The extent of Knowledge and practice toward neonatal resuscitation among nurses and midwives in public hospitals of South Wollo, northeast Ethiopia: Cross-sectional study

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Abstract

Background: The neonatal period is the most vulnerable time for child morbidity and mortality. Asphyxia due to poor resuscitation techniques contributed significantly to this vulnerability. Therefore, this study is aimed to assess the extent of knowledge and practice towards neonatal resuscitation among nurses and midwives in public hospitals of south Wollo northeast Ethiopia.

Method: Institutional based cross-sectional study design was employed among 143 study participants selected by a simple random sampling method from each hospital. Self-administered questionnaire and interview-based guide were used to collect data. Data were coded and entered into EPI data software version 3.1 and was exported into SPSS version 20 for analysis. Logistic regression with backward LR method was performed to see the possible associations of factors with the outcome variables. Finally, p-values of less than 0.05 in multivariate analysis were declared having a significant association with the outcome variable.

Result: One hundred and forty-three participants were included with a response rate of 100%. Only 32.9% and 24.5% of the participants had good knowledge and practice toward neonatal resuscitation respectively. After adjustment was made for covariates; lack of training (AOR: 3.44, 95% CI:1.54-7.68), absence of guideline (AOR: 3.8, 95% CI: 1.68-8.58) and lack of supportive supervision (AOR: 2.49, 95% CI:1.1-5.6) were significantly associated with poor knowledge score, whereas absence of guidelines (AOR: 2.83, 95% CI:1.12-7.15) and lack of supportive supervision (AOR: 5.28, 95% CI: 1.86-14.96) were significantly associated with the poor practice of the participants. Specialization with neonatology (AOR: 0.19, 95% CI: 0.047-0.8) was associated with good practice level of neonatal resuscitation.

Conclusion: Knowledge and practice of nurses and midwives toward neonatal resuscitation were suboptimal. The training was found to be a single predictor for knowledge while supportive supervision and availability of resuscitation guidelines were predictors for both knowledge and practice toward neonatal resuscitation. Therefore, regular training and supportive supervision need to be strengthened to fill the identified gaps. Other observational and qualitative studies are recommended to explore factors that contributed to poor knowledge and practice toward neonatal resuscitation.

Background

The first 28 days of life is called the neonatal period and incontrovertibly, it is the most vulnerable and high-risk time in life because of the highest mortality and morbidity that occurred in this period [1–3]. The vast majority of these deaths took place in developing countries and approximately 70% occurs in South-east Asia and Sub-Saharan Africa (SSA) [4, 5]. Sub-Saharan African countries (SSA) are the region of home to most of the highest mortality countries in the world with 1 child in 13 dying before the first birthday compared to 1 in 189 in high-income countries [3, 4].

Asphyxia due to poor resuscitation techniques had remained one of the leading causes of neonatal mortality and morbidity globally [3, 6–8]. According to the world health organization (WHO) report of

2012, about one-quarter of the global neonatal deaths were caused by asphyxia [2, 9]. Furthermore, the 2013 Report of Global Development Alliance (GDA)showed thatout of 139 million newborns 17 million babies need help to breathe with resuscitation and close to 700,000 were died from asphyxia [10]. Asphyxia could also result in the short term and long term neurological disorders among survivals [11]. The burden of asphyxia is disproportionately concentrated in low and middle-income countries (LMICs) with the highest percentage in Sub Saharan countries (SSA) [11, 12]. Studies in Nigeria and Zambia indicated that asphyxia had contributed to a greater proportion of neonatal mortality [11, 14]. According to the 2011 Ethiopian Demographic Health Survey (EDHS), asphyxia is the second most common cause of neonatal mortality in Ethiopia [15]. A study in southwestern and northern Ethiopia indicated 47.5% and 31% of neonatal mortality was attributed to asphyxia respectively [7, 8].

Despite the severity of asphyxia on neonatal mortality and morbidity, competency toward neonatal resuscitation had remained a significant challenge [16, 17]. Many neonates in developing countries were died unnecessarily due to poor resuscitation techniques [18]. Studies conducted in Sub Saharan Countries had revealed that nurses and midwives had a considerable knowledge and skill gap in all areas of resuscitations [19–22]. However, studies conducted to date to identify barriers contributing to poor resuscitation had remained scarce in low resource countries including Ethiopia [24, 25]. Therefore, this study was aimed to assess the extent of knowledge and practice toward neonatal resuscitation among nurses and midwives in public hospitals of northeast Ethiopia.

