet cloth after drying the newborn likely increases three times and keeping the baby warm after stimulation more than three times increase survival of the newborn were significantly associated(32).

A mixed method study conducted in Boston revealed that from a total of 155 deliveries one third(32.5%) didn't breath at birth(30). Of those asphyxiated, majority 45 (88.2%) were successfully resuscitated, 11.8% by drying and stimulation, 19.6% by stimulation and airway clearing, 39.2% by a combination of drying, stimulation, and airway clearing, and 17.6% by bag-mask ventilation with or without chest compressions. Six of the newborns (11.8%) died.

The average time to newborn assessment for all deliveries was 16 seconds, and to bag-mask ventilation was 3.2 minutes.

2.2. Health care professional's knowledge towards neonatal resuscitation.

Health care provider's knowledge towards resuscitation is very crucial to have an impact on neonatal mortality and morbidity related to asphyxia. However, several studies revealed that health professionals have a considerable knowledge gap in all areas of neonatal care and resuscitation (33-36). In contrast, other studies had identified adequate knowledge of neonatal resuscitation among health professionals(37).

A cross-sectional study conducted in Afghanistan reported an average knowledge score of 71% and 66% of physicians and midwifes respectively (33). That was explained poor knowledge score (<85%) of health care providers necessary for successful neonatal resuscitation. A similar study conducted among nurses working in maternity ward in Nepal revealed that mean knowledge score of 66% and 93% of respondents had inadequate knowledge (score <85%) with regarding newborn resuscitation (34). Another cross-sectional study conducted in Ghana (Tamale) among midwifes revealed that almost all (98.1%) of the participants had insufficient knowledge of neonatal resuscitation(38).

According to a study conducted in Kenya most of healthcare providers(85.4%), had heard of neonatal resuscitation in spite of only 25 of them received formal training(35). The average duration of neonatal training was 3 hours with half of them having missed out on practical exposure. Only 68 (one third) of them scored above 85% for asked steps of resuscitation procedure. Majority (more than 70%) of them considered their knowledge about neonatal resuscitation was inadequate and blamed that medical training programs could be inadequate.

A cross-sectional study conducted in North West Ethiopia among health professionals (nurses, midwifes, pediatric and obstetric residents) reported an overall mean knowledge score of 19.9 (SD=3.1) with mean percentage score of 42.6% which was considered as poor (<80%)(36). The mean knowledge scores of midwives and nurses were 19.7 (SD=3.03), 20.2 (SD=2.94) with mean knowledge score of 42.8% and 43.9% respectively. Similarly, mean knowledge score percentage of pediatric and GYN-OBS residents were 42.8% and 43% with mean difference 19.7 (SD=4.4) and 19.6 (SD=3.3) respectively. A similar study in Ethiopia shows that overall knowledge score of the health care providers ranged from 12 to 24 out of 37 items

(with mean score of 18.4(±5.47)and mean score percentage of 49% about neonatal resuscitation (39).

In contrast study conducted in Western Nigeria on nurses revealed that majority (78.8%) of the participants had adequate knowledge of neonatal resuscitation. Specifically, 95.5% had adequate knowledge of evaluation on meconium- stained liquor, necessary materials of neonatal resuscitation and danger signs of newborn infants(37).

2.3. Practice towards neonatal resuscitation

Study conducted among nurses in Nepal shows that 90.7% respondents had insufficient skill (< 85% score) on newborn resuscitation(34). Another study conducted in Afghanistan revealed that three fourth of doctors and more than three fourth of midwives were confidently perform newborn resuscitation(33). Similar direct observational study in Kenya from 138 NR shows overall quality of care scores were good (86%) While for airway clearance (83%) and in the presence of meconium less than half of the participant was performed well(40). Another study conducted in Ghana shows that more than half (55%) of the participating midwives were not experienced in performing neonatal resuscitation. Only 45% of them practice on neonatal resuscitation(38).

A study conducted among pediatricians in the Gujarat town of India shows nearly two third of the participants had correct knowledge and practice regarding effective bag and mask ventilation (BMV) and chest compressions(41). From those participants knowledge and practice about continuous positive air way pressure (CPAP) use in delivery room were reported in 18.3% and nearly one third of them used room air for BMV during resuscitation. The study also revealed that only 46 (36.5%) of the pediatricians applied plastic/thermal wraps for extremely low birth weight newborns. Similarly, only 48 (38.1%) pediatricians followed the recommended practice of cutting the umbilical cord after a delay of one minute. Seventy eight more than half of them adopted the current recommendations of endotracheal suctioning of non-vigorous newborn in cases of meconium stained liquor. Whereas thirty-five (one fourth) of them followed oral cavity suctioning before delivery of shoulder.

Study conducted among health professionals in Northwest Ethiopia revealed that the overall score of skills 6.8 (SD=3.9) which was 56.5% in newborn resuscitation(36). The average skill of participants was poor. Nevertheless, the mean scores of skills of midwives and nurses was

59% (±39%), 55.8% (±31.2%) respectively while pediatric residents scored 47.5% (±=34.75%) and obstetrics and gynecology residents 55% (±33%) of the total 12 skill questions.

2.4. Factors affecting knowledge and practice towards neonatal resuscitation.

2.4.1. Provider related factors

An observational study conducted in Kenya revealed that years of experience in maternity unit positively associated by 1.86 unit change to good drying/stimulation for every unit increase of work experienced. Similarly it also significantly associated with airway maintenance by a change almost 1.9 times for every unit increase of year of experience. Nurses were poor compared to physicians during initial bag and mask ventilation practice($\beta = -2.338$, $P = 0.05$, CI = −4.732–0.056)(40). A cross-sectional study conducted among maternity nurses in Nepal shows the level of skill on newborn resuscitation was significantly associated with the total work experience , work experience in maternity ward (p=0.028) and resuscitation training (34). This study also reported that there was statistically significant positive association between the knowledge score and skill score of respondents regarding newborn resuscitation (p<0.0018). However, the study revealed that there was no significant association in skill scores of participants with age, year of service and place of previous work.

Another study conducted in South Sudan revealed that despite improvements in knowledge, skills, and competency three months after training, participants showed a marked decline one year after training(42). The study also shows that knowledge was increased from 42.5% on pretest to 97% on posttest but decreased to 84.5% three months' post training and further decreased to 69.4% one year post training. Skills were increased from 26.1% on pretest to 94.4% on posttest, remained at 94.4% at three months, and decreased to 77.0% one year after the training. Simple resuscitation scores were also increased from 26.9% on pretest to 88.8% on posttest and remained roughly at three months and decreased to 76.4% one year after the training. For complex resuscitation, scores were decreased from 90.9% posttest to 76.9% one year after the training.

The Afghanistan study also shows that training was significantly associated with greater knowledge and clinical skills(33). Another qualitative study conducted among midwives in Tanzania revealed that none caring attitude, preparation of equipment, anxiety and fear due to

stress of ventilating a non-breathing baby often led to poor resuscitation performance(43). A study conducted in Ghana also shows that training (p=0.013), educational level and work place (p=0.021) were associated with knowledge of midwifes in neonatal resuscitation(44). But there were no significant association in their level of experience of neonatal resuscitation with academic qualification, work place, and year of service as a midwife well as knowledge scores and work experience.

Study conducted among pediatricians in India also shows that the participants who underwent neonatal resuscitation program(NRP) training were following correct practices as compared to those who had no training with respect to meconium stained liquor (80% versus 53.1%, P = 0.002)(41). But no significant difference was reported with respect to application of plastic/thermal wraps for extremely low birth weight babies (43.6% versus 34.9%, P = 0.33) and the use of bag and mask with room air was not significantly different (84.4% versus 82.4%, P= 0.49) between those who underwent NRP training and those who did not.

Study conducted in Ethiopia shows that there was no significant association in the knowledge score and the participants age , type of profession , qualification, year of service and place of previous work but, significantly different in terms of sex of the participants (36). The same study also reported there was no significant difference in skill scores of the participants in terms of sex, age, type of profession, year of service, qualification and place of previous work.

2.4.2. Institutional related factors

According to WHO recommendation and technical specifications, neonatal resuscitation equipment and supplies include bag with mask of different size, suction machine and catheter, suction bulb single use, stethoscope, weighting scale, syringes and drugs, neonatal resuscitation manual need to be in place(45).

Institutional factors are attributes to the health setup which may affect provider's performance of neonatal resuscitation and thereby neonatal outcomes. These factors may include availability of supplies and equipment, availabilities of guidelines, working unit, duration of working hours, supportive supervisions and work load(33, 39, 40, 43). A study conducted in India revealed that availability of equipment's like supplemental oxygen and CPAP in delivery unit can affect neonatal resuscitation practice and newborn outcome(46). A Tanzanian qualitative study shows that difficulties in interpreting clinical responses due to lack of resuscitation monitor delay subsequent actions during resuscitation(43).

An observational study conducted in Kenya revealed that health care professionals skill in key critical neonatal resuscitation steps in airway maintenance to initiate spontaneous breathing was affected by the availability of NR guidelines, action plans in NR, trainings and necessary equipment to provide care in the hospital(32). Similar study conducted in Kenya revealed that health system factors as availability of resuscitation equipment (p=0.001), place of keeping resuscitation equipment (p=0.021) and referring to guidelines (p=0.001) significantly affected neonatal resuscitation practice(47).

A study conducted in Ethiopia showed that health care providers who had training on neonatal resuscitation, guideline availability and availability of essential equipment were significantly associated with sufficient knowledge of neonatal resuscitation(39). In contrast, an Afghanistan study suggested that lack of equipment do not pose major barriers to poor neonatal resuscitation practice(33). Furthermore, the study reported that maintaining provider's competency towards neonatal resuscitation is challenging in facilities with no supportive supervision and low caseloads.

In general different studies have been done worldwide on knowledge and practice of neonatal resuscitation and its predictors with different recommendations, but still there are gaps that shows as the performance is still poor especial in low resource setting countries like Ethiopia. Those studies showed that provider related factors like sex, age .profession, level of education, qualification, training, work experience and attitude and institutional factors like hospital setup, work unit, availability of resuscitation materials, availability of guidelines, previous work place and unit, work load was associated to neonatal resuscitation knowledge and practice.

