ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL ALLIED OF HEALTH SCIENCES

DEPARTMENT OF NURSING AND MIDWIFERY

ASSESSMENT OF KNOWLEDGE AND PRACTICE OF ESSENTIAL NEWBORN CARE AND ASSOCIATED FACTORS AMONG NURSES AND MIDWIVES WORKING AT HEALTH CENTERS IN JIMMA ZONE, OROMIA REGIONAL STATE, SOUTH WEST OF ETHIOPIA, 2016.

BY

BAYISA BEREKA (BSC).

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

MAY, 2016

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ADVISOR: ASRAT DEMISSIE (*RN, BSC, MSC, ASSISTANT PROFESSOR*).

MAY, 2016

ADDIS ABABA, ETHIOPI

Abstract

Background- *In Ethiopia, institutionalization of deliveries are happening at a fast pace. Assessing the knowledge and practice of midwives and nurses in these institutions is a priority in this current scenario. The initial adaptations by the baby at the time of birth should be facilitated by the midwives by giving essential newborn care. Therefore, this study is aimed to identify whether there is knowledge and performance gap on essential newborn care among the study participants.*

Objective- *The objective of this study was to assess knowledge and practice of essential newborn care and associated factors among Nurses and midwives working at health centers of Jimma Zone.*

Methods- *Quantitative cross-sectional facility based study design was conducted on midwives and nurses working at health centers of Jimma Zone. Simple random sampling method was used to select the estimated 279 study participants from those who provides delivery and neonatal care. Self-administer questionnaires was distributed to participants to collect data and facilitated by data collectors. The data was entered to EpiData Manager and exported to statistical package for social sciences version 20 and analyzed. Finally, the results was illustrated in the form of text, tables and graphs.*

Results-*The mean knowledge score of study participants was 23.27 out of the 35 points. The study revealed that 52.2% and 47.8% of the respondents had good and poor knowledge about essential newborn care respectively. The mean score of practice of essential newborn care was 32.82 out of the total 48 points and 51.1% and 48.9% of the respondents had good and poor level of practice respectively. Field of study, educational level, interest to work in delivery room, in-service training were significantly associated with level of essential newborn care practice.*

Conclusion and recommendation- *Even though the study population had good knowledge and practice of essential newborn care in general, they had poor knowledge and practice on some components of essential newborn care. Level of education, interest to work in delivery room, in-service training on newborn care and level of knowledge were found to be independent predictors of practice. Hence, strengthening of practical based in-service training and areas those should be emphasized, priority should be given for those trained to give delivery and newborn care service, and incorporation of all components of essential newborn care in curriculum were recommended.*

Key words-knowledge, practice, essential newborn care, midwives, nurses*.*

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Acronyms

AOR----------Adjusted odd ratio

ANM---------Auxiliary Nurse Midwives

BCG ----------Bacilli Chalmette Guerin

CI----------Confidence interval

COR----------Crude odd ratio

CSA----------Central Statistical Agency

E.C----------Ethiopian calendar

ENC----------Essential newborn care.

EDHS----------Ethiopian demographic and health survey

LBW----------Low birth weight

MAISHA-------Mothers and Infants, Safe, Healthy, Alive

Mg ----------Milligram

MDG 4--------Millennium developmental goals four

NGOs----------Non-governmental organizations

OPV----------Oral polio vaccine

PCV----------pneumococcal conjugate vaccine

SD----------Standard deviation

SRS----------Simple random sampling

SNNPR--------South nation, nationalities and peoples region

TTC----------Tetracycline

U5MR--------Under five mortality rate

WHO---------world health organization

1. INTRODUCTION

1.1 Background

The transition from intrauterine to extra uterine life is dramatic one and demands considerable and effective physiological alterations by the baby in order to ensure survival. These initial adaptations are crucial to the baby's subsequent wellbeing and should be understood and facilitated by the midwives at the time of birth by giving essential newborn care (1). Not only the time of birth, but also the first hour after birth has a major influence on the survival, future health, and wellbeing of a newly born infant. The health workers have an important role at time of birth. The care they provide during this period is critical in helping to prevent complications and ensuring survival (2). Skilled care during labour and childbirth with prompt management of complications alone can prevent about 50% of newborn mortality and 45% of intra-partum stillbirths. Combined with adequate newborn care in the postnatal period, 75% of current newborn deaths can be prevented as well as thousands of stillbirths and maternal deaths (3).

Therefore, WHO recommends essential newborn care practices that should be given to all newborn infants at birth to protect against newborn morbidity and mortality (4). Essential newborn care is a comprehensive strategy designed to improve the health of newborns through interventions before conception, during pregnancy, at and soon after birth, and in the postnatal period (5).The ENC Protocol is a series of time bound, chronologically-ordered, standard procedures that a baby receives at birth .At the heart of its protocol there are four time-bound interventions: immediate drying, skin to skin contact followed by clamping of the cord after 1 to 3 minutes, non-separation of baby from mother, and breastfeeding initiation (6).Essential newborn care has standardized effective procedural steps: dry and stimulate, evaluate breathing, cord care, keep the newborn warm(Prevent hypothermia),initiate breastfeeding within the first one hour, administer eye drops/eye ointment, administer vitamin k intramuscularly, place the newborn’s identification bands, weigh the newborn when it is stable and warm, record all observations and treatment provided, delay bathing of the baby for 24 hours after birth (7).

A baby's skin temperature falls within seconds of being born. If the temperature continues to fall, the baby will become ill and may even die. This is why a baby must be dried immediately after

birth and delivered onto a warm towel or piece of cloth, and loosely wrapped before being placed naked between the mother's breasts or over abdomen. The baby's breathing should be assessed at the time of drying. A normal newborn should be crying vigorously or breathing regularly at a rate of 40-60 breaths per minute. If the baby is not breathing well, then the steps of resuscitation have to be carried out. Keeping the baby between the mother's breasts ensures that the baby's temperature is kept at the correct level for as long as the skin contact continues. This first skin-to-skin contact should last uninterrupted for at least one hour after birth or until after the first breastfeed. Exclusive breastfeeding has a significant protective effect against infections. Early breastfeeding and keeping the baby close to the mother reduce the risk of hypothermia and hypoglycemia (2).

One of the essential newborn care practices is clean cord care which is very important in preventing early neonatal infections. The precise timing of clamping and cutting the umbilical cord is important as there is some evidence of potential benefits for the baby when the cord is not clamped and cut immediately after birth. Physiological studies have shown that there is a transfer from the placenta of about 80 ml of blood at 1 minute after birth, reaching about 100 ml at 3 minutes after birth. These additional volumes of blood can supply extra iron amounting to 40–50 mg/kg of body weight (8). Eye care is given to protect a baby's eyes from infection. In areas where sexually transmitted diseases are common, eye care is needed soon after delivery because infections such as gonorrhea can be passed to the baby during the birthing process which can result in blindness. A baby's both eyes should be gently wiped with separate sterile swabs soaked in warm sterile water. Eye drops (whenever indicated) or ointment should be given. This can be done after the baby has been dried or when he is being held by his mother.

Weighing and vitamin K are also one activity of essential newborn care. Weighing helps to identify babies at a higher risk of death. For example, < 2500 grams may require special care to prevent low body temperature, < 2000 grams should receive prolonged skin-to-skin and < 1500 grams will need referral. Vitamin K will protect babies from serious bleeding**.** Every newborn should take 1mg of vitamin K intramuscular injection and 0.5 mg for <1000gms (2).

1.2 Statement of the problem

Birth and the first day of life is the time of greatest risk for both the mother and the baby, resulting in nearly half of all newborn deaths and stillbirths. For live born babies, the risk of death is greatest on the day of birth. Even though remarkable progress has been made in recent decades to reduce the number of child deaths worldwide, neonatal mortality rate declined at a slower pace. Yet a large proportion of newborn deaths are preventable. Currently, 2.9 million babies die within the first month of life accounting for 44% of under-five mortality (3).Three quarters of neonatal deaths occur within the first week of life and the highest risk of dying is within the first 24 hours. Each year, approximately 300,000 African babies die on the day of their birth, mostly as a result of inadequate maternal and newborn care (9). Ethiopia is one of the ten countries with the highest number of neonatal deaths globally (10). In Ethiopia, neonatal mortality has remained stable at around 37 deaths per 1000 live births in recent years (11).

Newborns are most vulnerable during the first hours and days of life, yet this critical window of opportunity is being missed• While evidence shows that initiating breastfeeding within one hour of birth reduces the baby's risk of death by 44%,recent data show that less than half of newborn babies (43%) worldwide receive the benefits of immediate breastfeeding. Great efforts have been made to improve the health of children and neonatal death around the world over the past four decades, with some notable successes. Yet, achievements have not been as expected (12).

As many as two-thirds of neonatal deaths could be saved with essential care at birth and the early newborn period. Simple interventions to improve in health facilities- for example, improving steps to help newborns breathe at birth-have demonstrated up to 47% reduction in newborn mortality in health facilities in Tanzania (13) .Unless newborn receives appropriate basic care, also called essential newborn care, they quickly fall sick and too often they die (10).But, the standardized procedure for providing essential newborn care is not commonly practiced. This has resulted in serious consequences of unacceptably high neonatal morbidity and mortality in the first 24 hours of life (eg. asphyxia, hypothermia, hypoglycemia, infection).

Promotion of essential newborn care is one strategy for improving newborn health outcomes that can be delivered in communities as well as facilities (14). Promotion of essential newborn care practices require health systems that provide continuity of care starting from the beginning of

pregnancy (and even before) and continuing through professional skilled care at birth into the postnatal period. On the other hands, most crucially, there is a need to ensure that the delicate and often overlooked handover between maternal and child services actually takes place (15).

Knowledge is one of the crucial aspects of health systems to adherence to essential newborn care practices. But, in Ethiopia, hospitals health workers' mean knowledge score for immediate newborn care steps was relatively low and suggests that lack of knowledge may impede provision of ENC. Among these workers there was performance gap on immediate essential newborn care provided until the first hour after birth. This is evidenced by only 12% of newborns were placed skin-to-skin on the mother's chest or abdomen, only about a third of the cases did health workers help the mother initiate breastfeeding within the first hour of delivery and/or delay cord clamping/tying and18% of newborns received all elements of essential newborn care (16).

According to study conducted in Jimma from September 2012 to December 2013, there is high status (35.5 per 1000) of neonatal mortality and immediate neonatal care practices were identified as one of the determinant factors (17). In addition to this gap, although midwives and nurses are providing primary care to women during pregnancy, labor, essential newborn care and the postpartum period in almost all health centers, still there is no study about knowledge and practice of essential newborn care among midwives and nurses working at health centers in Jimma zone and probably in Ethiopia. Therefore, the main purpose of this study is to identify whether there is knowledge and performance gap on essential newborn care among nurses and midwives.

1.3 Significance of the study

It is widely acknowledged that MDG 4 target for child survival cannot be achieved without a particular focus on newborn health. In Ethiopia, concerning MDG4, a rapid decline in under five mortality rate has been achieved, with an annual rate of reduction of 5.0% over the past 20 years. However, challenges still remain; for example, according to the 2011 EDHS results (CSA and ICF, 2012), neonatal mortality rate, that accounts for 42% of U5MR, has been stagnant over the past ten years (18).

Quality of effective essential newborn care by midwives and nurses during and after birth will improve survival of newborn and health of subsequent life times. To strengthen this, knowledge and practice of midwives and nurses is essential in improving the life of newborn and reduces mortality and morbidity of newborn babies as well as play good role in the fulfillment of sustainable developmental goal. Therefore, the finding of this study will be used by researchers as input information for further study in the future on this area, provide important information for health sector program managers and health policy makers, provide pertinent information for curriculum designers to make necessary modification and guide governmental and non-governmental health organizations to focus and train nurses and midwives . It can also give clue in the assessment of hinders of the fulfillment of sustainable developmental goal. The study result will also provide a means of evaluation of the essential newborn care undergoing and will provide suggesting recommendations for its improvement.

2. LITERATURE REVIEW

Essential newborn care is a care given to all newborn infants at birth to optimize their chances of survival and it has standardized effective procedural steps: dry and stimulate, evaluate breathing, cord care, keep the newborn warm (prevent hypothermia), initiate breastfeeding within the first one hour of delivery, administer eye drops/eye ointment, administer vitamin k intramuscularly, place the newborn's identification bands, weigh the newborn when it is stable and warm, record all observations and treatment provided, delay bathing of the baby for 24 hours after birth (7). Different studies conducted in different areas on the components of essential newborn care and discussed below.

2.1 Overview of knowledge and practice

A study conducted in Khartoum state teaching hospitals showed that, study population had 50.6% an overall knowledge level in spite of this; their performance level of practices was poor (41.1%) towards immediate care of the newborn, 3.1% wipes of the eyes and face when the head is delivered, after full delivery of the baby, 92.7% dries the baby while assessing the baby's breathing and wearing sterile gown, clean mask and glass was 39.6% ,42.7% of them could give the correct answer at which immediate care of newborn start (1).

According to study conducted on essential newborn care services in India, the average knowledge score of providers about resuscitation was 76% and for remaining ENC domains was 78%.According to the study, the corresponding average skill scores were 24% and 34%, while knowledge domain scores were largely satisfactory (>75%) for the majority of providers about breastfeeding, the scores were only moderately satisfactory (50-75%) for all other knowledge domains. In the study, the skill scores for all domains were predominantly non-satisfactory (<50%) and the mean score for the nursing staff on resuscitation-related knowledge and skill was 74% and 20% respectively (19). Other cross-sectional health facility surveys conducted in Tanzania to assess health worker knowledge of essential newborn care .The study revealed that the health worker average knowledge score of essential newborn care was 41% and 87% of health workers helps initiate breastfeeding within one hour (13).