Methods

Study setting and study participants

The institution-based cross-sectional study design was employed among 143 nurses and midwives working at delivery and NICU unit from 1st February to 30th April 2018 in public hospitals of south Wollo northeast Ethiopia. All nurses and midwives from neonatal intensive care unit and delivery units of each hospital during the study period were included; whereas nurses and midwives who were seriously sick and on leave allowance were excluded. The study participants were proportionally allocated to each study hospital and then to their working units (NICU and delivery) based on the number of their source populations. Study participants were recruited by a simple random sampling technique using the list of nurses and midwives from the salary payroll of each hospital as a sampling frame.

Data processing and management

Data collection tool was prepared from similar kinds of literature, WHO guidelines and Ethiopian Pediatric Association Guidelines and Training manuals. The tool consists of a structured self-administered questionnaire addressing provider and institutional characteristics; structured questions addressing the knowledge of nurses and midwives and interview-based guide addressing the practice level of the participant. The tool was validated by 8 experts and its content validity index was 0.89 (CVI = 0.89) which is greater than 0.78, the cut-off point for the content validity index. Before the actual data collection time,

the tool was pre-tested in a separate hospital and the necessary changes were made. The three-day training was given for data collectors and supervisors regarding the data collection instrument and procedure. Trained data collectors distribute self-administeredquestionnaires to the participants in the respectivedepartments and then interviewed the participants for their level of practice after collecting self-administered questionnaires. Completeness of the data was checked by supervisors and principal investigators daily. Data were verified, coded and entered into Epi-Data Software version 3.1 and was exported into SPSS version 20 Software for analysis. Results were described using descriptive statistics like frequency, percentage and mean using tables, graphs, and texts. To measure the possible association of factors with the outcome variables binary logistic regression using a backward method was performed and factors with p-values of less than 0.05 in multivariate analysis were considered statistically significant.

Results

Socio-demographic characteristics of the participant

A total of 143 participants were included from delivery and neonatal intensive care units of 10 hospitals with a response rate of 100%. Majorities of the participants 96(67.1%) were from primary hospitals and the rest 47(32.9%) were from a referral hospital. In terms of working unit 102(71.3%) were from a delivery unit and the rest 41(28.7%) were from neonatal intensive care units. Regarding the educational level majority of the participants, 110(76.9%) were degree holders. The maximum and minimum age of the participant was 43 and 20 years respectively. While the mean age of the participants was 29.02(SD = 5.44). Majorities of the participants 71(49.7%) were between the ages of 25 and 29 years *(Table 1).*

Knowledge level of the participant towards neonatal resuscitation

In this study two-thirds of the participants, 96(67.1%) had poor knowledge scores toward neonatal resuscitations. The minimum and maximum knowledge scores of the participants toward neonatal resuscitation were 8(29.63%) and 25(92.59%) respectively with an inter-quartile range of 7(25.93%). Out of 92 midwives, more than two-thirds of 69.6% had poor knowledge score similarly out of 30 BSC nurses two-third (66.7%) had poor knowledge score toward neonatal resuscitation. From a total of 13 neonatal nurses, more than half 53.8% had poor knowledge scores similarly from a total of 8 pediatric nurses more than half (62.5%) had poor knowledge scores toward neonatal resuscitation. In terms of educational status from a total of 110-degree holders, more than two-thirds (68.2%) had poor knowledge scores towards neonatal resuscitation *(Table 1).* This study revealed the majority of the participants in all governmental hospitals had poor knowledge scores towards neonatal resuscitation. The lowest knowledge score was observed in two governmental hospitals; Woreilu and Wogidy hospitals where 75% of the participants in these hospitals had poor knowledge scores towards neonatal resuscitation *(Figure 1).*

Knowledge of the participant in different steps of resuscitation

Among the different steps of neonatal resuscitation, the correct responses given by the participants were more than 80% for only 6 of 27 knowledge questions. In this study 80(55.9%), 70(49%) and 38(26.6%) of the participants had better knowledge in the area of initial steps of resuscitation, BMV and chest compression respectively but none of them had good knowledge in medication administration. The most frequently answered knowledge questions were slightly extended neck for resuscitation 132 (92.3%), 0.9% NaCl is volume expander 128(89.5%), inadequate seal is the reason for the failure of BMV 126(88.1%), epinephrine is the preferred medication for resuscitation 119(83.2%) and 3:1 is the ratio of compression to ventilation 118(82.5%) *(Table 2)*.