Hence, this study is aimed to assess knowledge and skills of neonatal resuscitation among health professionals and its associated factors that influence at selected public hospitals of Addis Ababa.

2.5. Conceptual frame work.

A conceptual framework was adapted for the current study from different literature sources (33, 39, 40, 43). As the diagram below shows, knowledge and practice of health professionals towards neonatal resuscitation can be affected by different provider and institutional factors. Also knowledge itself can affect practice of health professionals.

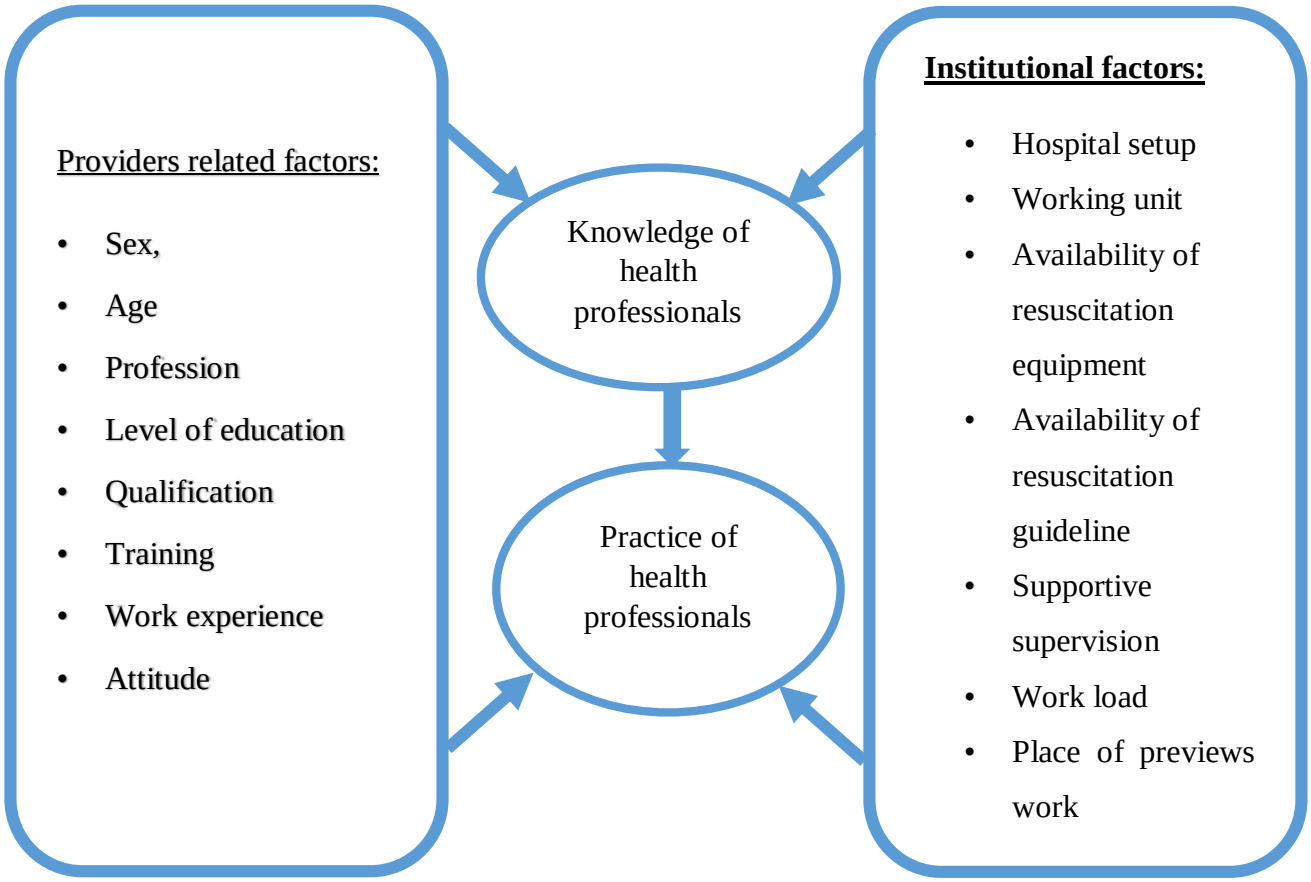

Figure 1: Schematic presentation of conceptual frame work for assessment of knowledge and practice of neonatal resuscitation among health professionals and its associated factors in selected public hospitals of Addis Ababa, 2020.

CHAPTER III

OBJECTIVES

3.1. General objectives

To assess knowledge and practice of neonatal resuscitation and its associated factors among health professionals working in intensive care units and delivery rooms at selected public hospitals of Addis Ababa, 2020.

3.2. Specific objectives

The specific objectives of this study are:

1. To assess knowledge of neonatal resuscitation among health professionals working in neonatal intensive care unit and delivery rooms at selected public hospitals of Addis Ababa, Ethiopia, 2020.
2. To examine practice of neonatal resuscitation among health professionals working in neonatal intensive care unit and delivery rooms at selected public hospitals of Addis Ababa, Ethiopia, 2020.
3. To identify factors associated with the knowledge and practice of neonatal resuscitation among health professionals working in neonatal intensive care units and delivery rooms at selected public hospitals of Addis Ababa, Ethiopia, 2020.

CHAPTER IV

METHOD AND MATERIALS

4.1. Study area

The study was conducted in Addis Ababa which is the capital city of Ethiopia with a population of 3,384,569 and annual growth rate of 2.7%(48). The population in the near future is expected to grow to exceed 6.5 million residents with the annual growth rate of the city has been estimated in recent years to be 3.8%(49). Its area is estimated to be 527 km^2 with altitudes ranging from 2,200 to 3,000m above mean sea level. The city has an average temperature of 16.3°C and average rainfall of 1143 mm(49).

In Addis Ababa there are a total of twelve public hospitals. Among these, two were excluded (Emmanuelle Psychiatric Hospital and Police hospital) which don't give delivery and neonatal intensive care service in the same institution. Public hospitals selected for this study were four referral hospitals of Addis Ababa, namely: Tikur Anbessa Specialized Hospital (TASH), Zewditu Memorial Hospital (ZMH), Gandhi Memorial Hospital (GMH) and Yekatit 12 Hospital(Y-12H).

Tikur Anbessa specialized hospital was established in 1965 E.C and run by ministry of health before it was handed over to Addis Ababa University in 1991 E.C. as a referral hospital. It provides the appropriate service in the internal medicine, surgical, pediatric, neonatology, gynecological and obstetrics, Oncology and rehabilitation departments. The hospital provides a tertiary level referral treatment and is open 24 hours for emergency services. Tikur Anbessa specialized hospital is one of the referral and teaching hospitals of Addis Ababa which has its own NICU and GYN-OBS departments with an admission. This hospital gives care for newborn babies who born in this hospital and also referred from other health facilities(50).

Health care providers for NICU were nurses, 2 neonatal specialists, pediatric residents, and neonatal nursing residents who gives supportive care as a student. In the unit there were 32 nurses. Pediatric residents were working in NICU, labor ward and pediatric unit with a monthly rotation. In OBS-GYN department there are 42 midwifes and GYN-OBS residents with monthly rotation to other hospitals.

But residents had monthly rotation with no fixed number. A total number of 136 residents with 64 pediatric and 72 GYN-OBS residents from AAU are distributed to those selected hospitals of Addis Ababa for their study.

Zewditu memorial hospital is in central Addis Ababa, Ethiopia. It was built, owned and operated by the Seventh-day Adventist Church at 1932 G.C, then nationalized during the Derg regime in about 1976 G.C. The hospital is named after Empress Zewditu, the cousin and predecessor on the throne of Emperor Haile Selassie. It has NICU and OBS-GNY department. In NICU and labor ward there are a total of 73 with 25 NICU Nurses and 48 midwifes. Number of GYN-OBS residents was not fixed because they had monthly rotation with different number. This hospital has no pediatric residents(51).

Gandhi Memorial Hospital was founded in 1948 G.C. It was purposely built for maternity and baby care. In NICU and labor ward, there are a total of 75 with 25 NICU nurses and 50 midwifes. It has pediatric and GYN-OBS residents who are the distributed from Addis Ababa University medical school of residency program. They have a rotation monthly the other selected hospitals(52).

Yekatit-12 Hospital was founded at 1922 G.C named as Bete Sayda and was known as Haile Selassie I Hospital at 1945, named after Emperor Haile Selassie I until the Ethiopian revolution of 1970s(53). Currently it is one of medical college in AA.it has GYN-OBS and NICU departments. In labor ward and NICU there are a total of 72, nurses with 42 midwifes and 30 nurses in NICU. It has also GYN-OBS and pediatric residents with monthly rotation. GYN-OBS residents are from St, Paulo's with average number of 16 within one month.

4.2. Study period

The study was conducted from March 26 - May 15, 2020 G.C.

4.3. Study design

An institution-based cross-sectional study was conducted in selected hospitals of Addis Ababa, Ethiopia.

4.4. Source population

The source populations were all nurses and midwives, all pediatric, Obstetrics and Gynecology residents working in hospitals located in Addis Ababa.

4.5. Study population

The study population were midwives and nurses working in delivery room and neonatal intensive care unit, all Pediatric and Obstetrics and Gynecology residents who are working in selected hospitals of AA.

4.5. Inclusion and exclusion criteria

4.5.1. Inclusion criteria

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

- All midwives and nurses working in delivery rooms of selected hospitals.
- All nurses working in neonatal intensive care units of selected hospitals.
- All 1st year, 2nd year, and 3rd year pediatric residents in selected hospitals.
- All 1st year, 2nd year, 3rd year and 4th year Obstetrics and Gynecology residents in selected hospitals.

4.5.2. Exclusion criteria

Nurses, midwives and residents who were not accessible during data collection period and on sick leave.