On the other hand, a cross sectional study conducted in Khartoum on nurse midwives to assess their knowledge and practice regarding immediate health new borne care. Accordingly, when they

asked about when should immediate care of newborn start, 5% say before birth, 40% during birth and 55% say after birth. In this study, the application of universal precaution was very poor (wear sterile gloves 37.5%, wear sterile gown 25% and mask 60%).The study also showed that the level of knowledge of nurse midwives concerning immediate healthy newborn care is very good. But, the ideal newborn care not done by sequent steps of immediate newborn care and also two to three steps are omitted (20).

A detailed observational assessment of immediate newborn care practices was performed on consecutive deliveries in Philippine .The study revealed that more than 90% of infants were dried, weighed, given eye prophylaxis and injected with vitamin K, approximately 70% were put to the breast, examined and vaccinated against hepatitis B virus and less than 10% were allowed skin to-skin contact (21).

According to cross-sectional study on assessment of essential newborn care services in India, in most of the domains, knowledge and skill scores were found to be higher or similar in doctors when compared with nursing staff, except for skill domains relating to preparation at birth and breastfeeding, where nursing staff scored higher than doctors. In the domains of essential newborn care, the overall average knowledge and skill score was 78% and 34% and the average knowledge score for nursing staff was 77% and skill was 35% (22).

According to descriptive observational research on nursing care provided immediately after birth at university hospitals in Egypt, 43.5% and 47.8% of nurses had good and poor knowledge respectively about immediate care of mother and newborn .On the other hand,40% of nurses have a good knowledge about newborn and mother care after birth. However, there is no significance difference ($P > 0.05$) between nurses' knowledge and practices regarding newborn and mother care after birth. In the study, more than half of nurses (52.6%) have a good knowledge and practice for hand washing, clean the airway, apply Apgar score, sterile clump of the cord, as well as put eye drop to the neonate and approximately three quarter of nurses have good practice for measuring baby weight (23).

As study done in Uganda on primary healthcare workers knowledge,46.5% of them judged to have adequate knowledge in immediate newborn care and less than a quarter of them could correctly mention the optimal timing for the first postnatal care visit,77.6% of study participants knows that administering vit k for the prevention of bleeding in newborn (24).

2.2. Knowledge and practice Airway clearance, Evaluate Breathing, and neonatal resuscitation

According to a study conducted in India, the mean score for knowledge and skills in neonatal resuscitation was 76% and 24% respectively. According to the author ,for nursing staff, the average score for knowledge and skill in neonatal resuscitation was found to be 74% and 20% (22).

According to community based exploratory survey conducted in selected sub centers of Ambala district in Haryana ,two third of ANMs (67.7%) maintained airway by cleaning the mouth with gauze followed by 32.3% maintained airway through suction 35.48% placed the baby on mother's chest/ abdomen (25).

According to a study conducted in Kenya on knowledge of neonatal resuscitation, most medical providers had heard of neonatal resuscitation (85.4%) with only 23 receiving formal training. As per the study, only 35.4% of the health care providers scored above 85% on the knowledge domain of neonatal resuscitation and more than 70% of them considered their knowledge about neonatal resuscitation inadequate and blamed it on inadequate medical training programs (26).

In retrospective a study done in Addis Ababa on HCs in 2013, providers knowledge mean score on diagnosing birth asphyxia was 2.4 out of 4 correct answers and five providers only knew four of the six preliminary steps of neonatal resuscitation. On the other hand, mean skill score on how to resuscitate a neonate with bag mask was 1.5 out of 5 correct answers (27).

An institution based cross-sectional study was conducted among all nurses, midwives and residents in university teaching hospital of Northwest Ethiopia .Accordingly, the mean knowledge scores of midwives, nurses, on neonatal resuscitation were 19.7 and 20.2 respectively. The knowledge and skills of midwives, nurses and residents about neonatal resuscitation were sub standardized (28).

Another cross-sectional study conducted in Afghanistan on newborn resuscitation among doctors and midwives. As per the a study, more than 80% of providers had been trained on newborn resuscitation, but midwives were more likely than doctors to receive such training as part of pre-service education (59% and 35%, respectively, $p < 0.001$) and no significant differences were found between doctors and midwives on knowledge, clinical skills, or confidence in performing newborn resuscitation. Doctors and midwives scored 71% and 66% respectively on knowledge questions and 66% and 71% on the skills assessment (29).

2. 3.knowledge and practice of Hypothermia and thermal protection

Study conducted in Khartoum state teaching hospitals revealed that 78.1% of the study participants could mentioned that newborn should be placed on the mother's abdomen immediately after delivery (1). According to c ross-sectional health facility surveys conducted in Tanzania to assess health worker knowledge of essential newborn care in health centers,77% of health worker immediately places newborn on the mother's abdomen , 97% immediately dries baby with towel, 97% discards wet towel and covers with dry towel (13),while a cross-sectional study conducted India revealed that, although 89% of the providers demonstrated wiping of newborn with dry cloth, 63% showed putting neonate on warm surface and only 5% were able to use all methods to prevent heat loss (22). On the other hand community based exploratory survey in Haryana revealed that, most of the study participants (90.32%) maintained temperature by cleaning and wrapping the baby,61.2% of them motivated mothers to initiate breast feeding,58.06% kept the baby warm in warm towel,25.80% kept the baby along with mother,19.35% kept room heaters in winter to keep the room warm and only 3.2% delayed them bath (25).

A cross-sectional national health facility survey conducted in Ethiopia to assess maternal and newborn care practices until the first hour after birth. As per the study, the vast majority of newborns were dried with a towel immediately after birth, but less than half were covered with another dry towel after the first (wet) towel was discarded. In this study, the three key newborn care standards that aim at preventing the occurrence of hypothermia was found to be far from standard (45%),none of the babies delivered by obstetrician-gynecologists, general practitioners, and bachelor's-level nurses, were placed in skin to skin contact with their mothers, but one-third of the babies delivered by diploma-holding nurses were placed in skin-to skin contact .Diploma-holding nurses also did a better job of covering newborns with a dry towel and discarding the wet towel and compared to BSc nurses and diploma holder midwives (80%,28% and 38%) respectively. This study also revealed that,only12% of newborns were placed skin to skin on the mother's chest or abdomen (16).

According to a household survey to assess newborn care practices at home and in health facilities in 4 regions of Ethiopia, the most common immediate placements of the baby for home births were beside the mother (48.7%) or with someone else (15.9%), compared with a newborn bed/ table (38.3%) or on the mother's chest/belly (21.5%) for facility deliveries. In 7.7% of home births and

25.8% of facility births, the newborn was placed in skin to skin position at some point following the delivery (14).

Assessment of quality of care for prevention and management of common maternal and newborn complications in Tanzania revealed that drying and wrapping the infant immediately after birth were both high (91%,93%). Infants being placed in skin to skin contact with their mothers occurred infrequently at health centers and dispensaries (37%) and regional hospitals (43%), likely due in part to the traditional practice of taking the infant to be weighed and keeping the infant separated from the mother (30).

2.4 Knowledge and practice of Breast feeding

According to quality care a study in Ethiopia ,only 18% of newborns received all elements of essential newborn care and in only about a third of the cases did health workers help the mother initiate breastfeeding within the first hour of delivery (16).

A cross sectional study carried out in Uganda on primary healthcare workers knowledge related to prenatal and immediate newborn care showed that, over 70% of health workers mentioned the correct time for initiation and duration for breastfeeding and appropriate care for the cord. According to this study, 86.4 % of the participants responded that initiation of breast feeding is within the first hour of delivery, 10.9% within 1-6 hours of delivery and 2.7 % responded as after six hours of delivery and 77.6% of study participants could identify that giving vitamin k is the recommended action to prevent bleeding in newborns (24).

Assessment of quality of care for prevention and management of common maternal and newborn complications in Tanzania revealed that immediate initiation of breastfeeding (within first hour) was low;40% in regional hospitals and 55% in health centers and dispensaries, limiting the opportunities for mothers and infants to benefit from early initiation of breastfeeding (30) ,while according to MAISHA quality of maternal and newborn care study, health workers at health centers helps initiate of breastfeeding within one hour was 55% and 87% in 2010 and 2012 respectively (31).

2.5 Knowledge and practice of Prevention of infection and cord care

According to study conducted in Khartoum on knowledge, attitude and practices of nurse midwives towards immediate health new borne care, 35.4% of them clamps the cord

approximately 2-3 minutes after the birth or after cessation of cord pulsations (1). In Ethiopia, the study on quality of care revealed that, only about one third of the health workers did delay cord clamping/tying until the pulsations had stopped or at least 2-3 minutes after birth (16),while study, a cross-sectional health facility surveys conducted in Tanzania to assess health worker knowledge of essential newborn care in health centers revealed that,100% of health workers cuts cord with clean blade,83% ties or clamps cord when pulsations stop, or by 2-3 minutes after birth (13).

According to Community based exploratory survey conducted in selected sub centers of Ambala district in Haryana, only 38.70% ANMs gave eye care to the baby, where as 61.3% provided cord care by cleaning the cord and letting to air dry (25).

A study conducted among nurse midwives in Peru to measure the effect of a two-component intervention on mean time to clamp the umbilical cord. The study showed that the proportion of cord clamping times greater than or equal to 1 minute increased from 39.3% pre-intervention to 85.7% post-intervention. In addition, in the post-intervention group, only 27.7% of cord clamping times occurred at less than 2 minutes, whereas in the pre-intervention group 95.5% of cord clamping times occurred at less than 2 minutes (32).

Assessment of quality of care for prevention and management of common maternal and newborn complications in Tanzania revealed that, although 82% of providers washed their hands after procedures, before examination during initial assessment only 57% of providers washed hands. Before examination in the first stage of labour, only 54% of providers washed their hands and the low percentage of providers wearing protective clothing other than gloves (51%) (30).

2.6 Factors those associated with level of knowledge and practice

A cross sectional study carried out in Uganda on Primary healthcare workers knowledge related to prenatal and immediate newborn care. Accordingly, 38% of nursing assistants, 45.8% of general nurses and 62.5% of midwives have adequate knowledge. As per the study, 38% of nursing assistants, 69.4% of general nurses and 65% of midwives were considered to have adequate knowledge in identifying and caring for LBW babies. Compared to nursing assistants, general nurses ($p<0.001$) and midwives ($p=0.007$) significantly had adequate knowledge in identifying and stabilizing LBW babies. Regarding level of care**,** about 44.1% of health workers of health center levels III/ II and 50% of hospital/ health center IV were considered to have adequate knowledge

in immediate newborn care. About 45.6% and 47.1% of health workers who had served six years or more and five years or less respectively were considered to have adequate knowledge. There was no statistical difference in knowledge between health workers who had served six years or longer in reference to health workers who had served five years or less (p=0.836) (24).

According to descriptive non participatory observational research on Nursing care provided immediately after birth at University hospitals in Egypt ,there were a significance relationship between nurses education and their knowledge of immediate newborn care, total knowledge score as well as responses to mothers questions, while a negative correlation were found regarding to their years of experience (23).

Generally, the health care professionals in general and nurses and midwives in particular play a vital role to insure that the newborn has best possible beginning of life and nurses and midwives must aware of the potential problems and be alert to the newborn changing condition and to intervene appropriately when necessary. The nurses and midwives are the first health care provider who has direct contact with newborn during birth and in post natal periods in almost all health centers in Ethiopia. Hence nurses and midwives require the knowledge and skill to take care of the babies keeping in mind the basic principles so that many complication can be prevented. Knowledge and practice of midwives and nurses on essential newborn care is essential in improving the life of newborn and reduces mortality and morbidity of newborn babies and studying on this area is very important. Even tough, there are some studies on knowledge and practice of newborn care in different aspects throughout the world, there is no sufficient study on essential newborn care in Ethiopia. Therefore, it is important to study on the level of knowledge and practice of nurses and midwives towards essential newborn care and the study will have its contribution to fill this gap.

2.7. Conceptual frame work

The conceptual framework developed based on the literature. The details of the frame work displayed in the figure 1 below. The arrows in the diagram shows the relationship between the variables. As depicted in the diagram, knowledge and essential newborn care practice can be affected by socio-demographic characteristics and Personal and institutional factors. On the other hand, knowledge can affect practice of essential newborn care.