Mean knowledge score of the participant

In this study, the overall mean knowledge score of the participant toward neonatal resuscitation was 68.56% (SD = 16.37%). The overall mean knowledge scores for comprehensive nurses, pediatric nurses, neonatal nurses and midwives were 64.69% (SD = 17.22%), 70.83% (SD = 16.61%), 75.21% (SD = 14.05%) and 68.68% (SD = 16.72%) respectively. The mean knowledge scores of the participants in the initial steps of resuscitation, bag, and mask ventilation, chest compression, and medication administration were 69.37% (SD = 26.2%), 75.5% (SD = 20.9%), 61.42% (SD = 20.2%) and 35% (SD = 20.2%) respectively.

Factors affecting knowledge of the participants

This study showed that there was no significant association in the knowledge score of the participants in terms of sex, age, educational level, year of services, working units, level of working hospitals and attitude of the participants. But there was a significant association in the knowledge score of the participants in terms of neonatal resuscitation training *(p = 0.002)*, availability of resuscitation guideline *(p = 0.001)* and supportive supervision *(p = 0.027)*. Untrained nurses and midwives had 3 times less knowledge than trained nurses and midwives.

Nurses and midwives who had no neonatal resuscitation guidelines in the workplace had almost 4 times less knowledge than those who had a guideline. Participants with no supportive supervision had 2 times less knowledge than those who got supportive supervision *(Table 3)*.

The practice of the participant toward neonatal resuscitation

This study revealed that the majority of the participants (75.5%) had poor practice towards neonatal resuscitation. The minimum and maximum practice scores of the participants about neonatal resuscitation were 8(26.67%) and 27(90%) respectively with an inter-quartile range of 7(23.33%). In this study from a total of 92 midwives, the majority (81.5%) had poor practice similarly from a total of 30 BSC nurses, the majority (70%) had poor practice towards neonatal resuscitation. From a total of 13 neonatal

nurses nearly half (53.8%) had poor practice similarly from a total of 8 pediatric nurses, two-thirds (62.5%) had poor practice toward neonatal resuscitation. Among 110-degree holders, 75.5% had poor practice toward neonatal resuscitation. Out of 43 participants who had a poor attitude towards neonatal resuscitation majority (88.4%) had poor practice towards neonatal resuscitation. In terms of neonatal resuscitation training out of a total of 78 participants with no neonatal resuscitation training majority (83.3%) had poor practice toward neonatal resuscitation *(Table 5).* In this study, the majority of the participant in all governmental hospitals had poor practice towards neonatal resuscitation. About 80% or more of the participants from Woreilu, Jamma and Mekaneselam hospitals had poor practice while none of the participants from Wogidy hospital had good practice toward neonatal resuscitation *(Figure 2)*

The practice of the participant in different steps of resuscitation

Among the different steps of neonatal resuscitation, the correct response given by the participants was more than 80% for only 10 of 30 practice questions. While the percentages of correct response for 20 practice questions were less than 80%. In this study 55(38.5%), 63(44.1%), 74(51.7%), 67(46.9%), 33(23.1%) and 35(24.5%) of the participants had better practice in the area of preparation step, assessment of the newborn, initial steps of resuscitation, BMV, chest compression and medication administration. The most frequently answered practice questions were clear the new born's airway 142 (99.3%), ventilate the newborn 40–60bpm 135 (94.4%) and assess the newborn for color 131 (91.6%) *(Table 4).*

Mean practice score of the participant

In this study, the overall mean practice score of the participant towards neonatal resuscitation was 62.96% (SD = 15.89%). The overall mean practice scores for comprehensive nurses, pediatric nurses, neonatal nurses and midwives were 60.11% (SD = 16.62%), 67.5% (SD = 13.77%), 70% (SD = 13.81%) and 62.5% (SD = 15.96%) respectively. The mean practice scores of the participants in the preparation step, assessment of the newborn, initial steps of resuscitation, bag and mask ventilation, chest compression and medication administration were 64.2% (SD = 21.86%), 69.5% (SD = 23.37%), 74.27% (SD = 20.64%), 68.25% (SD = 21.54%), 52.17% (SD = 24.78%) and 49.65% (SD = 28.27) respectively. This study showed that BSC nurses and midwives had poor mean knowledge scores in all steps of resuscitation. While pediatric nurses and neonatal nurses had good knowledge in initial steps of resuscitation and BMV respectively but they had poor performance in other areas of neonatal resuscitations.