4.6. Sampling size and sampling procedure

4.6.1. Sample size determination

Single population proportion formula was used to estimate the sample size and with the following assumptions:

Based on the study conducted in North West Ethiopia on knowledge and practice of health professionals on neonatal resuscitation, a proportion of 56% (0.56) was used.

Level of significance 5% ($\alpha = 0.05$), 95 % confidence level ($Z \alpha/2 = 1.96$) and absolute precision or margin of error 5% ($d = 0.05$).

The following two formulas were used to calculate sample sizes.

$$no = \frac{(\frac{Z\alpha}{2})^2 \times p(1-p)}{d^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$nf = \frac{no}{1+\frac{no}{N}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

no= sample size before using correction formula,

nf= sample size after using correction formula

N= total numbers of study population which is **446**.

Using formula (1) the sample size (no) is **379**. But, since the source populations were small (<10,000) correction formula (formula 2) was used and added 10% non-response rate a total of **225** Samples were used for this study.

4.6.2. Sampling procedure

The researcher used a simple random sampling method to select the study settings. That means there were total of twelve (12) public hospitals in Addis Ababa. Among these, two were excluded (Emmanuelle Psychiatric Hospital and Police hospital doesn't give delivery and neonatal care service. From the rest ten (10) hospitals, four hospitals (TASH, ZMH, GMH and Y-12 Hospitals) were selected using simple random lottery method.

Samples of nurses and midwifes taken from NICU and delivery units of each respective hospitals by using simple random sampling method. A list of nurses and midwives was obtained from NICU and delivery units of each hospital. But samples of pediatric and GYN-OBS was taken from the total number those residents distributed from AAU to attend residentship program in selected hospitals. That was by reason of frequent rotation maximum one month stay in each hospital and no fixed number for rotation. During data collection time there was two rounds of rotation. They also had a chance to attach their study within three months for all those selected hospitals.

The list of pediatric and GYN-OBS residents were obtained from AAU Tikur Anbessa specialized hospital residency program list and adding 16 the rest of GYN-OBS residents from Y-12 Hospital those who were colleagues of another teaching institution. The sample size was proportionally allocated to each hospital and then to NICU and delivery units of each hospital

for those nurses and midwifes. Finally, estimated number of nurses and midwives were selected from NICU and delivery units of each hospital by simple random sampling method based on the number of source population in each hospital and working units. The sample size of residents proportionally allocated (grouped) to pediatric and GYN-OBS residents. Estimated number of pediatric and GYN-OBS residents were selected from their working hospitals assigned at data collection time. From total sample size of GYN-OBS residents the proportion of Y-12 Hospital (8 samples) was subtracted and samples were selected in this hospital of GYN-OBS department with simple random sampling method. For overall samples of health professionals, data collectors distributed self-administered questionnaire by selecting them with simple random sampling method and collected sheets with in a given time period

Table 1: Sample allocation for the assessment of knowledge and practice towards neonatal resuscitation from public hospitals of Addis Ababa, 2020.

SAMPLE ALLOCATION

Providers	**Total population**				**Sample**				
	Nurse	Midwives	PDR	GOR	Nurse	Midwives	PDR	GOR	**TOTAL**
TASH	32	42	64	86	16	21	32	45	**225**
ZMH	25	48			13	24			
GMH	25	50			13	25			
Y-12H	30	42			15	21			

Simple random sampling method

TASH = Tikur Anbessa Specialized Hospital

ZMH = Zewditu Memorial Hospital

GMH = Gandhi Memorial Hospital

Y-12H = Yekatit 12 Hospital

PDR = Pediatric Residents

GOR = Gynecology and Obstetrics Residents

Samples were allocated proportionally to each hospital based on the following formula:

$$nx = \frac{Nx \times nt}{N}$$

Where:

nx =Sample size of each hospital,

Nx=Source populations of each hospital,

nt = Total sample size **(225**)

N = Total source populations (**446)**

Samples were allocated proportionally to each profession based on the following formula:

where:

$$np = \frac{Np \times nx}{Nx}$$

Np = source population of each profession

np = sample size of each profession

4.7. Study variables

4.7.1. Dependent variables

- Knowledge toward neonatal resuscitation and
- Practice toward neonatal resuscitation.

4.7.2. Independent variables

Providers related factors:

- Sex,
- Age
- Profession
- Level of education
- Qualification
- Training
- Work experiences and
- Attitude
- knowledge

Institutional factors:

- Hospital setup
- Working unit
- Availability of resuscitation equipment
- Availability of resuscitation guideline
- Supportive supervision
- Work load
- Place of previews work

4.8. Definition of terms

Neonate: The baby after delivery up to the age of 28 days.

Resuscitation: Revive or restore life to a person with breathing and/or circulation difficulty.

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

Basic Newborn Resuscitation: Airway clearing (suctioning if required) head positioning and positive pressure ventilation via bag-and- mask.

Advanced Newborn Resuscitation: Basic neonatal resuscitation (as above) plus endotracheal intubation, supplemental oxygen, chest compressions, and medications.

Immediate assessment and stimulation of the newborn baby: Immediate assessment, warming, drying and tactile stimulation (rubbing with the drying cloth, rubbing the back or flicking the feet) of the newborn at the time of birth.

4.9. Operational definition

Knowledge: Awareness or understanding of health professionals about neonatal resuscitation. The participant's knowledge was assessed using a structured questionnaire consisting of 31 items. Those answered correctly for each question given as a score one and those wrongly answered scored as zero. Each score was summed and converted to percentile. The total knowledge score of the participant's was ranged from minimum zero to maximum 100 within this continues variable. The higher the score would have the better the knowledge about neonatal resuscitation.

Practice: Actual application of neonatal resuscitation among health professionals through interview questionnaires. Participant's practice of neonatal resuscitation was assessed using a self-reported questionnaire consisting 16 items. Those answered correctly for each question

given as a score one and those wrongly answered scored as zero. Each score was summed and converted to percentile. The total practice score of the participant's was ranged from minimum zero to maximum 100 within this continues variable. The higher the score would indicate better neonatal resuscitation practice.

Attitude: Felling of health professionals about neonatal resuscitation. The participant's attitude was assessed using an 8 item likert scale. The scale had 5-point response options that range from strongly disagree one point to strongly agree five points. The total scale was summed and it ranged from 1 to 40 then converted to percentiles in minimum 2.5% and maximum 100% with in this continues variable. The higher score indicating a more positive attitude towards neonatal resuscitation.

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

Work load: Health professionals who serve for more than 5 neonates/24 hours and/or who works for more than 8hours/24hours according to Ethiopian pediatric society.

4.10. Data collection tools and procedure

Data collection tool of this study was organized by the researcher using previous similar kind of literatures, WHO guidelines(54), 2015 American Heart Association guidelines(55), Help Babies Breath(HBB) 2nd edition knowledge assessments, and Ethiopian Pediatric Association Guidelines(56). The tool consists of structured self-administered questionnaire addresses socio-demographic, knowledge and practice questions about basic neonatal resuscitation procedures and advanced CPR, provider and institutional characteristics. It was pretested on 5% (12 participants) of the total sample size in St Paul's Millennium Medical College prior one week of actual data collection period. Based on the result of the pretest, ambiguous questionnaire and interview guides were modified for clarity and consistency.

For data collection procedure, six health professionals (four BSc nurse data collectors and two BSc midwife supervisors) were involved. One day training about data collection procedure given for those data collectors and supervisors regarding the study purpose, on how to conduct the interview, how to administer self-administered questionnaire, how to take consent, keep

confidentiality and respect the right of the participants. Data collectors were assigned to each selected hospital and they distribute self-administered questionnaire to health care providers randomly based on source of population and sample size of each unit. Time allowed to finish the total questions was 45 minutes. Data collectors were observing the participants and collect answer sheets with in a given time period.

4.11. Data quality control

Before the actual data collection period, tool was pretested on 5% (12 study participants) of the total sample size in another hospital of AA. Based on the result of the pretest, ambiguous items in questionnaire and interview guides were modified for clarity and consistency.

Data collectors were selected from other hospitals to prevent social bias. Supervisors were visiting daily the process of data collection, delivery of the instrument, reviewing the recorded data readability, reliability and odd indicators written as clearly or not.

4.12. Data processing and analysis

The study results (data) was verified, coded and entered to Epi Data 4.6 Software(57) and then exported into SPSS version 26 Software for analysis(58). The analysis result was described using descriptive analysis: frequency, percentage standard deviation and mean, using tables, figures and texts. Simple and multiple linear regression analysis method used to identify factors associated with the health professionals' knowledge and practice of neonatal resuscitation. Those variables that had P value $\leq$ 0.25 in simple linear regression and met assumptions of linear regression were taken to the multiple linear regression model to adjust for possible confounder. Significance level below 5% and 95% confidence interval used to determine the statistical significance of association between variables. Finally, variables with $p<0.05$ in the multiple linear regression analysis were considered to declare statistically significant associations between covariates with knowledge and practice of health professionals towards neonatal resuscitation.

4.13. Ethical considerations

Ethical clearance obtained from School of Nursing and Midwifery, Addis Ababa University Health Science College Institutional Research Ethical Review Board (IRB), Department of Pediatric Research Committee (DPRC). Ethical clearance and permission also obtained from

School of Nursing and Midwifery, Addis Ababa public health research and emergency management core processes and selected government hospitals. Permission also obtained from each heads of respective ward. Study participants were asked for their willingness to participate in the study, explained why the participants were chosen, no possible risks rather the time needed to complete the questionnaire, why the research was being conducted, obtaining informed consent from each participant verbally and written done to the study subjects. The researcher explained the right not to participate in the study, to stop at any time in between or not to answer any questions that they were not willing to answer were also tasks of data collector. Name and personal identifiers were not recorded on the questioner to maintain confidentiality of the participants.

4.14. Dissemination of the result

The result of the study was submitted and presented to the School of Nursing and Midwifery, College of Health Sciences at AAU as partial fulfillment for the requirement of master's degree in neonatal nursing. The final result of this thesis already accessed from AAU, Health Science College library as the source for future learning. It will also be disseminated to Addis Ababa public health research and emergency management core processes, ministry of health which can provide basic information about the health professionals' knowledge and practice towards the delivery of quality health service for neonates. It will also be submitted to national or international peer review Journals for possible publication.