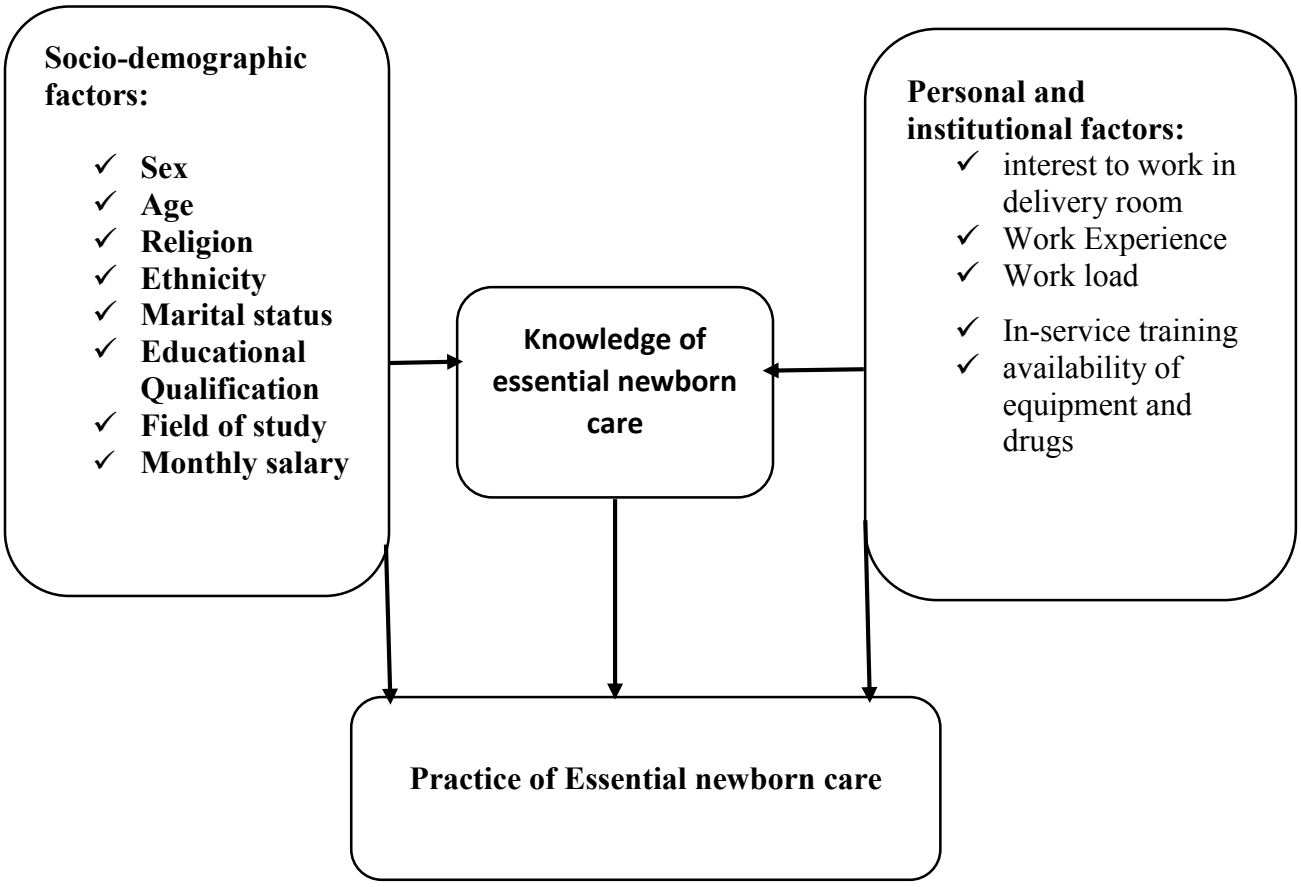

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Figure1: ***Conceptual framework (developed based on literatures)***

3. OBJECTIVE

3.1 General objective

- ✓ To assess knowledge and practice of essential newborn care and associated factors among nurses and midwives working at health centers of Jimma Zone, Oromia regional State, south west of Ethiopia.

3.2 Specific objectives

- ✓ To assess the knowledge of study participants about essential newborn care.
- ✓ To assess the practice of study participants regarding essential newborn care.
- ✓ To identify factors associated with knowledge and practice of essential newborn care.

4. METHODS

4.1 Study area and period

The study was conducted in Jimma zone from March 9/2016 to April 8 /2016. Jimma zone is one of the 18 zones and 9 administrative towns found under Oromia regional state. It covers a total areas of 184,125.4 km². It is located at 346 km to South West of Addis Ababa. It is bounded in North by West Shoa, in South by SNNPR, in East by East Wellega and SNNPR, in West by SNNPR and Illubabor. Formerly Jimma zone is organized to seventeen rural districts and one administrative town. The total population of the zone is projected to be 3,174,447 of which female accounts 1,603,096. From the total population, 702,505 were females of reproductive age group. The Zone had one hundred seventeen governmental health facilities of which health centers accounts one hundred twelve and the remaining five were district hospitals and there were 111private clinics in the zone. In addition to this, there were two health centers under construction. At the beginning of 2008 E.C, there were 181 midwives and 573 nurses working in one hundred twelve health centers and they provide different health care services. Midwives and Nurses provided routine delivery and neonatal care in all health centers in Jimma Zone. The zone expected annual institutional delivery was 110,153 deliveries and these delivery were planned to be served by these nurses and midwives.

Figure 2-Map of Jimma Zone

4.2 Study design

A Quantitative cross-sectional facility based study design was conducted.

4.3 Population

4.3.1. Source Population

All nurses and midwives who provide different health care services in health centers of Jimma zone.

4.3.2. Sampling Population

The sampling population were all nurses and midwives who provided delivery and neonatal care services.

4.3.3. Study population

All randomly selected nurses and midwives from those who provided delivery and neonatal care services were included.

4.3.4. Study unit

Each individual participants included in the study.

4.4 Sample size and Sampling procedures

4.4.1 Sample Size Calculation

A single population proportion formula was used to estimate the sample size of study participants included in the study. There was no study conducted in Jimma area on knowledge and practice of midwives and nurses on essential newborn care. To estimate the appropriate sample size for the study population, the following assumptions were made: proportion of knowledge and practice of nurses and midwives on essential newborn care was taken as 50% (p= 0.5), level of significance was considered to be 5% ($\alpha = 0.05$), 95 % confidence level ($Z\alpha/2 = 1.96$) and margin of error to be tolerated 5% (d = 0.05).

$$no = \frac{(Z\ \alpha/2)^2 * P\ (1-P)}{d^2}$$

Where, n = sample size

p = proportion of knowledge and practice of nurses and midwives (50%)

Z = standard normal distribution curve value for the 95% CI with the value of 1.96

d=margin of error to be tolerated 5% (d = 0.05).

$$no = \frac{(1.96)^2 * 0.5(1-0.5)}{(0.05)^2} \approx \mathbf{384}$$

n=384 participants

Because of the source population is less than 10,000, sample size correction was made to estimate the final sample size.

$$\mathbf{nf} = \frac{\mathbf{n}}{\mathbf{1} + \frac{\mathbf{n}}{\mathbf{N}}}$$

Where, **nf** = Final sample size

no = initial sample size

N = Source population (total midwives and nurses)

384/ (1+384/754) ≈**254 participants**

By adding a 10% of the sample size for non-response rate to maintain the generalizability of the data, the total **279** individuals were included in the study.

4.4.2 Sampling procedures

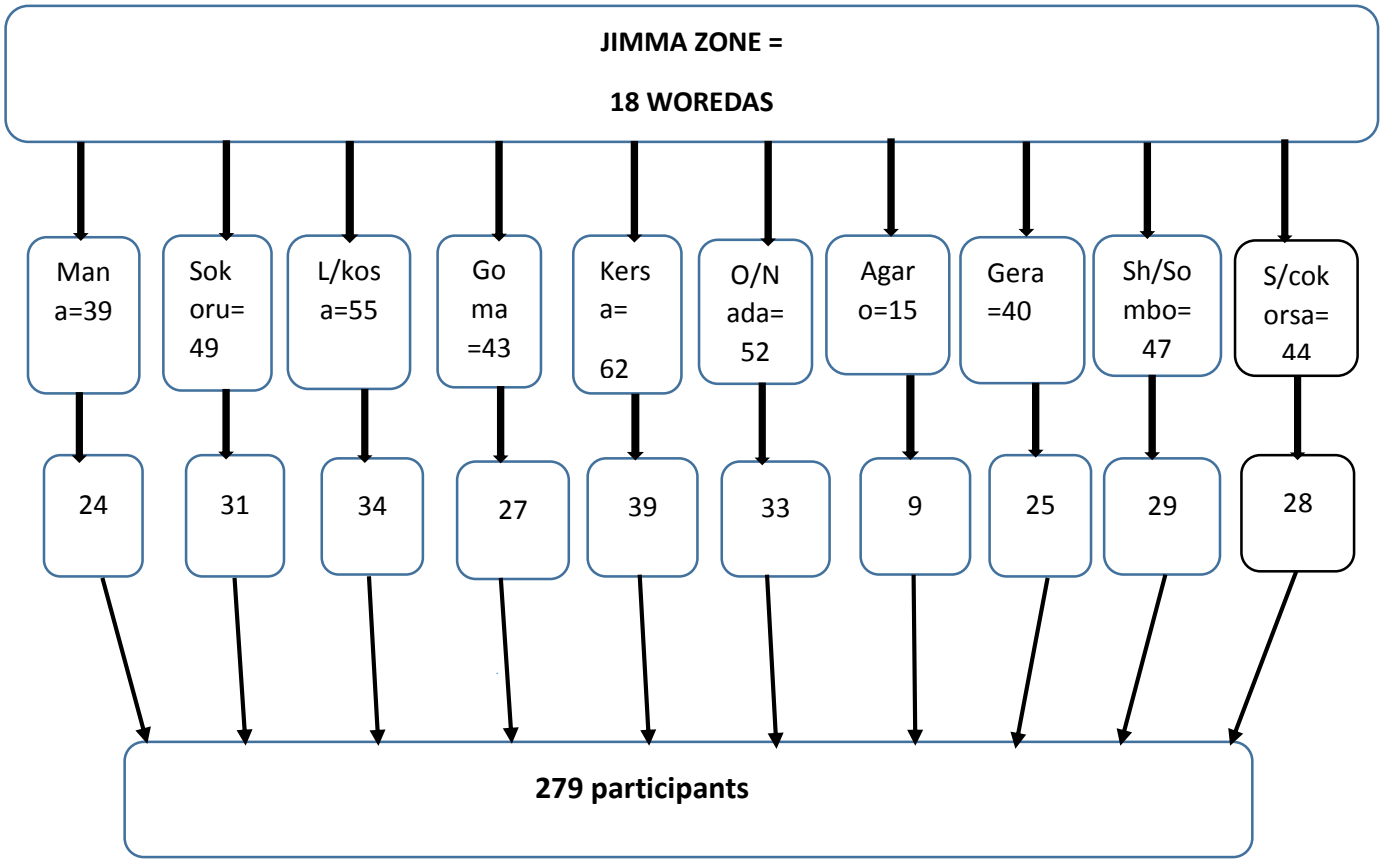

Figure 3: Schematic representation of sampling procedures.

First, total sample size (279) was estimated based on the total number of nurses and midwives in the Zone. Next, to maximize the representativeness of the data, ten woredas were selected by lottery method and all health centers under the selected woredas were included in the study. Then, because the number of midwives in each woredas is small and all of them were involved in delivery and neonatal care services, all midwives in selected woredas were considered to be included. Because the number of midwives in the zone is not enough to handle all delivery services, nurses were always rotate and practice among departments including the delivery unit .As they were regularly assigned, during night duty and weekends, they provided all types of services including delivery care. Even though there was probability of very few exceptional cases, all most all nurses had equal chance to be involved in the study. Therefore, Proportional allocation was made for nurses to take the appropriate number of nurses from each woredas and health centers based on

the number of nurses. Finally, SRS method was used to select study units from nurse's staff to be included in the study based on the number of nurses of each health center in the selected woredas as sampling frame.

4.5 Inclusion and Exclusion criteria

4.5.1 Inclusion Criteria

- ✓ All qualified diploma and degree nurses and midwives recruited by government who provide delivery and neonatal care services at selected health centers.

4.5.2 Exclusion criteria

- ✓ Nurses and midwives who did not provide delivery and neonatal care services within the last six month prior to data collection to the time of data collection.
- ✓ Those nurses and midwives who were inaccessible

4.6 Method of data collection and Tools

Data was collected by distributing self-administered structured questionnaires that adopted from two published articles (1 and 24) and further modification of the tool was done based on the Ethiopian Federal Ministry of health new born care training Participants manual (7).The questionnaire has sixty two questions and four parts: part one is socio-demographic characteristics, part two is personal and institutional factors, part three is knowledge of essential newborn care and part four contains practical questions .The questionnaire has both closed and open ended questions and participants were completed the necessary information by themselves. Data collectors were facilitated data collection process and helped the participants in case if they had any questions on the items of tool. Data collectors waited for each respondent to complete their questionnaire and immediately retrieved after they were completed .The knowledge part questions have multiple responses and participants were allowed to give one or more than one response based on what they know from the given alternatives.

4.7 Study Variables

4.7.1. Dependent variable

Essential newborn care practice

4.7.2. Intermediate variable

Knowledge of essential newborn care

4.7.3. Independent variable

Socio-demographic characteristics of respondents:

- ✓ Age
- ✓ Sex
- ✓ Religion
- ✓ Marital status
- ✓ Ethnicity
- ✓ Field of study
- ✓ Educational qualification
- ✓ Monthly salary

Personal and institutional factors:

- ✓ Work experience
- ✓ in service training
- ✓ Work load
- ✓ Interest to work in delivery room
- ✓ availability of equipment
- ✓ availability of drugs and vaccines

4.8 Operational Definition

Essential Newborn Care- It is a care given to all newborn infants starting from delivery of the head to the first 28 days and it includes dry and stimulate, evaluate breathing, cord care, keep the newborn warm (Prevent hypothermia), initiate breastfeeding in the first one hour, administer eye ointment, administer vitamin k intramuscularly, weigh the newborn when it is stable and warm, delay bathing of the baby for 24 hours after birth, advice of mother on neonatal danger signs and postnatal care.

Knowledge- Refers to knowledge response of questions about essential newborn care.

Good knowledge- If the summed score of correct response of knowledge questions is greater than the mean score of the study population.

Poor knowledge- if the summed score of correct response is below the mean score of the study population.

Practice: Refers to performance self-report of respondents according to prepared questions regarding essential newborn care practice**.**

Good practice- If the summed scores of performance self-report for practice is greater than the mean score of the study population.

Poor practice. If the summed scores of performance self- report for practice is less than the mean score of study population.

Knowledge on neonatal danger signs: participant considered as knowledgeable on key danger signs of neonate, if he/she can mention at least four of the eleven key danger signs for neonate.