Factors affecting the practice level of the participant.

This study revealed that there was no significant association in the practice score of the participants in terms of sex, age, educational level, year of services, working units, level of working hospitals, workload, attitude and training of the participants. But there was a significant association in the practice score of the participants in terms of availability of resuscitation guidelines *(p = 0.028)* and supportive supervision

(p = 0.002). Lack of neonatal resuscitation guidelines and supportive supervision were associated with a low level of resuscitation performance. Nurses and midwives who had no resuscitation guidelines in the workplace had 3 times less performance than nurses and midwives who had a guideline. Respondents with no supportive supervision had 5 times less performance than those who got supportive supervision *(Table 5).*

Discussion

In this study the overall knowledge and practice of comprehensive nurses, pediatric nurses, neonatal nurses and midwives toward neonatal resuscitation were sub standardize. The overall mean knowledge and practice score of the participants was 68.56% (SD = 16.37%) and 62.96% (SD = 15.89%) respectively. This study had revealed that only 32.9% and 24.5% of the participants had good knowledge and practice towards neonatal resuscitation respectively.

The overall mean knowledge score of the participants was 68.56% (SD = 16.37%). This score was higher than the study from Gondar teaching hospital (50%) [28]. The difference in the scores might be due to the difference in the study period and study setting. From this study, it was found that the mean knowledge score of nurses was insufficient (64.69%). This finding was higher than the study from India (57%) and another study from Gondar teaching hospital (43.9%) [18, 19]. The discrepancy could be due to the difference in the quality of training on neonatal resuscitation and the availability of resuscitation materials. The mean knowledge score of midwives was 68.68% (SD = 16.72%)). This finding was higher than the study from Gondar teaching hospital (42.8%) [19]. The discrepancy could be due to the difference in the study period and the study setting.

This study showed only 32.9% of the participant had good knowledge (a score greater than 80%) toward neonatal resuscitation. This finding was in line with the study from Kenya (only 35.4% score greater than 85%), a study from India (only 34% score greater than 85%) and another similar study from India (only 33.33% had good knowledge) [20, 29, 30]. The overall mean practice score of the nurses and midwives was 62.96%(SD = 15.89%). This finding was in sharp comparison with the study from Gondar teaching hospital 56.7% [19].

In this study, 75.5% of the participant had poor practice toward neonatal resuscitation. The finding was in sharp contrast to the study from Iran (84.6%) [31]. The discrepancy might be due to the difference in the quality of neonatal resuscitation training, adequate exposure to real resuscitation cases and hospital set up for resuscitation. This study showed that 30% of the nurse had good practice toward neonatal resuscitation. This finding was inconsistent with the study from Nigeria only 10% of the nurses involved in the management of birth asphyxia adopted appropriate high levels of practices [32]. This discrepancy might be due to the difference in the quality of the training, supportive supervision or refreshment training.

This study showed that resuscitation training (p = 0.002) and supportive supervision (p = 0.027) were associated with the good knowledge of nurses and midwives. This finding was consistent with that of the

study from Afghanistan in which training complemented with supportive supervision was significantly associated with a higher knowledge [33]. In this study, a lack of resuscitation guidelines in the workplace was significantly associated with a low level of knowledge. This might be probably because of the lack of guidelines in the workplaces impedes nurses and midwives from updating their knowledge on neonatal resuscitations.

In this study lack of neonatal resuscitation guideline (p = 0.028) and supportive supervision (p = 0.002) were significantly associated with a low level of resuscitation practice. This could be because a lack of resuscitation guidelines in the workplace could result in nonadherence to the resuscitation guideline which in turn resulted in poor resuscitation practice. Similarly, if there is no supportive supervision, the practice level of nurses and midwives deteriorate which may have contributed to poor neonatal resuscitation practice. In this study, being a neonatal nurse is associated with a higher performance of neonatal resuscitation (p = *0.024).* This might be because neonatal nurses received adequate training on neonatal resuscitation during the undergraduate study than other fields of study.

Limitation of the study: The major limitations of this study were an assessment of practice using an interview guide rather than an observational checklist.<\p>

Conclusion

In conclusion, the overall mean knowledge and practice scores of nurses and midwives were inadequate. Lack of resuscitation guidelines and supportive supervision were independent predictors for both the knowledge and practice level of the participants while lack of resuscitation training was a single independent predictor of practice level of the participants.