CHAPTER V

RESULT

5.1. Providers perception, socio-demographic and institutional characteristics.

A total of 225 health professionals were included with a response rate of 96% from NICU and delivery units of four referral hospitals of AA. Most of the participants 72(32.9%) were from TASH and the rest were from the other hospitals (Table 3). Regarding the work place 120(55.6%) were previously working in delivery and maternity units. Majority of the participants 135(62.5%) were from labor ward and 81(37.5) from NICU. In terms of field of study, higher the number 88(40.7%) were midwifes and the least 14(6.7%) neonatal nurses. According to educational level majority of them 128(59.3%) were BSc and the least 2(1%) MSc degree holders. Female accounts 128(58.3%) and male 90(41.7%) of the participant. The maximum and minimum age of the participants were 48 and 23 years respectively with mean of 29.41(SD=4.02). Majority of the participants 111(51.4%) were between the age of 25 and 29 years. Minimum and maximum attitude score of the participants were 15(37.5%) and 39(97.5) respectively with standard deviation (SD=12%). (Table 3).

5.2 Knowledge scores of the participants towards neonatal resuscitation.

This study had showed that the overall knowledge scores of the study participants about neonatal resuscitation ranges 23.53% to 85.29% out of 31 items with the mean percentage score of 62.73%(SD= 12.7%). (Figure 2). In terms of field of study minimum and maximum knowledge score was observed for midwifes and Gyni-Obs residents respectively. Minimum mean(63.5%) and maximum mean(77%) knowledge score was observed on comprehensive nurses and Gyni-Obs residents respectively among participants according to field of study. (Table 2).

5.2.1 Knowledge scores of the health professionals in different steps of neonatal resuscitation.

In this study the most frequent correctly answered neonatal resuscitation procedures were routine care techniques dry, remove and skin to skin 196(90.7%), correct position of the neck slightly extended during resuscitation 196(90.7%), preferred medication for neonatal

resuscitation 196(90.7%), immediately after birth baby should be kept on mothers abdomen 192(88.9%), mask should cover mouth, nose and part of the chins 183(84.7%), ratio of chest compression to ventilation 3:1, 179(82.9), indication to give volume expander shock 174(80.6%) of the participants. (Table 4).

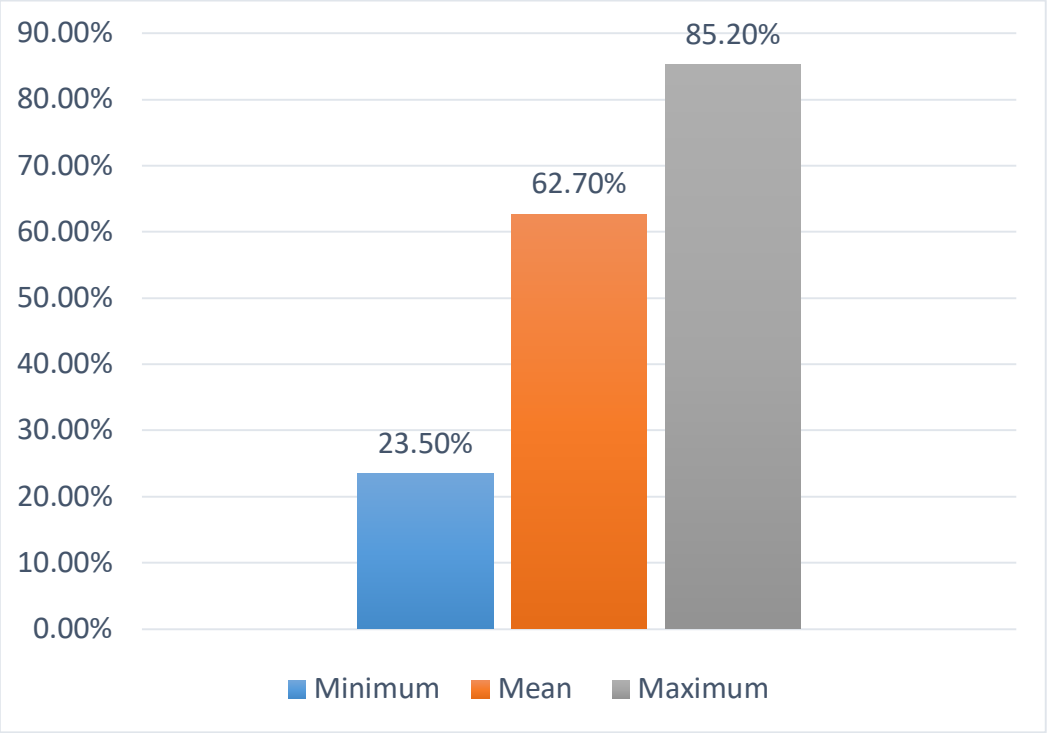

Figure 2: Knowledge scores of the participants towards neonatal resuscitation at selected public hospitals of Addis Ababa, June, 2020.

Table 2: Knowledge scores of participants towards neonatal resuscitation in terms of field of study at selected public hospitals of Addis Ababa, June, 2020.

Field of study	Mean(SD)%	Minimum (%)	Maximum (%)
Comprehensive nurse	63.5(14.8)	32.3	79.4
Neonatal nurse	63.8(12.7)	32.3	73.3
Midwifes	65.8(14.5)	23.5	82.3
Pediatric residents	74.5(11.6)	38.3	82.3
Gynecology and obstetrics residents	77(7.7)	52.9	85.2

Table 3: Provider and institutional characteristics of the health professionals at selected public hospitals of AA, June, 2020.

Variables	Categories	Frequency (n)	Percent (%)
Sex	Male	90	41.7
	Female	126	58.3
Age(years)	20-24	13	6
	25-29	111	44.4
	30-34	74	34
	35-39	11	5.1
	>40	7	3.2
Field of the study	Compressive nurse	40	18.5
	Neonatal nurse	14	6.5
	Midwifery	88	40.7
	Pediatric resident	31	14.4
	Gyni-Obs resident	43	19.9
Educational level	Diploma	12	5.6
	BSc Degree	128	59.3
	MSc Degree	2	0.9
	1st year resident	24	11.1
	2nd year resident	17	7.9
	3rd year resident	21	9.7
	4th year resident	12	5.6
Work experience (Total)	<5 years	101	46.8
	5-10 years	97	44.9
	11-20 years	16	7.4
	>20 years	2	0.9
Work experience (neonatal care)	<5 years	167	77.3
	5-10 years	46	21.3
	11-15 years	3	1.4
Resuscitation training	Yes	89	41.2
	No	127	58.8
Hospital	TASH	71	32.9
	GMH	56	25.9
	ZMH	45	20.8
Previous work unit	Y-12	44	20.4
	NICU	16	7.6
	Delivery or maternity	120	55.6
	Pediatric	46	21.3
	Other	34	15.7
Resuscitation corner	Present	147	68.1
	Absent	69	31.9
Full resuscitation material	Present	53	24.5
	Absent	163	75.5
Resuscitation guideline	Present	119	55.1
	Absent	97	44.9
Supportive supervision	Present	40	18.5
	Absent	176	81.5
Work load	Yes	109	50.5
	No	107	49.5

Table 4: Responses given by health professionals for selected knowledge questions from public hospitals of Addis Ababa June, 2020.

Questions	RESPOSES	
	Correct n (%	Incorrect n(%)
Slightly extended neck for resuscitation of the new born	196(90.7)	20(9.3)
Routine care dry, remove and skin to skin	196(90.7)	20(9.3)
Preferred medication for resuscitation	196(90.7)	20(9.3)
Immediately after delivery newborn should be placed on the abdomen	192(88.9)	24(11.1)
Mask covers mouth, nose and tip of chine during resuscitation.	183(84.7)	33(15.3)
Ratio of chest compression to ventilation 3:1	179(82.9)	37(17.1)
Indication to start volume expander shock	174(80.6)	42(19.4)
Baby not respond for initial step	165(76.4)	51(23.6)
Indications to suction	165(76.4)	51(23.6)
Indication to start chest compression HR<60 Bits per min	160(74.1)	56(25.9)
Corrective measure if chest not moving during BMV, reapply the mask.	156(72.2)	60(27.8)
Wiping meconium from face and nose before delivery	140(64.8)	76(35.2)
Ventilation should be commenced within one minute	122(56.5)	96(43.5)
Suctioning unnecessary can cause	120(55.6)	96(44.4)
Chest compression techniques	114(52.8)	102(47.2)
A measure that can be done for persistent apnea after birth.	105(48.6)	111(51.4)
Depth of chest compression is 1/3rd of the anterior posterior diameter.	91(42.1)	125(57.9)
Assessing HR of the baby within 30 seconds after given epinephrine	77(35.6)	139(64.4)
Correct method to stimulate the baby	69(31.9)	147(68.1)
Helping to breath for baby born with meconium	45(20)	171(80)
Best source of gas during neonatal resuscitation room air	39(18.1)	177(81.9)

5.2.2. Knowledge scores in different groups of participants for selected neonatal resuscitation procedures.

Mean knowledge score of participants who had training was 70.1 % (±10.2%) with minimum and maximum range of 38, 2% and 85.3% respectively. From 40 comprehensive nurses, 52.5% of them correctly answered compression pressured needed that 1/3 of AP diameter. Two-thirds (62.5%) of nurses answered indication to start chest compression was HR < 60/minutes. For a

question of best indicator to effective ventilation, 52.5% of nurses answered correctly that chest movement is better. Among 31 pediatric residents, a quarter (25%) of them answer correctly for how deep pressure used for chest compression. For a baby born with meconium and to initiate breathing only, 12% of pediatric residents answered correctly that assess and stimulate first. For how long continuing CPR before reassess heart rate was correctly answered by 41.9% of pediatric residents. For persistent apnea after birth, 54.8% of pediatric residents answered correctly that give positive pressure promptly. (Table 5).