4.9 Data quality assurance

To ensure the quality of data, the following measures were taken. First, standardized study tools was adopted from two published sources and modified according to Ethiopian context. The tool was checked for validity by three professional experts. Pretest was done on 6% of the sample size in four health centers found in Jimma town. Reliability test was done and chrombach's alpha coefficient was 0.84 for items of practice .Modification of tools was done prior to actual data collection time based on pretest results. Data collectors were two diploma nurses and one diploma midwife who know more about the topic issue. Supervisor was one degree nurse on academic

status of Graduate assistant lecturer. Detail training was given for data collectors and supervisor ten days ahead of actual data collection time on the selection procedure of study units, objectives of the study, on the steps how they can give the necessary information for the participants at the beginning and in between if they have any question. The data collectors had informed the participants; how they can fill the necessary information, role of their genuine participation for the study. Daily, supervisor and principal investigator supervised and checked the completeness and quality of data. After data collection completed, the completeness of data was checked by supervisor and principal investigator ahead of data entry. Incomplete and inconsistent questionnaires were excluded from analysis.

4.10 Methods of data analysis

After data checked for its completeness, cleaned for inconsistencies and missing values, it was coded and entered to EpiData Manager and exported to statistical package for social sciences (SPSS) version 20 and analyzed. *Descriptive statistics* was used to organize and summarize data, to identify the general features and trends in a set of data and extracting useful information. Each correct alternatives under each knowledge questions was graded as 1point and incorrect was graded as 0. Finally, it was dichotomized as good knowledge and poor knowledge based on the sum of correct responses of each items of knowledge questions by taking the mean score as cut-off point. Practice of essential newborn care was graded by assigning scores to Likert scale responses on a scale of 0–2 points: 0=never,1= sometimes, 2=always (Labrague ***et al.,* 2012**).There were 24 items of practical question and the maximum total score for practice was considered to be 48. The total score was dichotomized in to good practice and poor practice based on the summed score taking the mean score as cut-off point. Simple frequencies were done to see the overall distribution of the study participants with the different study variables. Bivariate analysis was done to determine whether there is association between different independent and outcome variables. Those variables which have significant association with knowledge and practice of ENC were further analyzed by multivariate Logistic regression to identify the independent predictors of knowledge and practice of ENC. Confidence interval of 95% was used to see the precision of the study and the statistical association was considered as significant if p-value is less than 0.05. The final result was illustrated in the form of texts, tables and graphs.

4.11 Ethical consideration

Before starting any steps in the study, ethical clearance and approval was obtained from the ethical committee of department of Nursing and Midwifery, college of health science, Addis Ababa University. Official letters was obtained from department of Nursing and Midwifery and brought to Oromia regional health Bureau and then written permission was obtained. The obtained written permission letter was given to Jimma Zone health Office and from there to respective woredas health offices. Oral permission was obtained from each health center managers. Finally, the data collectors approached each of the participants by giving detail explanation of the purpose and possible benefit of the study, clarifying that participation is voluntary, as well as respect of the subject privacy was ensured, obtained written consent of participants and data collection was done. Data was handled in careful manner and the confidentiality of the data was kept.

4.12 Communication of the results

The findings of this study will be communicated to department of Nursing and Midwifery, College of health Sciences of Addis Ababa University, health policy makers, Oromia health Bureau, Jimma Zonal health Office. Finally, it will be published in the known health journal.

5. RESULTS

From the total 279 estimated samples, five questionnaires were excluded as a result of incompleteness and inconsistencies and two questionnaires were not returned back, making the response rate of 97.49%. The analysis was done based on the data collected from 272 participants.

5.1 socio-demographic characteristics

According to the study, 140 (51.5%) of the participants were males and 132 (48.5%) were females. The largest proportion,155 (57 %) of the respondents were between the ages of 25 and 29 years and smallest proportion, 5 (1.8 %) found between 40 and 44 years .The participants' age ranges from 22 to 51 years with the mean of 28.86 (SD=±5.78) years. Majority of the respondents, 222(81.6%) were diploma holders and more than half, 191 (70.2%) of the respondents were nurses. Out of the total participants, 93(34.2%), 96 (35.3%), 81(29.8%) were Muslim, Orthodox and Protestant followers respectively. Regarding ethnicity, 206 (75.7%) were Oromo ethnic group, 38 (14.0%) were Amara ethnic group, 15 (5.5%) were Dawuro and 13 (4.8%) were other ethnic group (Table 1).

Table 1: **Distribution of socio-demographic characteristics of study participants in Jimma zone health centers, Oromia Regional State, South West Ethiopia, March to April,2016 (n=272).**

Variables		Frequency	Percent
Sex	Male	140	51.5
	Female	132	48.5
Age in years	20-24	42	15.4
	25-29	155	57.0
	30-34	42	15.4
	35-39	14	5.1
	40-44	5	1.8
	45 and above	14	5.1
Religion	Muslim	93	34.2
	Orthodox	96	35.3
	Protestant	81	29.8
	Other	2	0.7
Etnicity	Oromo	206	75.7
	Amhara	38	14.0
	Dawuro	15	5.5
	Other	13	4.8
Educational qualification	*Degree*	50	18.4
	Diploma	222	81.6
Field of study	Nursing	191	70.2
	Midwifery	81	29.8
Monthly salary in Ethiopian birr	1401-2350	167	61.4
	2351-3550	82	30.1
	3551-5000	21	7.7
	5000 and above	2	0.7

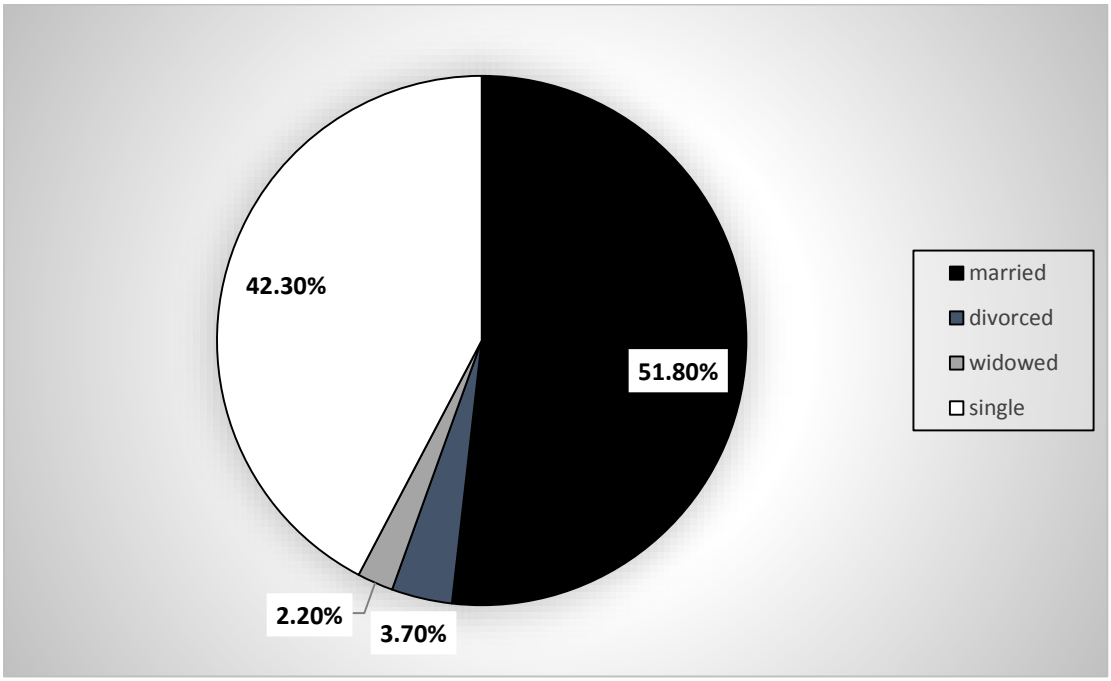

Figure 4 -Distribution of marital status of study participants in Jimma zone health centers, Oromia Regional State, South West Ethiopia, March to Aptil,2016(n=272).

Regarding marital status, 141 (51.8%) of respondents were married followed by single 115 (42.30%).The remaining few participants; 3.7% and 2.20% were divorced and widowed respectively.

Two third, 180 (66.2%) and three quarters (76.5%) of the study participants had less than six year experience of general health care service and delivery care service respectively. Among the study participants, only 60 (22.1%) were responded that they had no interest to work in delivery room, 164 (60.3%) responded that they had work load. When they asked about availability of equipment and vaccines, less than half, 125 (46.0%) and 117 (43.0%) of study subjects were responded that all equipment of newborn care and all vaccines and drugs of newborn care respectively were available at their health institution. The study revealed that, only 101(37.1%) of respondents were took training on new born care of which 53 (52.5%), 35 (34.7%), 13 (12.9%) took training once, twice and three times respectively (Table 2).

Table 2-Distribution of institutional and personal factors of knowledge and practice of essential newborn care among participants working at health centers in Jemma Zone, March to April,2016(n=272)

Question	Response	*Frequency*	*Percent*
Work experience in health care services	0-5 years	180	66.2
	6-10years	69	25.4
	11-15 years	2	0.7
	16-20years	8	2.9
	>20years	13	4.8
Work experience of delivery service	0-5 years	208	76.5
	6-10years	46	16.9
	11-15 years	4	1.5
	16-20years	5	1.8
	>20years	9	3.3
Having interest to work in delivery room	Yes	212	77.9
	No	60	22.1
Availability of equipment	Yes	125	46.0
	No	147	54.0
Availability of drugs and vaccines	Yes	117	43.0
	No	155	57.0
Having work load	Yes	164	60.3
	No	108	39.7
Having in service training	Yes	101	37.1
	No	171	62.9
Number of in service trainings taken	One	53	52.5
	Two	35	34.7
	≥Three	13	12.9

5.2. Knowledge and practice of Airway clearance and neonatal resuscitation

When the participants asked about measures to be taken for babies not cries immediately after delivery, 205 (75.4%) of them knew that the correct measure is calling a help and start resuscitation, 49 (18.0%) of them responded as cover the baby and allow skin to skin contact and the remaining 18 (6.6%) were responded as put the baby on newborn table and give mother care. About position of the baby's head to open the airway, 169 (62.1%) of respondents were aware that the baby's head should be slightly extended and the remaining participants did not able to respond the correct position of the head; 66 (24.3%) were responded as flexed position of the head and 37 (13.6%) of them responded as hyperextended position of the head. Concerning the actions to be taken when the baby is not breathing well after drying and stimulating, 191 (70.2%) were aware that ventilation with bag and mask is the action to be taken and the remaining 81 (29.8%) were responded as more stimulation to breath which is not correct measures. Out of the responding participants, only 93 (34.2%) could identify that 40 breath per minutes is the recommended breath per minute during ventilation of newborn, but the remaining 87 (32.0%) and 92 (33.8%) were responded as 30 and 60 breaths per minutes respectively. The average score of resuscitation domain was 60.48%

Table 3 -Distribution of respondents by their knowledge on neonatal airway management and resuscitation in Jimma zone health centers, March to April, 2016 (n=272).

Variables	Response	Frequency	Percent
Measures to be taken if the baby not cries immediately after delivery	Cover the baby and allow skin to skin contact	49	18.0
	Call a help and start resuscitation	205	75.4
	Put baby on new born table and give mother care	18	6.6
Position baby's head to help open the baby's airway	A flexed position of the head	66	24.3
	Slightly extended position	169	62.1
	Hyper extended position of head	37	13.6
The mentioned measures if baby is not breathing well after drying and stimulation	More stimulation to breath	81	29.8
	Ventilation with bag and mask	191	70.2
The recommended breath per minutes for new born	30 breaths per minute	87	32.0
	40 breaths per minutes	93	34.2
	60 breaths per minute	92	33.8

When the respondents asked about wiping of face and eyes when the head is delivered, 128 (47.1%) responded that they applied always, 86 (31.6%) applied sometimes whereas 58(21.3%) of the respondents did not apply at all. Regarding Apgar score, 168 (61.8%) of the respondents took Apgar score of all delivery they conducted, 82 (30.1%) took only for some babies they delivered whereas 22 (8.1%) did not take Apgar score at all. Concerning airway clearance after delivery, 181 (66.5%) respondents were applied the principle of checking and sucking airway after delivery for all babies they delivered, 86 (31.6%) were applied the principle on some babies while 5 (1.8%) of respondents did not apply at all. Out of the total participants,201 (73.9%) were checked for breathing or crying while drying it always, 63 (23.2%) were checked for breathing or crying while drying it only sometimes but ,8 (2.9%) did not checked at all.

Table 4 -Distribution of respondents by their practice on neonatal airway management and resuscitation in Jimma zone health centers, March to April, 2016 (n=272).

Item of practice	Response	Frequency	Percent
Wipes the eyes and face when the head is delivered.	No never	58	21.3
	Yes, some times	86	31.6
	Yes, always	128	47.1
Taking Apgar Score for newborn babies	No never	22	8.1
	Yes, some times	82	30.1
	Yes, always	168	61.8
check and Sucks the air way after delivery	No never	5	1.8
	Yes, some times	86	31.6
	Yes, always	181	66.5
Check for breathing and/or whether the baby is crying or not while drying it.	No never	8	2.9
	Yes, some times	63	23.2
	Yes, always	201	73.9

5. 3 knowledge and practice of Hypothermia and thermal protection

According to the study, 183 (67.3 %) respondents knew that newborn should be bathed after twenty four hours of delivery, but the remaining 89 (32.7%) of the respondents did not know the recommended time at which newborn should be bathed; 11 (4.0%) of them responded as immediately bathing whereas 78 (28.7%) of them responded as within the first twenty four hours of delivery. When the study participants asked the methods of thermal protection, out of

the total study participants, 136 (50.0%) were aware that immediately dry can be used for thermal protection and 204 (75.0%) were aware that we can use skin to skin contact for thermal protection whereas 12 (4.4%) responded as early bathing which is not correct method of thermal protection. Regarding newborn placement immediately after birth, majority, 210 (77.2%) knew that newborn should kept on the mother's chest/ belly immediately after birth, but the remaining 62 (22.8%) did not know the recommended place where newborn should be placed immediately after birth.