Among a total of 88 midwifes, 55.7% of them correctly answered that ventilation should be initiated with in one minute for a baby not initiate breathing immediately after birth. Situations indicated to suck a newborn when there is secretion is responded correctly by 63.3% of midwives. For a baby born with meconium with no breathing effort, 28.4% of midwives answered correctly that assess, stimulate first. For correct stimulation method 25.5% and wiping meconium from the face when head appears first, 60.6% of Gyni-Obs residents answered correctly. (Table 5)

Table 5: Mean knowledge score of health professionals on major selected neonatal resuscitation procedures **(**Mean (%), SD) based on field of study at selected public hospitals of Addis Ababa June, 2020.

Resuscitation Procedures	Field of study				
	Comprehensive nurse	**Neonatal nurse**	**Midwife**	**Pediatric resident**	**Gyni-Obs resident**
BMV	51.2 %(±16.7)	55.3 %(±13.6)	49 %(±15.4)	53.6 %(±14.5)	57.3 %(±13.7)
Medication	67 %(±24.3)	53.6 %(±31.5)	63.8 %(± 25.1)	83.9 %(±19.5)	86.4 %(±14.2)
Meconium present	54 %(± 25.4)	55.3 %(±17.5)	51.7 %(±25.9)	56.4 %(±21.4)	58 %(±17.9)
Initial steps	61 %(± 19.5)	65.7 %(± 17.4)	68.9 %(± 17)	74.5 %(±14.6)	76.5 %(±13.4)
Chest compression	53 %(±19.2)	60%(±15.75)	55 %(± 21.4)	64.5 %(±12.3)	63.7 %(±17)

5.2.3 Predictors for knowledge of health professionals towards neonatal resuscitation.

To identify the associated factors between knowledge and providers/institutional characteristics, simple linear regression was with the following independent variables: age of health care provider, gender, field of study, educational level, total year of service, year of experience in neonatal care, neonatal care or resuscitation training, last time of training, attitude, previous work place and unit, working unit, presence of resuscitation corner and full

equipment, material store, having supportive supervision, presence of guidelines, work load, delivery and NICU same floor.

Variables that were associated with knowledge score ($p \leq 0.25$) in linear regression before running the multiple regression, the data was first checked against the basic assumptions of multiple regression. There was no independence of variables (Durbin-Watson value between 1.83). On the scatter plot there is no outliers as all dots were lies between -3 and +3 which is good fit for the assumption of multiple regression. Linearity was good assessed by partial regression plot and standardized residuals against the predicted values. The assumption of normality is met assessed by visualized normally distributed histogram. For the of assumption multicollinearity, tolerance model that it must be ≥ 0.2, all tolerance scores were greater than it and correlation analysis also showed all values are below 0.6 so that there was no evidence for multicillinearity.

5.2.4. Results of multiple linear regression analysis for outcome variable knowledge.

This study shows that there was significant association between neonatal resuscitation training ($p=0.003$), last training time ($p=0.000$), higher educational level ($p=0.000$) and attitude (0.001) of the participants. Among all regressed predictor variables, attitude ($\beta = .169$, $t = 3.254$, $p < 0.05$), previous training ($\beta = .246$, $t=2.98$, $p<0.05$), last training time ($\beta = .337$, $t=4.33$, $p<0.05$) and educational level ($\beta=.433$, $t=5.9$, $p< 0.05$) were significant as they greatly contributed to the variance. (Table 6).

In this model, if attitude score increases by 1 SD, then we can predict perceived knowledge of participants increase by 0.169 SD. Compared to professionals who did not have previous training those who had training scored higher on the knowledge test. When comparing last time of training more than two years those who had training recently, last 3 month, last one year scored higher on knowledge test. Compared to professionals those who are diploma and degree holder, those who are practicing post graduate residentship program scored high on knowledge tests.

Table 6: Multiple linear regression model of factors associated with health professionals' knowledge of neonatal resuscitation at selected public hospitals of Addis Ababa, June, 2020.

	Coefficients			**t**	**p-value**	**Multicollinearity statistics**	
Model 1	B	Std. Error of B	Beta (β)			**Tolerance**	**VIF**
(Constant)	42.822	4.870		8.793	.000		
Field of study	3.273	1.947	.129	1.681	.094	.395	2.532
Gender	-1.743	1.364	-.068	-1.278	.203	.826	1.211
Resuscitation corner	1.764	1.491	.065	1.183	.238	.773	1.294
Resuscitation material	-4.174	2.935	-.69	-1.422	.156	.982	1.019
Higher educational level	**11.579**	**1.960**	**.433**	**5.906**	**.000****	**.431**	2.319
Last training time(< 2 years)	**9.504**	**2.195**	**.337**	**4.330**	**.000****	**.382**	2.616
Previous work unit	.580	1.619	.022	.358	.720	.610	1.638
Had Training	**6.345**	**2.127**	**.246**	**2.983**	**.003****	**.341**	**2.936**
Attitude score	**.179**	**.055**	**.169**	**3.254**	**.001****	**.860**	1.163
Year of experience on neonatal Care	.022	.305	.004	.071	.943	.694	1.442
Dependent Variable: Knowledge score							

Key: ** = Highly significant, VIF = Variance inflation factor

5.3. Practice scores of participants towards neonatal resuscitation.

In this study the overall mean practice score of health professionals was 59.5% (SD =14.8%) with minimum and maximum score of 22.22% and 94.4% respectively. (Figure 3). The minimum (22.2%) and maximum (94.4%) of practice score was observed among midwifes and Gyni-Obs residents respectively. Over all mean practice score of comprehensive nurses, neonatal nurse, midwifes, pediatric and Gyni-Obs residents were 63 %(±11), 67(±10.7), 53.9 %(±14.9), 63.2 %(±15.5) and 62 %(±15.3) respectively. Whereas minimum mean (53.9%) and maximum mean (67%) practice score was also observed among midwifes and neonatal nurses respectively. (Table 7).

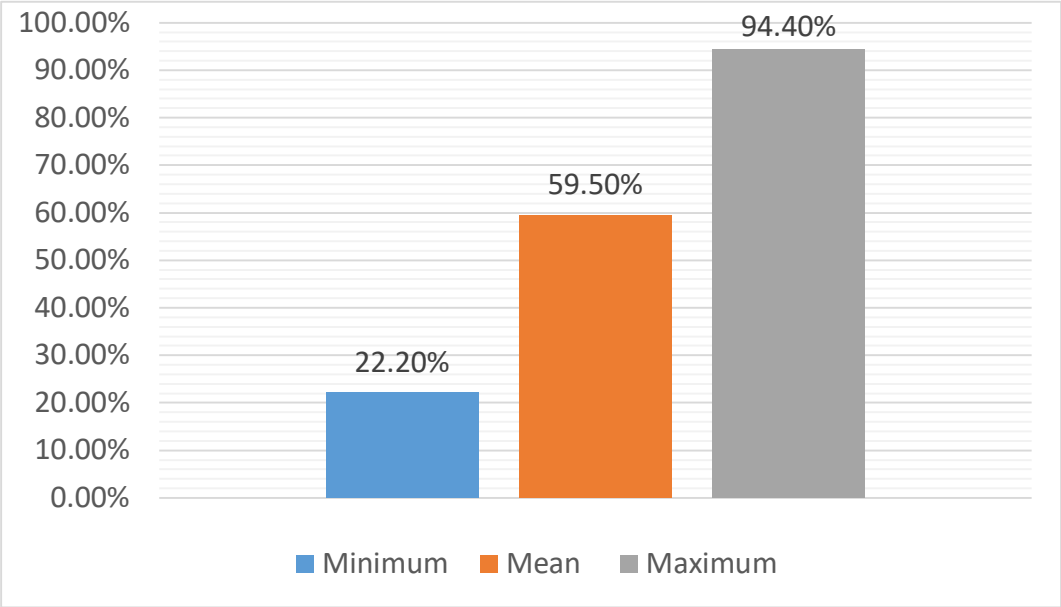

Figure 3: Practice scores of participants towards neonatal resuscitation at selected public hospitals of Addis Ababa, June, 2020.

Table 7: Mean practice score of the health professionals in terms of field of study at selected public hospitals of Addis Ababa, June, 2020.

Participant	Overall mean score (%)	Minimum (%)	Maximum (%)
Comprehensive nurse	63(±11)	38.9	83.3
Neonatal nurse	67(±10.7)	44.4	83.3
Midwife	53.9(±14.9)	22.2	88.8
Pediatric resident	63.2(±15.5)	33.3	88.8
Gynecology and-Obstetric resident	62(±15.3)	27.7	94.4

5.3.1. Health professionals practice score in different steps of neonatal resuscitation.

Almost all participants (98.1%) participated in different procedures of neonatal resuscitation. Majority (96.2%) performed BMV, 154(72.6%) CPR and 31(14.6%) participants practiced endotracheal tube insertion resuscitation procedure. More than half of study participants (56%) did not routinely apply plastic wrap for extremely low birth weight babies. Whereas (70.4%)

of them didn't check resuscitation materials regularly. Majority of the participants (71.3%) resuscitate a newborn in dedicated new born corner and the rest (28.6%) did anywhere in unit.

While 131(60.6%) of the participants incorrectly began practice to resuscitate meconium stained newborns initially. Most of participants (78.7%) began to resuscitate term and non-breathing newborn incorrectly that they mostly used O2 with cylinder for ventilation. More than half of the participants (67.1%) used saturation monitor for resuscitation while 152(51.9%) of them didn't use CPAP and half of participants (50.5%) perform CPAP beginning pressure level incorrectly. Almost 64% of participants practice incorrectly to resuscitate a newborn who had a systole and not improving with the initial steps. (Table 8).

Table 8: Responses most frequently given for selected practice questions towards neonatal resuscitation among health professionals from public hospitals of Addis Ababa, June, 2020.