Table 5- knowledge of thermal protection in health centers of Jimma Zone, Oromia regional state, south west Ethiopia from March to April, 2016(n=272).

Question	Response	Frequency	Percent
Time at which newborn should be bathed after delivery	Immediately	11	4.0
	within the first 24 hours of delivery	78	28.7
	after 24 hours of delivery	183	67.3
The mentioned methods of thermal protection*	immediately dry	136	50.0
	Allow skin to skin contact	204	75.0
	Early bathing	12	4.4
Where newborn should kept immediately after birth	Beside the mother	26	9.6
	With someone else	1	0.4
	On the mother's chest/ belly	210	77.2
	On newborn bed /table	35	12.9

*Multiple response used

About thermal protection practice, 218 (80.1%) of the study participants dried all newborn babies they delivered immediately after delivery with dry towel whereas 63 (23.2%) applied only for some babies but, few, 7 (2.6%) of them responded that they did not dry all babies they delivered. Out of the total respondents, 198 (72.8%) Kept all babies they delivered on mothers belly/chest immediately after the baby delivered whereas 7 (2.6%) of them did not kept all babies on the mother belly/chest. Of the total respondents, 154 (56.6%) discarded wet cloth/towel and cover the baby with dry cloth/towel for all babies while 109 (40.1%) of them apply this principle only for some babies. Of the responding participants, 168 (62.1%) kept all babies skin-to-skin contact with the mother while 95 (34.9%) of them kept skin to skin contact principle only sometimes but, 8 (2.9%) of them did not apply this principle at all. Majority, 235 (86.4%) of them initiated breast

feeding within the first hours of delivery whereas 37 (13.3%) of the study participants initiated breast feeding only for some babies they delivered.

Table 6- Practice of respondents on thermal protection and prevention of hypothermia in Jimma Zone health centers, South West of Ethiopia from March to April,2016(n=272).

Questions	Response	Frequency	Percent
Drying the baby immediately with dry towel	No, never	7	2.6
	Yes ,some times	47	17.3
	Yes ,always	218	80.1
Discarding wet cloth/towel and cover the baby with dry clothes	No, never	9	3.3
	Yes ,some times	109	40.1
	Yes ,always	154	56.6
Keeping the baby on mothers belly/ chest immediately after birth	No, never	7	2.6
	Yes ,some times	67	24.6
	Yes ,always	198	72.8
Keeping skin to skin contact with the mother	No, never	8	2.9
	Yes ,some times	95	34.9
	Yes ,always	169	62.1
Initiating breast feeding Within the first hour of delivery	No, never	0	0.0%
	Yes ,some times	37	13.3
	Yes ,always	235	86.4

5.4 Knowledge of breast feeding

Regarding breast feeding, 234 (86.0%) of study participants were aware that initiation of breast feeding after delivery should be taken within the first hours of delivery, but 34 (12.5%) and 4 (1.5%) of them responded as initiation of breast feeding should took place within 1-h hours and after six hours of delivery respectively .More than three quarters, 216 (79.4%) were aware that colostrum has infection protection role in newborn whereas the remaining 56 (20.6%) did not aware that colostrum has infection protection role. When the participants asked about the duration of exclusive breast feeding, 210 (77.2%) of the respondents knew that the mother should feed breast her baby exclusively for the first six months, but 62 (22.8%) of the respondents did not know for how long the mother should exclusively breast feed her baby; 13 (4.8%) responded as less than six month and 49 (18.0%) responded as for greater than six month.

Table 7-knowledge of breast feeding among study participants working at health centers in Jimma zone, south west of Ethiopia from March to April,2016(n=272).

Questions	Response	Frequency	Percent
Time of initiation of breast feeding after delivery	Within one hour of delivery	234	86.0
	within 1-6 hours of delivery	34	12.5
	>6 hours of delivery	4	1.5
Colostrum has infection protection role for newborn baby.	Yes	216	79.4
	No	56	20.6
How long should a mother exclusively breast feed her child	Less than 6 month	13	4.8
	For 6 months greater than 6 months	210	77.2
	Greater 6 month	49	18.0

5.5 Knowledge and practice of prevention of infection, cord care and care of low birth weight.

As shown in table 6, less than half, 103 (37.9%) of the study participants were aware that the cord of crying baby should be clamped or tied at 2-3 minutes of delivery or after the pulsation of umbilical artery stopped, but 102 (37.5%), 67(24.6%) of them responded as that the cord should be clamped or tied immediately after delivery and within 1-2 minutes of delivery respectively. Out of the total respondents, the vast majority, 254 (93.4%) knew that we should use sterile scissor to cut the cord, but only 66 (24.3%) were aware that new surgical blade can also be used to cut the cord whereas few respondents; 20 (7.4%) and 6 (2.2%) mentioned clean scissor and new razor blade respectively which is incorrect. When respondents asked the recommended care of dirty umbilical cord, 99 (36.4%) were aware that it should be cleaned with soap and water, dried and no need of bandaging, but, 67 (24.6%) of them responded as it should be cleaned with soap and water and covered with bandage and the remaining 103(37.9%) responded as alcohol should be used to clean the umbilicus. The vast majority, 252 (92.6%) were aware that silver nitrate/tetracycline can be applied for the treatment of eye infection for newborn but, only 74 (27.2%) were aware that sterile water can also be used to clean infected eyes. About the recommended cares of low birth weight babies,145 (53.3%), 192 (70%) and 46 (16.9%) could identify that breast feeding early and frequently, keeping the child warm and infection prevention respectively are the recommended

cares of low birth weight babies whereas 11 (4.0%) responded as bathing often which is contradictory with world health organization guidelines.

Table 8-Knowledge of respondents on prevention of infection, cord care and care of low birth weight, Jimma Zone health centers, South West of Ethiopia from March to April,2016 (n=272).

Questions	Response	Frequency	Percent
How long should you wait to clamp or tie the umbilical cord of a crying baby	clamp or tie Immediately	102	37.5
	clamp or tie 1-2 minutes of delivery	67	24.6
	Clamp or tie 2-3 minutes of delivery	103	37.9
What kind of instrument do we can use to cut the cord*	Clean Scissor	20	7.4
	New Surgical blade	66	24.3
	new razor blade	6	2.2
	Sterile Scissor	254	93.4
What is the recommended care of dirty umbilical cord	clean it with soap and water and cover with bandage	67	24.6
	clean it with soap and water ,dry it and do not cover	99	36.4
	use alcohol to clean the umbilicus	103	37.9.
	Clean with sterile water and apply topical antibiotics	3	1.1
The recommended treatment of eye infection in newborn include*	Apply nothing	7	2.6
	Apply breast milk in the eye	6	2.2
	Clean eye with sterile water	74	27.2
	Apply silver nitrate/tetracycline	252	92.6
The recommended care for Low Birth Weight baby*	Bath often	11	4.0
	Breast feeding early and frequently	145	53.3
	Keep the child warm	192	70.6
	Prevent infection from developing	46	16.9

*Indicate that there is multiple response for a single question

As shown in table 9 about personal protective equipment, 207 (76.1%) used sterile glove during cord care for all babies whereas 64 (23.5%) of them used some times only .Of the total

respondents, only 51 (18.8%) wore clean mask for all delivery they conducted whereas 123 (45.2%) of the respondents did not wear clean mask for all delivery they conducted,123 (45.2%) of them wore clean apron during all deliveries they conducted, but,104(38.2%) wore for some delivery they conducted whereas 45 (16.5%) did not wear at all. Concerning hand washing during delivery, only 37 (13.6%) reported that they always wash their hand with soap and water before procedure, 102(37.5%) were reported that they sometimes wash their hands before procedures whereas133 (48.9%) did not wash their hand before all delivery they conducted. On the other hand, only 40 (14.7%) study participants ensured all mother/ caregivers to wash their hands before handling the baby but majority, 145 (53.3%) of the did not advice mothers/care givers at all.

When participants asked about cord care practice, 87 (32.0%) waited for 2-3 minutes after delivery to clamp the umbilical cord of all crying babies, 59 (21.7%) waited 2-3 minutes after delivery only for some babies to clamp the cord of crying babies while 126 (46.3%) clamped the cord of all crying babies within less than two minutes or immediately after baby delivered. After clamping the cord, the vast majority, 250 (91.9%) were used sterile scissor to cut the cord but, 22 (8.1%) were used sterile scissor sometimes only. Of the study participants, 118 (43.4%) reported that they gave cord care by cleaning and letting it to air dry whereas 113 (41.5%) of them applied this care only for some babies they delivered.

On eye care, more than half, 159 (58.5%) did not clean eyes immediately after birth from medial to lateral side with swab soaked in sterile water whereas 85 (31.3%) were applied this care only sometimes, but few , 28 (10.3%) of them reported that they applied this care for all babies they delivered. Of the total participants, 149 (54.8%) were reported that they applied eye ointment for all newborn babies they delivered, 107(39.3%) were applied sometimes whereas 16 (5.9%) did not apply this care at all. When they apply eye ointment, 178 (65.4%) applied without touching the eyes with the tip of ampule, 60 (22.1%) applied some times without touching, 34 (12.5%) applied always by touching. More than three quarters, 238 (87.5%) of the participants reported that they weighed and recorded the weight of all babies they delivered (Table 9).

Table 9-Practice of respondents on prevention of infection, cord care and weighing of newborns, Jimma Zone health centers, South West of Ethiopia from March to April,2016 (n=272).

Item of practice	Level of practice		
	No, never	Yes, some times	Yes, always
Put on sterile glove during cord care	1(0.4%)	64(23.5%)	207(76.1%)
During delivery, wearing mask	123(45.2%)	98(36.0%)	51(18.8%)
During delivery, wearing apron	45(16.5%)	104(38.2%)	123(45.2%)
Hand washing during delivery& neonatal care with soap and water before the procedure	133(48.9%)	102(37.5%)	37(13.6%)
clean eyes immediately after birth from medial to lateral side with swab soaked in sterile water, using separate swab for each eye	159(58.5%)	85(31.3%)	28(10.3%)
Using Sterile Scissor to cut the cord.	0(0%)	22(8.1%)	250(91.9%)
Clamping the cord within 2- 3 minutes after the birth or after cessation of cord pulsations.	126(46.3%)	59(21.7%)	87(32.0%)
Ensuring the mother/ caregivers wash their hands before handling the baby	145(53.3%)	87(32.0%)	40(14.7%)
Giving eye ointment for newborn babies	16(5.9%)	107(39.3%)	149(54.8%)
Not touching the eyes with the tip of the ampule while giving eye ointment	34(12.5%)	60(22.1%)	178(65.4%)
cord care by cleaning the cord and letting to air dry	41(15.1%)	113(41.5%)	118(43.4%)
Weigh and record the baby's weight	2(0.7%)	32(11.8%)	238(87.5%)

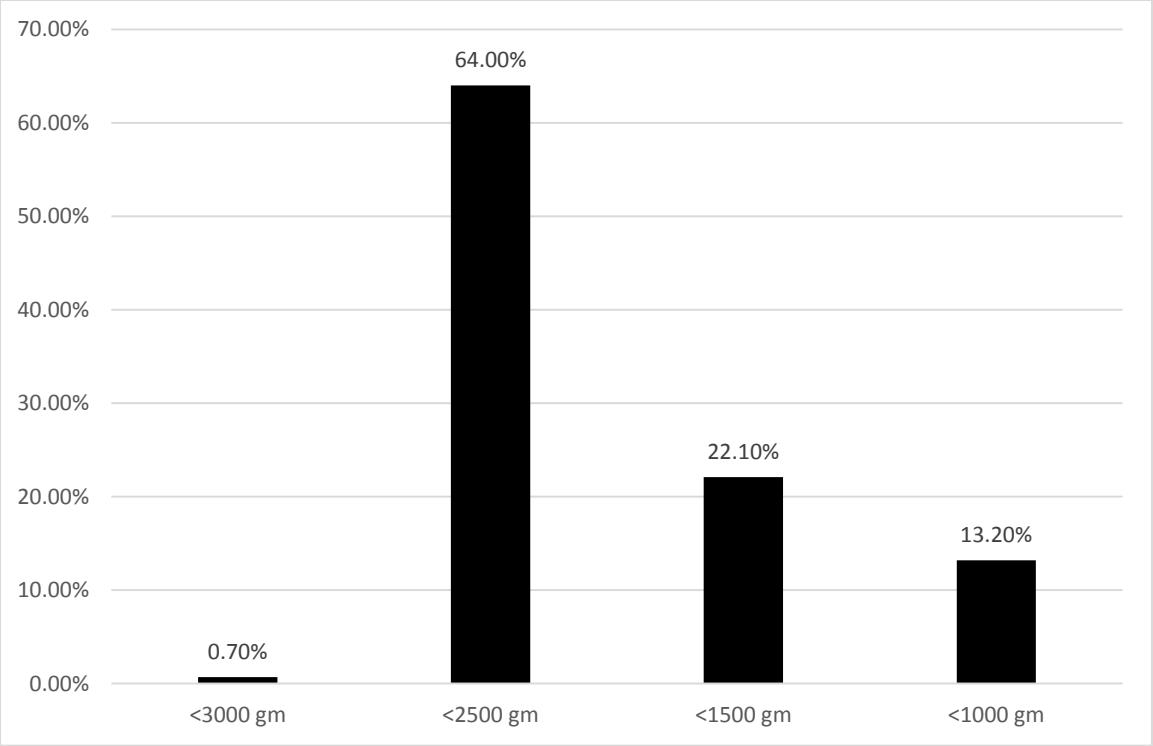

Figure 5 -knowledge of low birth weight among study participants in Jimma Zone health center, south west of Ethiopia, from March to April,2016 (n=272).