Questions	yes	No
Resuscitating newborn on dedicated corner	154(71.3%)	62(28.7%)
Use saturation monitor during neonatal resuscitation	145(67.1%)	71(32.9%)
Begin CPAP with pressure of 5 centimeter initially	107(50.5%)	109(49.5%)
Apply plastic wrapping for extremely low birth weight	895(44%)	121(56%)
Resuscitating a baby born with meconium stained stimulate initially	85(39.4%)	131(60.6%)
Resuscitating preterm in respiratory distress with CPAP	85(39.4%)	131(60.6 %)
Resuscitating newborn having systole not more than 20 minutes or less	78(36.1%)	138(63.9%)
Checking resuscitation materials regularly	64(29.6%)	152(70.4%)
Begin resuscitating term new born with room air	46(21.3%)	170(78.7%)

5.3.2 Mean practice score of health professionals on major neonatal resuscitation procedures.

The mean practice score of health professionals in appropriate use of materials was 80.6 %(SD=17.4%), 91 %(SD=21%), 38 %(SD=23%), 85.4 %(SD=12.5%), 47.6 %(SD=27.2%) respectively for comprehensive nurse, neonatal nurse, midwifery, pediatric residents and Gyni-Obs residents. Whereas midwifes and residents readiness and preparedness to resuscitation had

mean practice score below 50% except neonatal nurse and compressive nurse had 58.9 %(SD=31%), 51 %(SD=27%) respectively. (Table 9).

Table 9: Mean practice score of health professionals on major neonatal resuscitation procedures (mean (%), SD) in terms of field of study at selected public hospitals of Addis Ababa June, 2020.

Resuscitation Procedures	Field of study				
	Comprehensive nurse	**Neonatal nurse**	**Midwife**	**Pediatric resident**	**Gyni-Obs resident**
Readiness to NR	51.2%(±27)	58.9%(±31	29.8%(±20.7)	36.2%(±24.8)	31.9%(±19.9)
Initial steps of NR	46.2%(±22.3)	39.2%(±18.9)	44.9%(± 20.8)	40.3%(±27.8)	47%(±22)
CPR practice	49.6 %(±18.6)	56.1 %(±14.2)	42.3%(±20.1)	61.7%(±19.3)	53.8 %(±13.1)
Appropriate use of materials	80.6(±17.4)	92%(±21)	38%(±23)	85.4%(±12.5)	47.6%(±27.2)

5.3.2. Predictor variables affecting practice of health professionals towards neonatal resuscitation.

To identify the potential predictors practice and providers/facility characteristics, simple linear regression was tested with the following independent variables: age of health care provider, gender, field of study, educational level, total year of service, year of experience in neonatal care, neonatal care or resuscitation training, last training time attitude, previous work place and unit, working unit, presence of resuscitation corner and full equipment, material store, having supportive supervision, presence of guidelines, work load, delivery and NICU the same floor and knowledge score itself.

Before multivariate analysis assumption testing was done for variables that were associated ($p \leq 0.25$) with practice score by linear regression. There was no independence of variables (Durbin-Watson=1.78). On the scatter plot there is no outliers as all dots were lies between -3 and +3 which is good fit for the assumption of multiple regression. Linearity was good assessed by partial regression plot and standardized residuals against the predicted values. The assumption of normality is met assessed by visualized normally distributed histogram. For the of assumption multicollinarity, tolerance model that it must be ≥ 0.2, all tolerance scores were greater than it and correlation analysis also showed all values are below 0.6 so that there was no evidence for multicillinearity.

5.3.3. Results of multiple linear regression for dependent variable practice.

Among all regressed predictor variables attitude (β= .138, t= 2.354, p=.020), knowledge (β=.414, t= 5.697, p=.000), and availability of guidelines (β=.188, t= 3.436, p=0.001) had a significant positive association for the health professionals practice of neonatal resuscitation. Whereas, educational level (β=.-163, t =2.005, p= 0.046) was significantly associated to practice of participants as a negative correlation. **(**Table 10).

Table 10: Multiple linear regression model of factors associated with health professionals' practice of neonatal resuscitation at selected public hospitals of Addis Ababa, June, 2020.

Model		Coefficients			t	p-value	Multicollinearity statistics	
		B	Std.Error of B	Beta (β)			Tolerance	VIF
1	(Constant)	9.218	10.929		.843	.400		
	Attitude	**.171**	**.073**	**.138**	**2.354**	**.020***	.804	1.244
	Training had	3.731	2.119	.123	1.761	.080	.561	1.782
	Previous work unit	-3.008	2.158	-.098	-1.393	.165	.559	1.788
	Higher educational level	**-5.131**	**2.559**	**-.163**	**-2.005**	**.046***	.415	2.412
	Material availability	4.620	3.757	.065	1.230	.220	.973	1.028
	Field of study	-3.070	2.492	-.103	-1.232	.219	.393	2.542
	Age	.060	.241	.016	.248	.804	.645	1.551
	year of service on Neonatal Care	.698	.426	.113	1.640	.103	.581	1.721
	Knowledge	**.485**	**.085**	**.414**	**5.697**	**.000****	.520	1.924
	Guideline available	**5.622**	**1.636**	**.188**	**3.436**	**.001****	.920	1.087
	Work load	3.252	1.680	.109	1.936	.054	.863	1.159
	Lack of oxygen	-2.638	1.668	-.085	-1.581	.115	.941	1.062
Dependent Variable: practice score percentage								

Key: ** = Highly significant, * = significant, VIF = Variance inflation factor

In this model, if attitude score increases by 1 SD. we can predict perceived practice of participants increase by 0.138 SD. whereas if knowledge score increases by 1 unit we can predict perceived practice increase by 0.414 unit. Professionals who were working in setting where guidelines are available had higher score in self-reported practice questionnaire

compared to those who were working in settings where guideline are not available. Comparing professionals who were attending postgraduate residentship practice as seniority with those who were diploma and degree holders scored higher in self-reported practice questionnaire.

In this model training, previous work unit, resuscitation material availability, age, field of study, year of service on neonatal care, work load and lake of oxygen were not significantly associated with the practice score of health professionals.

CHAPTER VI

6.1. DISCUSSION

This study was intended to assess knowledge, practice and associated factors towards neonatal resuscitation among health professionals in public hospitals of Addis Ababa. Effective resuscitation is one of the most important procedure to prevent asphyxia related complications. For good outcome of effective resuscitation appropriate knowledge and practice of health professionals is needed. Understanding the level of knowledge, practice and its predictors could provide base line information for health care planning and quality improvement policy.

This study showed that health professionals possess lower overall mean score in neonatal resuscitation knowledge test. Low level of knowledge score could be due to limited in service training and limited inclusion of neonatal resuscitation protocol in undergraduate education program of health professionals. Thus, continuous training and updating educational program of health professionals need to be encouraged. This result is different from study done in Northern Ethiopia(39) and North West Ethiopia(36). The difference might be due to educational level improvement and time of neonatal resuscitation training that close to data collection period.

In this study midwifes had the mean knowledge score of 63.8%. This finding was parallel to a study done in Afghanistan 66% of the mean score(33). This result was higher than a study done in North West Ethiopia mean knowledge score of 53%. The difference might be quality of training and exposure of the participants for advanced neonatal resuscitation procedure. Mean knowledge score of nurses was 64.8% which is similar to a study done in Nepal 66 %(34). This finding is less than Nigerian's study that almost all the nurses had adequate knowledge(37). The difference of this result might be participants could have recent neonatal resuscitation training to data collection period and positive attitude towards neonatal resuscitation gained form training. Mean knowledge scores of pediatric and Gyni-Obs residents were 74.5% and 77% respectively. This result is higher than study done in North West Ethiopia 42.8% and 43% respectively(36). The difference might be due to availability of guidelines and exposure to advanced neonatal resuscitation procedure and quality of training given to the residents.

This study showed the overall mean practice score of health professionals was 59.5% (SD=14.8%). This might contribute for poor resuscitation performance and there by asphyxia

related complications. This finding was sharply comparable with the study done in North West Ethiopia (54.35%)(36) and highly different to the study done in Kenya (86%)(40). This high difference practice score might be due to unavailability of materials, absence guideline, and low coverage of refreshment training and supportive supervisions. This study finds that 43% of midwifes practice score was less than 50%. This finding was different to a study done in Afghanistan 83% of midwifes confident in practice(33). This low level of skill and highly difference might be due to less coverage of training, absence of guidelines, absence of supervision, and high level of negative attitude towards neonatal resuscitation. This might causes a less performance during resuscitation and asphyxia related complications. Thus, it is necessary updated refreshment training, supportive supervision and updating guidelines. Mean practice score of midwifes was 53.9 %(SD=14.9%). This finding was consistent to a study done in Gonder teaching hospital that was 56.6%(36). This achievement could be due to quality and last training period, quality of training given during undergraduate course for neonatal resuscitation procedure.

The mean practice score of nurses was 63% with minimum and maximum score of 38% and 83% respectively. This finding was comparable to a study done in Ethiopia (56%)(36) and high difference of minimum and maximum score could be due to training coverage, availability of materials and attitude of the participants. So it is important to encourage in-service training and continues supportive supervision. The mean practice score for pediatric and Gyni-Obs residents was 63% and 63% respectively that was higher than a study done in Ethiopia it was 47.5% and 55 % for pediatric and Gyni-Obs residents respectively(36). The discrepancy might be due to simulation-training and exposure of actual advanced neonatal resuscitation procedure during undergraduate and post graduate program. The minimum and maximum practice score of pediatric residents was 33.3% and 88.8% with a range of 55.5%. Similarly, the maximum and minimum practice score of Gyni-Obs residents was 27.7% and 94.4% with a range of 67.1%. This high score difference might be due to coverage and quality of resuscitation training given for residents, attitude and quality of resuscitation education and practice during undergraduate and postgraduate course.

This study shows that training (p=.003) and last training time less than two years (p=.000) were significantly associated with knowledge level of health professionals. This was similar to the study done in South Sudan(42) that showed knowledge increased post training test but after some time it was decline at three month, six month and one year after training. This was also

similar to study done in Afghanistan, India, Ghana and Ethiopia revealed training had a forward impact on health professionals' knowledge(33, 38, 39, 41). This study also showed educational level strongly associated with knowledge. This was consistent to a study done in Ghana(38). This effect might be due to difference in course contents during undergraduate and post graduate education. Attitude was one of significant predictor that is positive correlation with knowledge in this study. This was consistent with Tanzanian study(43). This could be due to non-caring feeling, fearing and anxious to care, feeling not the major role for the profession. So a better positive attitude might yield better knowledge level of health professionals. Thus, it is needed to improve quality of training and frequency of training to yield a better attitude. In this study there was no significant difference in the knowledge score of participants in terms of field of study, gender, resuscitation corner, resuscitation material, previous work unit and year of experience on neonatal care.

In this study better knowledge was significantly associated with practice level of health professionals. This study was parallel to Nepal study that shows statistically significant positive correlation between the knowledge and practice score of participants (34). This could be due to having a better knowledge can give a courage and better confidence to perform a practice. This study also showed availability of guideline a significant factor had a positive correlation to skill level. This was consistent to a study done in Kenya(32) and northern Ethiopia(39). This may be a probability guidelines gives a protocol and updating knowledge makes better skill for health professionals. Attitude also significantly associated with positive correlation of participants practice score in this study. This was parallel to a study done in Tanzania(43). This might be due to a better positive attitude of participant probably gives feeling of strongly responsible and of doing a better practice during neonatal resuscitation.

In this study educational level was significantly associated with negative correlation for practice level of nurses, midwifes and residents. This might be due to attitude difference of participants and feeling not being responsible and not the major role of their qualification and profession. It may be also senior residents leave this practice for the junior one and might make them to forget the practice. This study shows that there was no significant association between practice and training, previous work unit, material availability, field of study, age, year of service on neonatal care, work load, and lack of oxygen.

6.2. Strength and limitation of the study

Study tools used for data collection were adopted from validated sources and its contents were almost covers all the major steps of neonatal resuscitation. Researches on neonatal resuscitation in developing country remains low despite high prevalence of asphyxia and related complications. This study also might give knowledge and skill scores of important participants during neonatal resuscitation and predictors.

The major challenge for this study was shortage of time that most hospitals had their own criteria to give clearance that took a long time. Also data collection procedure that needs meeting participants as usual despite stay safe, stay at home current pandemic criteria. Other also assessment of practice using interview guide rather observational check list due to unexpected cases of asphyxia and short study period.

6.3. Conclusion

In conclusion, the overall knowledge and practice score of health professionals was low. Training, last training time, educational level and attitude of the participants significantly associated with knowledge scores of nurses, midwifes, pediatric and Gyni-Obs residents. Whereas Attitude, educational level, availability of guidelines and knowledge were significantly associated for practice score of those participants.

6.4. Recommendation

Based on the finding from this study, educational curriculum planners of health science and medicine should include neonatal resuscitation training program to undergraduate and postgraduate course.

Neonatal resuscitation is simple procedure that saves newborn life and improve quality of life for those coming in this word through asphyxia. So health professionals should update themselves with the available technology to improve their knowledge and practice.

Hospital managers and decision makers also need to provide periodic supportive supervision and refreshment training to update knowledge and practice of health care providers.

Further observational study on knowledge and practice should be conducted to assess the quality of care and appropriateness of practice toward neonatal resuscitation.

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ANNEXES

Annex I: Participants information sheet and consent

Hello, my name is_____I am a member of research team working to assess knowledge, practice and associated factors towards neonatal resuscitation among health professionals from public hospitals of Addis Ababa 2020, by Fatuma Arage who is studying for her Master's degree at Addis Ababa University, Collage of Health Science Department of Nursing and Midwifery. I kindly request you to give me you're a few minutes to fill this self-administered questionnaire about the study and be selected as the study participant.

Purpose of the study: the main aim of this study is to prepare thesis for partial fulfillment of the requirement for masters of Science in neonatal nursing by investigator. This study is expected to provide input for appropriate change in policy and program for improving the service delivery quality through improving providers' skill and knowledge toward neonatal resuscitations.

Study procedure and period: you and other study subjects are selected by simple random sampling method from NICU and delivery units of public hospitals of AA from March first to April 30, 2020. The questionnaire contains 47 knowledge and practice questions, and 28 health care provider and institutional characteristics.

Confidentiality: the collected information will be kept confidential and used only for research purposes. No one except the members of the research team will have access to the information collected. The personal information of the respondents will not be notified. The findings of the study will be generalized for the study population and it will not reflect anything specific of individual participants.

Benefits of the study: For your participation in the study no payment will be granted or has no any special privilege to you. But, participating in the study and giving your genuine information will provide great input to bring change in quality of health service to neonatal resuscitation.

Risks of the study: The procedure does not bear any physical or psychological trauma, but only taking few minutes of your time. Furthermore, you will not be forced to respond to information you do not know.

Rights: Participation in this study is fully voluntary. You have the right to declare to participate or not in this study. If you decide to participate, you are given the right to with draw from the study at any time and also, you have the right not to answer that you do not want to answer.

Contact address: If you have any questions or enquires any time about the study or procedures, please contact the principal investigator by the following address.

- Principal investigator: Fatuma Arage
- E -mail: favenarage@gmail.com
- Mobile phone: +251-910-27-48-90.

Having stated information above, would you like to participate in this study?

1. Yes _____
2. No _____

Thank you for your collaboration!!

Annex II: Participant information sheet and consent form for the head of the hospital

Hello, my name is_____I am a member of research team working to assess knowledge, practice and associated factors towards neonatal resuscitation among health professionals from public hospitals of Addis Ababa 2020, by Fatuma Arage who is studying for her Master's degree at Addis Ababa University, Collage of Health Science Department of Nursing and Midwifery. I kindly request you to give me your attention to explain some information about the study and your hospital being selected as the study setting.

The study title: assessment of knowledge, practice and associated factor towards neonatal resuscitation among health professionals from public hospitals of AA.

Purpose of the study: the main aim of this study is to prepare thesis for partial fulfillment of the requirement for masters of Science in neonatal nursing by investigator. This study is expected to provide input for appropriate change in policy and program for improving the service delivery quality through improving providers' skill and knowledge toward neonatal resuscitations.

Study procedure and period: your and other study hospitals are selected by simple random sampling method from public hospitals of AA with study period of March first to April 30, 2020. The questionnaire contains 47 knowledge and practice questions, and 28 health care provider and institutional characteristics.

Confidentiality: the collected information will be kept confidential and used only for research purposes. No one except the members of the research team will have access to the information collected from health professionals. The personal information of the respondents will not be notified. The findings of the study will be generalized for the study population and it will not reflect anything specific of individual participants.

Benefits of the study: For participation in this study no payment will be granted or has no any special privilege to you and to participants but, the findings from this research will give important information for the hospital, ministry of health and for health planners.

Risks of the study: The procedure does not bear any physical or psychological trauma, but only taking few minutes of health professional's time. Furthermore, they will not be forced to respond to information they do not know.

Rights: Participation in this study is fully voluntary. Health professionals have the right to declare to participate or not in this study. If they decide to participate, they have given the right to with draw from the study at any time and also, they have the right not to answer that they do not know the answer.

Contact address: If you have any questions or enquires any time about the study or procedures, please contact the principal investigator by the following address.

- Principal investigator: Fatuma Arage
- E -mail: favenarage@gmail.com

Mobile phone: +251-910-27-48-90.

Declaration of informed voluntary consent: I have read the participant information sheet. I have clearly understood the purpose of the research, the procedure, risks and benefits, issues of confidentiality, the rights of participating and the contact address for any questions. I have been given the opportunity to ask questions for things that may have been unclear. I was informed that participants have the right to withdraw from the study at any time or not to respond any question that they do not want. I am also informed that the Hospital has the right to discontinue this study from being conducted if any misdeeds and unethical procedures are observed during the data collection process in the hospital principles.

Therefore, I declare my voluntary consent on behalf of (_____) management to allow this study to be conducted in the Hospital with my initials (Signature) as indicated below.

Name and Signature of head of the Hospital: _____Date _____

Name and Signature of Data Collector: _____ Date _____

Thank you for your collaboration!!!

KNOWLEDGE AND PRACTICE OF NEONATAL RESUSCITATION AND ITS ASSOCIATED FACTORS AMONG HEALTH PROFESSIONALS WORKINGAT SELECTED PUBLIC HOSPITALS OF ADDIS ABABA.

Annex III: Questionnaire

Code_____ Date of data collection_____

Self-administered questions		
PART I: Questions related to Providers characteristics.		
101	Your sex?	1. Male 2. Female
102	What is your age in years? **(put absolute number)**	_____
103	What is your field of study/profession?	1. Comprehensive Nurse. 2. Neonatal nurse 3. Midwifery 4. Pediatric resident 5. GYN-OBS Resident 6. Others(specify)_____
104	What is your level of education?	1. Diploma 5. 2nd year resident 2. Degree 6. 3rd year resident 3. Masters 7. 4th year resident 4. 1st year Resident
105	What is your experience in year? (Total years of experience).	Put absolute number_____
106	How many years you have been experienced to provide neonatal resuscitation or neonatal care?	Put absolute number_____
107.	Have you taken resuscitation or neonatal care (including HBB) training in the work place?(if yes proceed question NO **108** and **109**)	1. Yes 2. No
108.	If yes for question number **107**, when you have taken this training? (Specify with weeks, months, or years).	Put absolute number_____
109.	If yes for question number 107, how many times have you got in-service training?	1. One 2. Two 3. Three

Part II: Questions addressing Attitude and perceptions of participants.