As shown in figure 5 above, nearly two third (64.0%) knew that low birth weight is weight less than 2500 grams but, 60(22.1%) defined as weight of less than 1500 grams, 36(13.2%) of them defined as less than 1000 and 2(0.7%) defined as weight of less than 3000 grams.

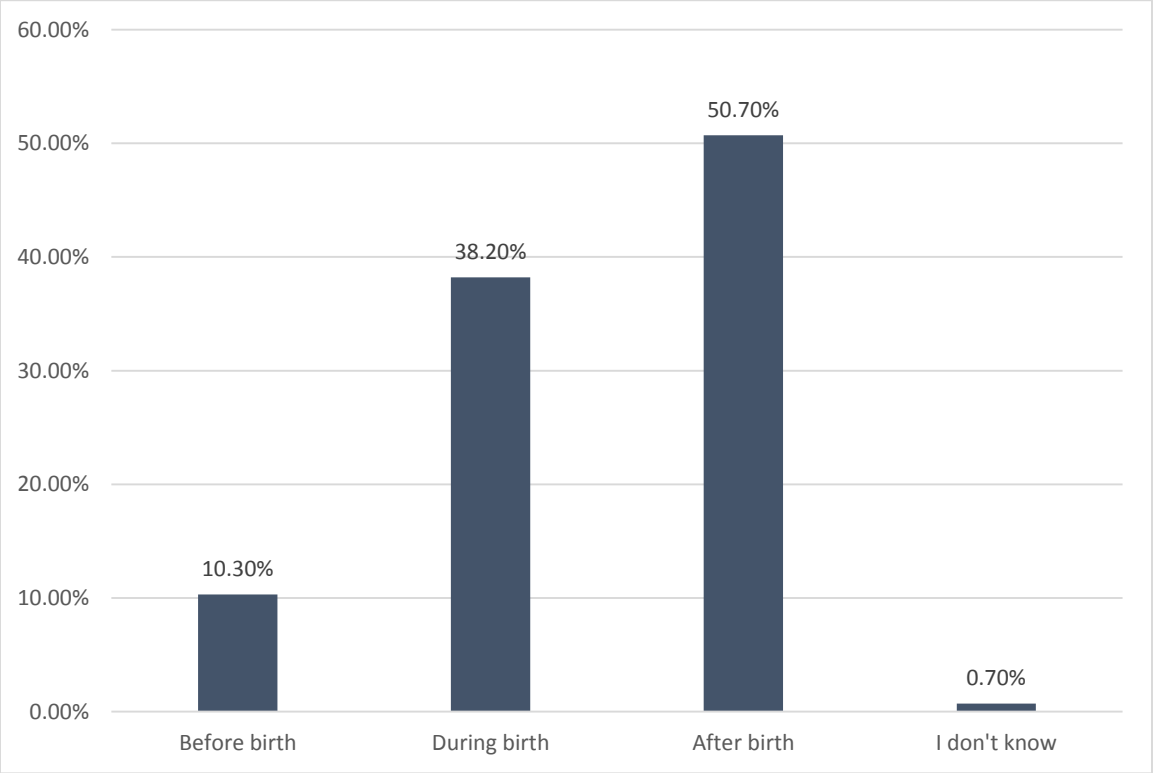

Figure 6-knowledge of respondents on time at which immediate new born care should start , Jimma Zone Health centers, South West of Ethiopia from March to April, 2016 (n=272).

As shown in figure 2 above, 104(38.2%) of the study participants were aware that immediate newborn care should start just during birth whereas 28 (10.3%) and 138 (50.7%) of the participants responded as immediate newborn care should start before birth and after birth respectively and 2 (0.7) of them responded as they do not know when it should start.

The vast majority, 245 (90.1%) of the participants were aware that bleeding in newborn can be prevented by giving vitamin k and the remaining 27 (9.9 %) did not know the correct action to prevent bleeding in newborn baby. More than half, 160 (58.8%) of the study participants knew that 0.5mg of vitamin k is the recommended dose for preterm babies while the remaining 112 (41.2%) of participants did not know the recommended dose of vitamin k for preterm babies. More than three quarters, 237 (87.1%) and 261 (96%) of the respondents could identify that BCG and OPV respectively are vaccines those should be given during essential newborn care. Regarding time of postnatal visit, 214 (78.7 %) were aware that the best time of first post natal visit should

be within the first 24 hours of delivery whereas 46 (16.9%) and 12 (4.4%) of them responded that the best time for the first post natal visit should be on the 3rd day and on the 7th day of delivery respectively.

Table 10-Knowledge of respondents on some components of post natal care and bleeding prevention in new born in Jimma Zone health centers, South west of Ethiopia from March to April 2016(n=272).

Variables	*Response*	*Frequency*	*Percent*
The mentioned best time for first postnatal visit	Within the first 24 hours	214	78.7
	On the 3rd day	46	16.9
	On the 7th day	12	4.4
The vaccines those mentioned as components essential newborn care	BCG	*237*	*87.1*
	OPV	*261*	*96.0*
	TTC	*49*	*18.0*
	Vit k	*94*	*34.6*
	Rota	*2*	*0.74*
	PCV	*2*	*0.74*
	Pentavalent	*1*	*0.37*
What is the recommended action to prevent bleeding in newborn	Breastfeed the child	*12*	*4.4*
	Not necessary to give anything	*15*	*5.5*
	Give vitamin K	*245*	*90.1*
What is recommended dose of vit k for preterm babies	1mg	*107*	*39.3*
	0.5mg	*160*	*58.8*
	Other dose	*5*	*1.8*

5.6 Knowledge of newborn danger signs

Respondents were considered as knowledgeable if they could identify at least four out the common 11dager signs. Out of the total participants, less than one third, 82 (30.1%) could mention four and more newborn danger signs whereas more than two third could identify only three and less than three danger signs .The only two danger signs those more than half of respondents, 162 (59.6%) and 139 (51.1%) of them could mention were poor feeding/suckling and difficulty/fast breathing respectively. To lesser extent, respondents were also abled to mention fever 99 (36.4%), yellow palms /sole/eyes 77 (28.3%), lethargy 70 (25.7%), convulsion 51 (18.8%), baby too small/ born too early 44 (16.2%),redness/discharge at the cord 32 (11.8%) and the remaining respondents could list few danger signs; eyes red/swollen/discharge 26 (9.6%) ,baby feels cold 19 (7.0%) ,loss of consciousness 13 (4.8%).

Table 11- Identified newborn danger signs among study participants in Jimma Zone health centers, South west of Ethiopia from March to April,2016 (n=272)

Questions	Response	frequency	Percent
The number of neonatal danger signs mentioned	*≤3*	190	69.9
	≥4	82	30.1
The mentioned newborn danger signs	*Convulsion*	51	18.8
	Fever	99	36.4
	Poor feeding/suckling	162	59.6
	Difficulty/fast breathing	139	51.1
	Baby feels cold	19	7.0
	Baby too small /born too early	44	16.2
	Redness /discharge at cord	32	11.8
	Eyes red/swollen/discharge	26	9.6
	Yellow palms/soles/eyes	77	28.3
	Lethargy	70	25.7
	Unconscious	13	4.8

5.7 Overall knowledge and practice of essential newborn care

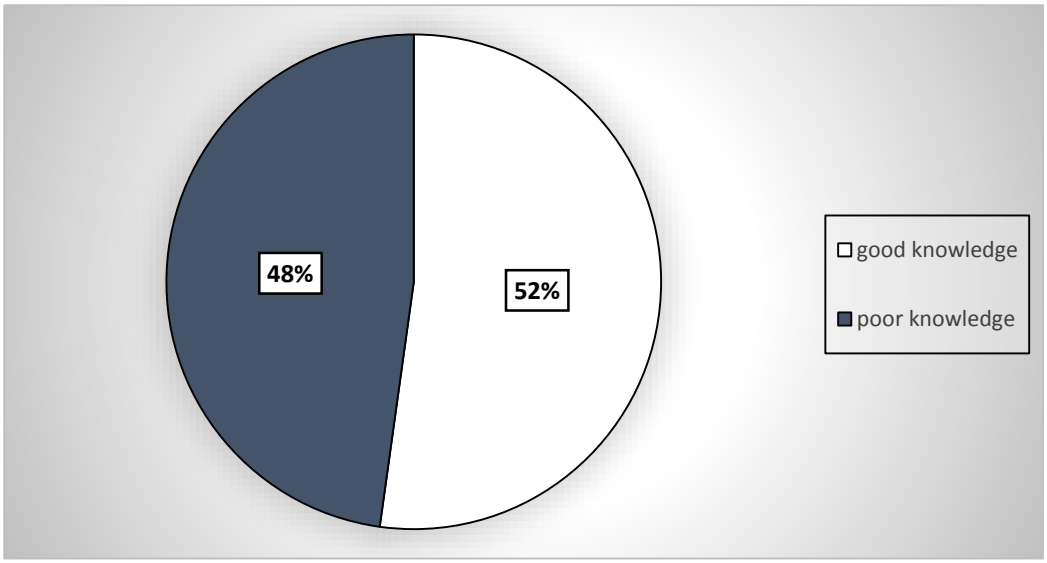

Figure 7- The overall knowledge of essential newborn care among nurses and midwives working at health centers in Jimma zone, south west of Ethiopia from March to April ,2016 (n=272).

The mean knowledge score of study participants was 23.27 (SD=±4.39) out of the total 35 points. The study revealed that 52.2% of the respondents had good knowledge about essential newborn care where as 47.8% had poor knowledge.

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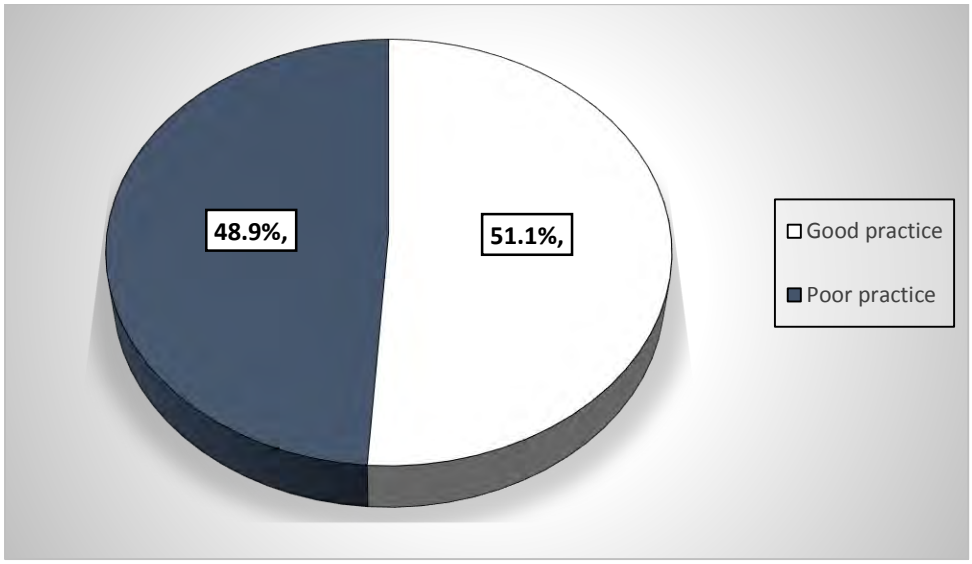

Figure 8-The overall practice of essential newborn care among nurses and midwives working at health centers in Jimma zone, south west of Ethiopia from March to April ,2016 (n=272).

The mean score of practice of essential newborn care was 32.82 (SD=±7.35) out of the total 48 points. An overall practice of essential newborn care, 51.1% of the respondents had good level of practice and the remaining 48.9% of them had poor level of practice

5.8 Some factors of knowledge and practice of essential newborn care

In order to identify factors associated with ENC knowledge and practice, logistic regression forward method was used with 95% CI and p- value < 5%, all variables those have association by binary logistic regression were entered to multiple-logistic regression and final independent predictors of ENC were identified .Age, religion, ethnicity, marital status, work experience and work load were not found to have significant association with participants' level of knowledge of essential newborn care both at binary and multiple regression analysis.

In crude analysis, respondents' sex was found to have association with their knowledge of essential newborn care (p=0.004). Males were less likely knowledgeable about essential new born care than females [COR (95% CI) 0.486 (0.300-0.780)] but, the association was insignificant after adjusting for possible confounders. Field of study was significantly associated with participants' knowledge about essential newborn care (p=0.001). Midwives were 3.899 times more likely knowledgeable about essential newborn care than nurses [AOR (95%CI) 3.899 (1.781-8.537)]. Educational qualification was also found to have association with knowledge of ENC (p<0.001).Diploma holders were 0.250 times less likely knowledgeable about ENC than degree holders [AOR (95%CI) 0.250 (0.120-0.523)]. Interest to work in delivery room was statistically significant with knowledge of ENC (p=0.005). Those respondents who had interest to work in delivery room were 2.822 times more likely knowledgeable about ENC than those who had no interest[AOR(95%CI) 2.822 (1.372-5.807)] .Training on immediate or essential newborn care was also found to be a factor for knowledge of ENC (p<0.001). Those participants who had at least one in-service training were 3.421 more likely knowledgeable about ENC than those did not trained at all [AOR (95%) 3.421 (1.779-6.579)].

Table 12- Association of socio-demographic characteristics and some selected variables with participants' level of knowledge on essential newborn care in Jimma Zone health centers, south west of Ethiopia from March to April, 2016.

Variables	Good knowledge	Poor knowledge	COR(95% CI)	P value	AOR(95% CI)	P values
Sex Female Male	 81(57.0%) 61(43.0%)	 51(39.2%) 79(60.8%)	 0.486(0.300- 0.780)	 0.004*	 1.008(0.544- 11.868)	 0.979
Field Nursing Midwifery	 76(53.5% 66(46.5%)	 115(88.5% 15(`11.5%)	 6.658(3.542 -12.514)	 <.001*	 3.899(1.781- 8.537)	 0.001*
Qualification Degree Diploma	 34(23.9%) 108(76.1%)	 16(12.3%) 114(87.7%)	 0.446(0.233 -0.854)	 0.015*	 0.250(0.120- 0.523)	 <.001*
Interest to work in delivery room: No Yes	 15(10.6%) 127(89.4%)	 45(34.6%) 85(65.4%)	 4.482(2.350 -8.549)	 <.001*	 2.822(1.372- 5.807)	 0.005*
Training No Yes	 64(45.1%) 78(54.9%)	 107(82.3%) 23(17.7%)	 5.67(3.243- 9.914)	 <.001*	 3.421(1.779- 6.579)	 <.001*

***Adjusted for all significant variables of p <0.05**

On both bivariate and multi-vitiate analysis, age, religion, ethnicity, marital status, work experience, work load and monthly salary were statistically insignificant with practice of essential newborn care. In crude analysis, respondents' sex was found to have association with their practice of essential newborn care (p=0.011). Males were less likely practiced than females [COR 95% CI) 0.535 (0.330-0.865)] but, the association was insignificant after adjusting for possible confounders.

Being nurses or midwives was found to have significant association with their practice of essential newborn care (p<0.001). Midwives were 4.419 times more likely practiced essential newborn care

than nurses [COR (95% CI) 4.419 (2.47-7.905)] but, the association was insignificant after adjusting for possible confounder.

Educational qualification was also found to have significant association with participants' practice of ENC (p=0.003). Diploma holders were 0.287 times less likely practiced than degree holders participants [AOR (95%CI) 0.287 (0.126-0.650)].

Interest of participant to work in delivery room was found be a factor for practice of essential newborn care (p=0.008). Participants those have interest to work in delivery room were 3.006 times more likely practiced than those who have no interest [AOR(95% CI) 3.006(1.328-6.804)].

Participants' in-service training on newborn care was also significantly associated with their practice of essential newborn care (p=0.004). Participants who had at least one time training on immediate or essential newborn care were 2.937 more likely practiced than those did not trained [AOR(95%CI) 2.937 (1.415-6.098)].

On bivariate analysis, availability of newborn care equipment at health centers was found to have association with ENC practice (p=0.002).Those participants who responded that all equipment of essential ENC were available at their health centers were 2.199 times more likely practiced than those who responded that there was scarcity of newborn care equipment [COR (95%CI) 2.199 (1.352-3.579)] but after adjustment of possible confounders it was statistically insignificant. In crude analysis, availability of newborn care drugs and vaccines were also found to have significant association with participants' practice of ENC (p=0.001). Those participants who responded that all drugs and vaccines of essential ENC were available at their health centers were 2.383 times more likely practiced than those who responded that there was scarcity of newborn care drugs and vaccines [COR (95%CI) 2.383 (1.455-3.901)] but after adjustment of possible confounders it was statistically insignificant. The study also showed significant association between level of knowledge and level of practice of ENC($p<0.001$).Those respondents who had good knowledge of ENC were 4.848 times more likely practiced than those who had poor knowledge[(AOR(95% CI) 4.848 (2.605-9.023)] .

Table 13-Association of selected socio-demographic variables, personal and institutional factors variables with Respondents' practice of essential new born care in Jimma zone health centers, South west Ethiopia March to April ,2016.

Variable	Poor practice	Good practice	COR(95% CI)	P-Value	AOR(95%CI)	P-value
Sex						
Female	54(40.6%)	78(56.1%)	0.535(0.330-0.865)	0.011*	1.025(0.527-1.991)	0.943
Male	79(59.4%)	61(43.9%)				
Field						
Nursing	113(85.0%)	78(56.1%)	4.419(2.470-7.905)	<.001*	1.522(0.667-3.472)	0.319
Midwifery	20(15.0%)	61(43.9%)				
Qualification						
Degree	14(10.5%)	36(25.9%)	0.337(0.172-0.659)	0.001*	0.297(0.126-0.650)	0.003*
Diploma	119(89.5%)	103(74.1%)				
Interest to work in delivery room						
No	47(35.3%)	13(9.4%)	5.297(2.703-10.378)	<0.001*	3.006(1.328-6.804)	0.008*
Yes	86(64.7%)	126(90.6%)				
Having Training						
No	108(81.2%)	63(45.3%)	5.211(3.012-9.018)	<0.001*	2.937(1.415-6.098)	0.004*
Yes	25(18.8%)	76(54.7%)				
Availability of equipment						
No	85(63.9%)	62(44.6%)	2.199(1.352-3.579)	0.002*	0.964(0.485-1.139)	0.916
Yes	48(36.1%)	77(55.4%)				
Availability of drugs & vaccine						
No	90(67.7%)	65(46.8%)	2.383(1.455-3.901)	0.001*	1.687(0.861-3.307)	0.128
Yes	43(32.3%)	74(53.2%)				
Level of knowledge						
Poor	98(73.7%)	32(23.0%)	9.362(5.390-16.263)	<0.001*	4.848(2.605-9.023)	<.001*
Good	35(26.3%)	107(77.0%)				

***Adjusted for all significant variables of p <0.05**

6. DISCUSSION

Knowledge is one of the crucial aspects of health systems to adherence of essential newborn care practices and lack of knowledge may impede provision of essential newborn care.

In this study, the average knowledge and practice score about ENC were 66.48% and 68.38% respectively. This knowledge report is lower compared to report of study conducted in India, which was 78% for all providers (19) and for nursing staff it was 77% and skill was 35% (22).The discrepancy could be due to the difference in in-service training .The other possible reason might be difference of educational level of study participants .As in the case of this study, majority of participants were diploma holders and majority of the participants had no in-service training on newborn care. The possible reasons for difference in average score of practice might be methodological difference between the two studies. But this study is higher when compared to that of Khartoum which showed that an overall knowledge level was 50.6% and their performance level was poor (41.1%) (1) .The possible reason for this difference might be the difference between study settings. This study also higher compared to result of study conducted in Tanzania (13) and Ethiopia (16) which revealed that average knowledge score of ENC was 41 % and 55% respectively. The reason of difference might be study participants and study settings respectively.

In this study, 52.2% of the respondents had good knowledge about ENC and 47.8% had poor knowledge whereas, 51.1% had good level of practice and 48.9% had poor level of practice. This is relatively higher compared to study conducted in Egypt, 43.5% and 47.8% of nurses had good and poor knowledge respectively and 52.6% have a good practice on components of essential newborn care (23) and also higher than that of Uganda, 46.5% judged to have adequate knowledge(24) and also higher than that of India, the skill scores was predominantly non-satisfactory (<50%) (19). This discrepancy in level of practice could be due to methodological difference. The slight difference in the level of knowledge might be due to the difference between study participants. The participants were nurses and midwives in this study in which midwives had good knowledge compared to nurses. But only nurses participated in case of study conducted in Egypt and it included nurse assistants in case of Uganda.

The study finding revealed that average knowledge score of resuscitation domain was lower (60.48%) compared to that of India, 76% for all health providers and 74% for nursing staffs (22)

and in Afghanistan doctors and midwives scored 71% and 66% (29).The reason of this difference might be due to difference in in-service training on resuscitation and difference in educational level of the two studies groups. Lack of knowledge on resuscitation can impede practice of resuscitation and increase risk of death and complication of asphyxia. Regarding airway maintenance practice, this study revealed that greater than 66.5% maintained airway by checking and sucking airway after delivery which was higher when compared to report of study done in Ambala district in Haryana,32.3% (25). The possible reason of this difference might be the difference of educational level study participants of the two study areas.

Exclusive breastfeeding has a significant protective effect against infections. Early breastfeeding and keeping the baby close to the mother reduce the risk of hypothermia and hypoglycemia and delaying of breast feeding after delivery limits the opportunities for mothers and infants to benefit from early initiation of breastfeeding .This study revealed that 86.0% of study participants were aware that initiation of breast feeding after delivery should be taken within the first hours of delivery and 77.2% of the respondents knew that the mother should feed breast her baby exclusively for the first six months whereas greater than 86.4% of participants initiated breast feeding within one hours of delivery. This is far greater when compared with study conducted Ethiopia in which only about a third of the cases did health workers help the mother initiate breastfeeding within the first hour of delivery (16). It is also higher than that of Tanzania, initiation of breastfeeding within first hour was 40% in regional hospitals and 55% in health centers and dispensaries (30) ,while according to MAISHA quality of maternal and newborn care study, initiate of breastfeeding within one hour was 55% and 87% in 2010 and 2012 respectively (31).This discrepancy could be the difference between study settings. Hospitals with the heaviest volume of deliveries makes the providers busy to consider all components of care on time. On the other hand there is time gap between the two studies; now a day government focused on newborn care and giving training for midwives and others who gives delivery services. On the other hand this study result is consistence with that of Uganda, 86.4 % initiated breast feeding within the first hour of delivery (24). This indicated that the two studies increased the opportunities for mothers and infants to benefit from early initiation of breastfeeding.

Thermal protection in newborn is very important. Because, it can prevent the complication of hypothermia. According to this study, 67.3 % respondents knew that newborn should be bathed after twenty four hours of delivery, 77.2% knew that newborn should kept on the mother's chest/

belly immediately after birth ,greater than 72.8% kept the baby on the mother's chest/ belly immediately after birth, more than 80.1% dried the babies immediately with dry towel, more than 56.6 % discarded wet cloth/towel and covered the baby with dry clothes, greater than 62.1% kept the baby skin to skin contact with the mother. This is consistent with study done in Khartoum,78.1% of the study participants could mention that newborn should be placed on the mother's abdomen immediately after delivery (1).But, this study is relatively lower compared with study done in Tanzania ,77% of health worker immediately placed newborn on the mother's abdomen , 97% immediately dries baby with towel, 97% discards wet towel and covers with dry towel (13).This difference might be knowledge difference between the two study group on importance of thermal protection. The other possible reason might be scarcity of newborn care equipment supported by on crude analysis, availability of equipment of newborn care was found to be a factor of practice. On the other hand study in India revealed that, although 89% of the providers demonstrated wiping of newborn with dry cloth, 63% showed putting neonate on warm surface (22)and study in Philippine revealed that more than 90% of infants were dried (21). The reason of this difference might be difference of educational level of study participants leads to knowledge difference on the importance of thermal protection. In this study, there was significant association between knowledge and practice of ENC and this can support this reason of difference. On the other hand the study finding is higher when compared to study done in In Ethiopia ,the vast majority of newborns were dried with a towel immediately after birth, but less than half were covered with another dry towel, only 12% of newborns were placed skin to skin contact(16) and in other study in 4 regions of Ethiopia, the most common immediate placements of the baby on the mother's chest/belly (21.5%) for facility deliveries and 25.8% of newborn was placed in skin to skin contact(14).The possible reason of these difference might be time gap between these studies. Now a day government focused on newborn health and giving training and others may share experience from those trained to some extent. This study was far greater compared to that of Tanzania ,skin to skin contact occurred infrequently at health centers and dispensaries (37%) and regional hospitals (43%), likely due in part to the traditional practice of taking the infant to be weighed and keeping the infant separated from the mother (30).

Clean cord care is very important in preventing early neonatal infections. The precise timing of clamping and cutting the umbilical cord is important as there is some evidence of potential benefits

for the baby when the cord is not clamped and cut immediately after birth (8).The study finding showed that, only 37.9% of the study participants were aware that the cord of crying baby should be clamped or tied at 2-3 minutes of delivery or after the pulsation of umbilical artery stopped and 32.0% and 21.7% of the participants delayed clamping of umbilical cord for all babies and some babies they delivered respectively. This is far lower when compared to report of study conducted in Tanzania which was 83% (13).The possible reason might be difference of awareness between the two study groups on the importance delayed cord clamping. But this study was relatively similar with study done in Khartoum (1) and in Ethiopia (16) in which 35.4% and one third respectively delayed cord clamping. The three studies indicate that the providers limits the babies from potential benefits of delaying cord clamping. But this study report is lower when compared to report of study done in *Peru in which* only 27.7% of cord clamping times occurred at less than 2 minutes (32) .This great difference is as the reason of training in the case of Peru and it was post intervention result. In this study, 91.9% used sterile scissor to cut the cord which was slightly lower compared to result of study done In Tanzania, 100% of health workers cuts cord with sterile blade/scissor (13). This slight difference might be due in part equipment availability.