201.	Delay to neonatal resuscitation may be related with perception of health professionals as having secondary role to neonatal care.	1. Strongly agree. 2. Agree. 3. Neutral. 4. Disagree. 5. Strongly disagree.
202.	Neonatal resuscitation is not the major role of my profession.	1. Strongly agree. 2. Agree. 3. Neutral. 4. Disagree. 5. Strongly disagree.
203	Resuscitating (ventilating) a non-breathing baby often leads me anxious and stress full as well as fear to do it.	1. Strongly agree. 2. Agree. 3. Neutral. 4. Disagree. 5. Strongly disagree.
204	It is always necessary to prepare all equipment's and personal power for resuscitation irrespective of the presence or absence of risk factor.	1. Strongly disagree. 2. Disagree. 3. Neutral. 4. Agree. 5. Strongly agree.
205	I support if hospitals have neonatal resuscitation team.	1. Strongly disagree. 2. Disagree. 3. Neutral. 4. Agree. 5. Strongly agree.
206	I think provider's motivation toward neonatal resuscitation may be related with incentives/benefits.	1. Strongly agree. 2. Agree. 3. Neutral 4. Disagree. 5. Strongly disagree.

207	If I had good knowledge practice toward resuscitation, I could not hesitate to use it whenever needed.	1. Strongly disagree. 2. Disagree. 3. Neutral. 4. Agree. 5. Strongly agree.
208	I am confident in performing newborn resuscitation.	1. Strongly disagree. 2. Disagree. 3. Neutral. 4. Agree. 5. Strongly agree.
Part III: Questions related to institutional characteristics		
301	Name of Hospital now you are working:	1. Tikur Anbessa 2. Gandhi 3. Zewuditu 4. Y-12 Hospital
302	Previous work place (if any before you start this resident ship program or transfer history of work place).	1. Referral hospital which has delivery unit and NICU 2. Health institution which has no delivery and NICU unit. 3. No transfer history
303	At which unit you have worked before you start to work in this unit now?	1. NICU 2. Delivery unit or maternity 3. Pediatric unit 4. Other (specify) _____
304	Which unit are you working currently?	1. NICU 2. Labor ward. 3. Other(specify)_____
305	Is NICU and delivery room in the same floor of your (now) hospital?	1. Yes 2. No
306	Does your hospital have resuscitation corner in your unit?	1. Yes 2. No

307	Does your hospital is fully equipped with resuscitation material? (A minimum of the following materials: Radiant warmer, bag with mask in different size, suction machine & catheter, single/multi use suction bulb, stethoscope, pulsoxymetry).	1. Yes 2. No 3. Incomplete equipment
308	If your answer is yes for question no **307**, where is those materials kept?	1. In the locked cupboard. 2. On the resuscitation tray and corner. 3. Anywhere (no specified place). 4. In equipment store.
309	What problems have you faced during neonatal resuscitation? (more than one answer is possible)	1. Lack of equipment. 2. Lack of trained assistant 3. Lack of oxygen. 4. Absence of guideline. 5. Others (specify)_____
310	Does your hospital (now) have neonatal resuscitation guidelines?	1. Yes 2. No 3. unsure
311	Does your hospital provide you supportive supervision?	1. Yes 2. No 3. Unsure
312	On average, for how many neonates (newborns) you serve per a day?	1. 0– 5 2. 5-10 3. >10
Part IV: knowledge questions related to neonatal resuscitation		
401	When you should be prepared to resuscitate the new born?	1. At every birth. 2. If we are sure that resuscitation is needed. 3. If there is anticipated risk only. 4. Others (specify) _____
402	Do you know the immediate problem of new born baby?	1. Yes 2. No

403	If yes, what are the problems? (More than one answer is possible)	1. Hypothermia 2. Asphyxia 3. Infection 4. other specify_____
404	Where do you keep the baby immediately after delivery?	1. In the mother's abdomen. 2. Clean and separate place/table. 3. Put simply on any place 4. Others specify_____
405	Which baby can receive routine care after birth?	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.
406	Routine care for a healthy baby at birth includes:	1. Drying, removing the wet cloth, and bathing the baby 2. Drying, removing the wet cloth, and positioning the baby skin-to-skin 3. Bathing and putting clean clothes on the baby. 4. Drying and wrapping the baby in the wet cloth.
407	When should the umbilical cord be clamped or tied and cut during routine care?	1. After the placenta is delivered. 2. Around 1-3 minutes after birth. 3. Immediately after the baby is born. 4. Before a baby has cried.
408	What is the correct methods of stimulating the new born?	1. Slapping/flicking the soles of the feet. 2. Slapping the back. 3. Squeezing the rib cage. 4. Holding upside down and shaking

409	If the baby is not breathing after full delivery what would be the initial step?	1. Mouth and nose 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
410	A newborn baby is quiet, limp and not crying. The baby does not respond to steps to stimulate breathing. What should you do next?	1. Slap the baby's back. 2. Hold the baby upside down. 3. Squeeze the baby's ribs. 4. Begin ventilation.
411	In which situation should a baby be suctioned?	1. When a baby is crying at birth. 2. When a baby is crying but there is meconium in the amniotic fluid. 3. When you see secretions blocking the mouth and nose. 4. Before drying the baby.
412	Wiping meconium from face and nose while head appears before delivery is important to prevent aspiration.	A. True B. False
413	If a baby is born through meconium stained amniotic fluid, has depressed respirations, decreased muscle tone, and/or a heart rate below 100/min, what is the correct action to help the baby to breath?	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.
414	suctioning a baby unnecessarily or frequently can:	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.

415	Ventilation should be commenced within:	1. One minute for newborns who have no breathing efforts immediately after delivery 2. After 1 minute Apgar score for newborn who have no breathing. 3. After 5 minutes Apgar score 4. After 10 minutes of Apgar score
416	What is the correct position of baby's neck for resuscitation?	1. Slightly extended 3. Hyper extended 2. Flexed. 4. Others
417	During resuscitation of the neonate by bag and mask, the mask should cover?	1. Mouth, nose and tip of chin but not the eyes. 2. Part of chin, mouth, nose and eyes. 3. Part of nose, mouth but not eyes and chin. 4. Parts of mouth, nose & chin but not the eyes.
418	A baby's chest is not moving with bag and mask ventilation. What should you do?	1. Stop ventilation. 2. Reapply the mask to get a better seal. 3. Slap the baby's back. 4. Give medicine to the baby.
419	For persistent apnea, just after birth what would you do?	1. Continue tactile stimulation a little bit more vigorously. 2. Give positive pressure ventilation promptly. 3. Give free flow of oxygen. 4. None
420	What is the best source of gas for resuscitation?	1. Room air 2. O2 with cylinder 3. O2 in concentrator. 4. O2 in concentrator and blender.

421	A baby who received ventilation:	1. Needs continued observation with mother. 2. Cannot be fed. 3. Always needs advanced care. 4. Should immediately receive antibiotics.
422	The best indicator of effective bag and mask ventilation is	1. Rising heart rate and audible breath sounds. 2. Rising oxygen saturation. 3. Chest movements. 4. None of the above
423	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. Apneic after initial resuscitation.
424	Which technique of chest compression is recommended during neonatal resuscitation?	1. Two thumps 2. Two fingers 3. One hand 4. Two hands
425	During chest compression how much pressure is recommended to use?	1. Depress the sternum to1/3rd of Anterior Posterior diameter of chest. 2. Depress the sternum to 1/2 of AP diameter of chest. 3. There is no strict guide line. 4. Go on increasing pressure till there is no response.
426	The ratio of neonate chest compression to ventilation is?	1. 3:1 2. 4:1 2. 2:15 4. 5:1
427	For how long does cardio-pulmonary resuscitation (CPR) continued before reassessing heartbeat?	1. 15 sec. 2. 20 sec. 3. 30 sec. 4. 60 sec

428	What is preferred medication during resuscitation?	1. Epinephrine 2. Naloxone 3. Steroids 4. Other (Specify)_____
429	When does volume expander indicated during neonatal resuscitation? (More than one answers is possible).	1. If there is sign of shock. 2. If there is history of blood loss. 3. To all resuscitated babies. 4. Other (specify) _____
430	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. Others (specify) _____
431	After how many seconds you assess for the effects of epinephrine?	1. After 20seconds of epinephrine. 2. After 30seconds of epinephrine. 3. After 40secconds of epinephrine. 4. After 60seconds of epinephrine.
Part V: practice questions related to neonatal resuscitation		
501	Have you ever practiced or participated in the neonatal resuscitation?	1. Yes 2. No
502	If the answer for Q No. 1 is **yes**, what was the procedure? (More than one answer is possible).	1. CPR 2. Endotracheal tube insertion 3. Bag and mask ventilation 4. Other(specify)_____
503	Number of neonates resuscitated by you in the last working years.(put absolute number)	Specify_____
504	Number of deliveries (vaginal or LSCS) attended in the last working years?(put absolute number)	Specify_____

505	Do you routinely apply plastic/thermal wraps for extremely low birth weight (ELBW) babies immediately afterbirth?	1. Yes 2. No
506	How frequently you check equipment required for resuscitation?	1. Every time 2. Occasionally 3. Not at all
507	Where do you resuscitate high-risk/unstable neonate after delivery?	1. In the dedicated newborn corner in the delivery room. 2. In a separate room near the delivery room. 3. In the NICU or separate adjacent room. 4. Anywhere
507	Device of your choice when providing positive pressure ventilation with a mask in the delivery room or NICU.	1. Self-inflating resuscitation bag. 2. Anesthesia bag. 3. Neopuff T-piece resuscitator. 4. Other(specify)_____
508	How do you begin resuscitation for a baby born through meconium-stained amniotic fluid and presents with poor muscle tone 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
509	How do you begin 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. 4. Neopuff
510	Do you use a saturation monitor in the resuscitation area of delivery room or NICU?	1. Yes 2. No
511	Do you use CPAP in the delivery room or NICU?	1. Yes 2. No

512	If you use CPAP in the delivery room or NICU, what level of pressure do you use in the beginning?	1. 4 cm 2. 5 cm 3. 6 cm 4. 7 cm
513	Do you refer guidelines during neonatal resuscitation?	1. Yes 2. No
514	If your answer is no for question no, **512** why?	1. No guidelines. 2. No supervision. 3. Guidelines not in front. 4. No need to use it.
515	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.
516	How long do you resuscitate a neonate who has a systole and not improving with all measures?(**if you remember put it the absolute time)**	1. 5 minutes 2. 10 minutes 3. 15 minutes 4. 20 minutes 5. >20 minutes 6. Other(specify)_____

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