The study revealed that, 13.6% washed their hand before all deliveries they conducted, 37.5% only sometimes but 48.9% did not washed at all and 53.3% did not ensure the mother to wash her hand before handling of the baby. The study finding also revealed that less than half consistently wore protective clothing other than gloves .This was lower than that of Tanzania, 57% washed hands before procedure and (51%) of providers wore protective clothing other than gloves (30).The possible reason might be inadequate water and equipment of newborn care in the study institution. This study showed that, 92.6% were aware that a applying silver nitrate/tetracycline is treatment of eye infection in newborn and *90.*1% knew that vitamin k prevents bleeding in newborn, but, only 54.8% administered eye ointment for all babies they delivered, 39.3% only for some babies, 16.9% administered vitamin k for all babies they delivered, 59.9% administered only for some babies whereas 23.2% did not administered at all and greater than 61.8% applied Apgar score. This is consistent when compared with results of studies conducted in Egypt ,52.6% put eye drops, apply Apgar score (23) .But, lower than that of Philippine in which more than 90% administered eye ointment and injected vitamin K (21).The study is higher compared to that of Uganda, 77.6% of study participants knew that vitamin k can prevent bleeding in newborn (24). This supports the

above difference on administration of vitamin k and eye ointment might be due to difference in availability of the study area and that of Philippine rather than knowledge gap.

Knowledge of study participants on newborn danger signs is very crucial for the survival and future well-being of the babies. But this study revealed that, less than one third could mention four and more newborn danger signs whereas more than two third could identify only three and less than three danger signs. This may impede the care they can give for the child with health problems and advice they can give for the mother.

Many factors can influence knowledge and practice of essential newborn care. In this study, in-service training, field of study, educational qualification and interest to work in delivery room were found to be factor of knowledge level and difference in year of experience was insignificant with knowledge level which is similar with that of Uganda in which there was no statistical difference in knowledge between health workers who had served six years or longer in reference to health workers who had served five years or less and there was difference in knowledge level based on field and level of education (24). In both cases being midwife and degree holder found to have better knowledge than being nurse and diploma holder respectively. Similarly study in Egypt revealed that ,there were a significance relationship between nurses education and their knowledge of immediate newborn care, while a negative correlation were found regarding to their years of experience (23).

On the other hand, this study showed that, educational level, interest to work in delivery room, in-service training were significantly associated with level of ENC practice. This in part due to all of these factors can increase knowledge level which can lead to increment of level of practice and this evidence can be supported by the presence of significant association between level of knowledge and practice. Compared to that of Egypt (23), no significance difference between nurses' knowledge and practices and the possible reason might be difference of study participants.

Strength and limitation of the study

Strength

- ✓ The study cover large scope of the study area and it increase the generalizability of the finding.
- ✓ The study compared the level of knowledge and practice for both nurses and midwives and could identify the gap on both knowledge and practice of ENC.
- ✓ The findings of this study provide valuable information for improving the quality of Programs to train nurses and midwives by enabling the identification areas of knowledge and practice gaps on newborn care.

Limitation

- ✓ The study was based on performance self-report rather than observed practices towards newborn care. Therefore, it may have social desirability response setting bias to some extent.
- ✓ Lack of enough similar literature to compare the findings of the study with different studies.

7. CONCLUSION AND RECOMMENDATION

7.1 conclusion

- Even though the study population had good knowledge and practice of ENC in general, they had poor knowledge and practice on some components of ENC:
  - ✓ The study population had knowledge gap on resuscitation domains and this may leads to malpractice, increase the risk of asphyxia and its complications.
  - ✓ The study population had poor knowledge and practice on the precise cord clamping time evidenced by majority of them clamped the cord within less than two minutes, limited potential benefits for the baby when the cord is not clamped and cut immediately after birth which may leads to neonatal anemia.
  - ✓ The study population had poor infection prevention practice like hand washing before procedure, wearing protective clothes other than glove .This may increase the risk for neonatal infection.
  - ✓ Majority of study population were not knowledgeable on identification of neonatal danger signs and this may impede the care given to neonate with health problem.
  - ✓ Consistently administration of vitamin k and eye ointment was relatively low in the study area
- The study population had good practice on initiating of breast feeding within the first hours of delivery.
- Majority of the study population had good knowledge and practice on thermal protection and they decreased the risk of hypothermia and its complication.
- Being midwife or nurse, educational level, interest to work in delivery room and in-service training on new born care were found to be independent predictors of knowledge on ENC in the study area.
- Level of education, interest to work in delivery room, in-service training on newborn care and level of knowledge on ENC were found to be independent predictors of ENC practice in the study area.

7.2 Recommendations

Based on the study findings, the following recommendations were forwarded:

Federal ministry of health, Oromia regional health Bureau and NGOs those are working in this area in collaboration with Jimma Zonal health office and each woredas health Offices were encouraged to:

- ✓ Strengthen practical based in-service training given to nurses and midwives on ENC including newborn resuscitation and upgrade their educational level.
- ✓ Give Priority for those who have training on delivery and newborn care and for those have better educational level on the assignment of nurses and midwives working in delivery room and motivation should be there for those have good performance.
- ✓ Increase the emphasis on identification of newborn danger signs ,delaying of cord clamping, hand washing before procedure and wearing of protective clothes, administration of vitamin k and eye ointment for all newborn babies by sharing evidence on their importance to support these practice.
- ✓ Conduct further observational study on quality and level of essential newborn care practice
- ✓ Provide all necessary equipment, vaccine and drugs of newborn care for each health centers.
- ✓ It is better if ministry of education incorporate all components of practical based essential newborn care in the curriculum for both diploma and degree program

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Annex I-Questionnaires

Information sheet

Hello! Good morning! My name is----------, I came from----------

Today I am here to collect data on the research undergoing by Bayisa Bereka (pediatrics and child health Nursing Msc candidate at AAU) with the objective of assessment of knowledge and practice of essential newborn care and associated factors among nurses and midwives working at health centers in Jimma zone. I would like to assure you that the study is confidential. I will not keep record of your name and address. Your participation in the study will be totally based on your willingness .You have the right to skip any question that you do not want to answer. But, your correct answer to each question can make the study valuable. For your participation**,** the process of the study has no payment, or special benefit. I can assure that the study also have no any physical or psychological trauma as well as political problem, but participation in the study by giving your correct answer can play great role in the successfulness of the study and also it will provide great input to bring change in quality of health service to newborns. Therefore, you are kindly requested to respond genuinely and voluntary with patience. To fill this questions, it may take 30 minutes.

Informed consent: It has been read to me all information stated above. Therefore, I am willing to participate in this study Signature _____

Date of data collection----------Time of distributed---------- Time of received----------
Data collector: I confirm that I have explained to the participant all relevant information about the study as indicated above. **Name:** **----------**Signature----------

Principal investigator address: phone=0917238905,email:bayisakiso@yahoo.com
Result of the administered questionnaire: 1. Completed 2. Refused 3. Partially completed
Checked by: Supervisor Name----------signature----------Date----------

Part I-Socio-demographic characteristics of study participants

Instruction- Read each items and **mark the box (□√) in front of your answers for each questions.**

S.No	Item of questions	Participant response
101	Sex?	□ Female □ Male
102	Your age in year?	----------in years
103	What is your religion?	□ Muslim □ Orthodox □ Protestant □ Catholic □ Other (specify)---------
104	To which ethnic group do you belong?	□ Oromo □ Amhara □ Dawuro □ Other(specify)--------
105	What is your current **marital status**?	□ Single □ Married □ Divorced □ Widowed □ Separated
106	What is your **field** of study?	□Nursing □ Midwifery
107	What is your Educational **qualification?**	□ Degree □ Diploma
108	What is your monthly Salary?	----------**in Ethiopian birr**

Part II –Factors other than socio-demographic characteristics.

Instruction- Read each items and **mark the box (□√) in front of your answers for each questions.**

S.No.	Item of questions	Participant response
201	What is your general work experience of health care services?	----------in years
202	What is your work experience of delivery services?	----------in years
203	Have you interest to work in delivery room?	□ Yes □ No
204	Do you think you have work load?	□ Yes □ No
205	Did you receive **in-service training on immediate or Essential newborn care**?	□ Yes □ No
206	If yes for **Q205**, **how many times** have you got In-service training?	□ One □ Two □ ≥ Three
207	Do you think that all **equipment** for newborn care are available in your health center?	□Yes □ No
208	Do you think that all **drug**s and **vaccines** for new born care are available in your health center?	□Yes □ No

Part- III- knowledge questions regarding essential newborn care.

Instruction-Read each items and **mark the box (□√) in front of your answers for each questions. More than one response is possible if you have more than one answers for one item of question.**

S.No	Item of questions	Responses
301	When do immediate newborn care should start?	□ before birth □ during birth □ after birth □ I don't know
302	Where newborn should kept immediately after birth?	□Beside the mother □With someone else □On the mother's chest/ belly □On newborn bed /table □Other (specify)----------
303	What method we can use to prevent hypothermia in newborn?	□ immediately drying □ allowing skin to skin contact □ early bathing □ Other(specify)----------
304	When do newborn should be bathed after delivery?	□ immediately □ within the first 24 hours of delivery □ after 24 hours of delivery □ Other (specify)----------
305	What do you do if the baby **no**t cries immediately after birth?	□Cover the baby and allow skin to skin contact □ Call a help and start resuscitation □put bay on newborn table and give mother care □Other (specify)----------
306	To help open the baby's air way, how you should position the baby's head?	□ A flexed position of the head □ Slightly extended position of head □Hyper extend extended position of head □ other(specify)----------
307	If a baby is not breathing well after drying, clearing the air way and rubbing the back once or twice, what you should give?	□ more stimulation to breath □ Ventilation with bag and mask □other (specify)----------
308	During ventilation of new born, what is the recommended breath per minutes?	□ 30 breaths per minute □ 40 breaths per minutes □ 60 breaths per minute
309	When we should initiate breast feeding for new born baby?	□after 6 hours of delivery □ within 1-6 hours of delivery □ Within the first hour of delivery □ Other (specify)----------
310	How long should a mother exclusively breast feed her child?	□Less than 6 month □For 6 months □Greater 6 months □Other(specify)----------

311	Colostrum has infection protection role for the newborn baby?	□Yes □No
312	How long should you wait to clamp or tie the umbilical cord of a crying baby?	□clamp or tie Immediately □clamp or tie 1-2 minutes of delivery □clamp or tie 2-3 minutes of delivery/after pulsation of umbilical artery stopped
313	What kind of instrument do we can use to cut the cord?	□Clean Scissor. □New Surgical blade □new razor blade □Sterile Scissor □ Other (specify)----------
314	What is the recommended care of dirty umbilical cord?	□ clean it with soap and water and cover with bandage □ clean it with soap and water ,dry it and do not cover □ use alcohol to clean the umbilicus □Other (specify)----------
315	The recommended treatment of eye infection in newborn include**?**	□Apply nothing □Apply breast milk in the eye □Clean eye with sterile water □Apply silver nitrate/tetracycline
316	What is the recommended action to prevent bleeding in newborn?	□Breastfeed the child □Not necessary to give anything □Give vitamin K □Other (specify)----------
317	How do you define low birth weight? It is a weight of	□<3000gm □<2500gm □<1500 gm □<1000 gm
318	The recommended care for Low Birth Weight baby?	□ Bath often □ Breast feeding early and frequently □ Keep the child warm □ Prevent infection from developing
319	The recommended dose of vit k for preterm baby is?	□ 1mg □ 0.5mg □ Other (specify)----------
320	Would you list the vaccines those should be given during essential newborn care?	---------- ---------- ----------
321	Would you list the neonatal danger signs those you know?	----------,----------,---------- ----------,----------,---------- ----------,----------,---------- ----------,----------,----------
322	What is the best timing for first postnatal visit?	□Within the first 24 hours of delivery □On the 3rd day of delivery □ On the 7th day of delivery □ Other(specify)----------

Part IV-Practical questions

Instruction-Please! Read the following practice items and put (√) **mark under the column of the option (No never, Yes some times, Yes always)** you select according to what you do for each items. **Only one option is possible for each question.**

S.No	Item of questions	Response rate		
		No, Never	Yes, some times	Yes, Always
401	Do you put on sterile glove during cord care?			
402	During delivery, do you wear clean apron?			
403	During delivery, do you wear clean mask?			
404	During delivery and newborn care, do you wash your hand with soap and water before the procedure?			
405	Do you Wipes the eyes and face when the head is delivered?			
406	Do you dry the baby immediately with dry towel?			
407	Do you clean eyes immediately after birth from medial to lateral side with swab soaked in sterile water, using separate swab for each eye?			
408	Do you check for breathing and/or whether the baby is crying or not while drying it?			
409	Do you check and Sucks the air way after delivery?			
410	Do you take Apgar Score for newborn babies?			
411	Do you keep the baby on mothers belly/chest immediately after the baby delivered?			
412	To clamp the cord of crying baby, do you wait for 2-3 minutes after the birth or until the cord pulsation stopped?			
413	Do you use Sterile Scissor to cut the cord?			
414	Do you give cord care by cleaning and letting it to air dry?			
415	Do you discard wet cloth/towel and cover the baby with dry cloth/towel?			
416	Do you keep the baby skin-to-skin contact with the mother?			

S.No	Item of questions	Response rate		
		No, never	Yes, some times	Yes, Always
417	Do you initiate breast feeding within the first hour of delivery?			
418	Do you administer Vit K for newborn?			
419	Do you ensure that the mother/ caregivers wash their hands before handling the baby?			
420	Do you give eye ointment for newborn babies within one hour of birth?			
421	Do you counsel the mother about newborn danger signs before discharge?			
422	Do you weigh and record the baby's weight?			
423	Do you administer eye ointment without touching the eyes with the tip of the ampule?			
424	Do you give OPV for newborn before discharge?			

Annex II-Declaration

I, the undersigned, declare that this research is my original work, has not been done for a degree in this or any other university and that all sources of materials used for the research have been fully acknowledged.

Principal investigator:

Bayisa Bereka (Bsc)

Signature----------

Name of institution: Addis Ababa University

Date of submission: 30-06-2016

This thesis report has been submitted for examination with my approval as university advisor.

Name of advisor: Asrat Demissie (Assistant professor)

Signature----------