Abbreviations

AAU Addis Ababa University

AHA American Heart Association

BMV   Bag and Mask Ventilation

EDHS Ethiopian Demographic Health Survey

HBB Helping Baby Breath

HCP Health Care Professionals

LMICs Low and Middle-Income Countries

NICU Neonatal Intensive Care Unit

NR Neonatal Resuscitation

NRP Neonatal Resuscitation Program

PALS Paediatrics Advanced Life Support.

PPV Positive Pressure Ventilation

SSA Sub-Saharan Africa

Declarations

Ethical approval

This study was approved by the institutional ethical review board of the Addis Ababa University college of health sciences.

Consent to the participate

Verbal consent was taken from the participants.

Consent for publication

Note applicable.

Availability of data and material

All of the relevant data related to this study are incorporated into the body of the manuscript. Furthermore, for clarity never hesitate to contact the corresponding author.

Competing interests

The authors declare they have no competing interests.

Authors' contributions

All authors conceived and designed the study. GB, KB, TH developed the proposal, collected the data, analyzed the data and wrote the draft. GB, AW and MB performed the interpretation of the data and draft of the manuscript. All authors involved in paper writing and manuscript preparation.

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Tables

Table 1: Sociodemographic characteristics of the participants in public hospitals of northeast Ethiopia June 2018.

Variables	Categories	Frequency(n)	Percent (%)
Sex	Male	78	55.3
	Female	63	44.1
Age of the participants	20-24	23	16.1
	25-29	71	49.7
	30-34	18	12.6
	35-39	22	15.4
	40-44	9	6.3
Work experiences	<5years	84	58.7
	6-10years	34	23.8
	11-15years	13	9.1
	16-20years	12	8.4
Resuscitation Training	No	78	54.5
	Yes	65	45.5
Full resuscitation Material	Absent	63	44.1
	Present	80	55.9
Resuscitation Guideline	Absent	69	48.3
	Present	77	53.8
Supportive supervision	Absent	68	47.6
	Present	75	52.4
Work load	No	65	45.5
	Yes	78	54.5
Attitude towards neonatal resuscitation	Poor	83	58.0
	Good	60	42.0
Field of study	BSC nurse	30	21
	Pediatric nurse	8	5.6
	Neonatal nurse	13	9.1
	Midwifery	92	64.3
Educational level	Diploma	33	23.1
	Degree	110	76.9

Table 2: Responses given by nurses and midwifes for selected knowledge questions toward neonatal resuscitation in public hospitals of northeast Ethiopia June 2018.

Questions	Response	
	Yes	No
	N (%)	N (%)
Slapping/flicking the sole of the feet	101 (70.6)	42 (29.4)
Persistent cyanosis is indication for BMV	92 (64.3)	51(37.5)
Inadequate seal is the reason for failure of BMV	126 (88.1)	17 (11.9)
Slightly extended neck for resuscitation of the new born	132 (92.3)	11 (7.7)
Mask size for term and preterm new born is 1&0 respectively	112 (78.3)	31 (21.7)
Mask covers mouth, nose and tip of chine during resuscitation	94 (65.7)	49 (34.3)
Two thump techniques for chest compression	72 (50.3)	71 (49.7)
The correct ratio of chest compression to ventilation is 3:1	118 (82.5)	25 (17.5)
Depth of chest compression is $2/3^{rd}$ of the antero-posterior diameter	70 (49)	73 (51)
Epinephrine is the preferred medication for resuscitation	119 (83.2)	24 (16.8)

Table 3: Bivariate and multivariate results showing association of independent variables with the knowledge score of nurses and midwifes in public hospitals of northeast Ethiopia June 2018.

Variables	Knowledge level		COR (95% CI)	AOR (95% CI)
	Poor n (%)	Good n (%)		
Age				
20-24	16(69.6)	7(30.4)	4.57(0.88-23.71)	2.2(0.3-16)
25-29	51(71.8)	20(28.2)	**5.1(1.16-22.39)**	4.15(0.69-25)
30-34	11(61.1)	7(38.9)	2.2(0.43-11.22)	1.34(0.17-10.32)
35-39	15(68.2)	7(31.8)	**7.5(1.28-44.09)**	5.39(0.73-39.58)
40-44	3(33.3)	6(66.7)	1	1
Sex				
Male				
Female	50(64.1)	28(35.9)	0.77(0.38-1.57)	0.77(0.32-1.89)
	44(69.8)	19(30.2	1	1
Experience				
<5years				
6-10years	59(70.2)	25(29.8)	**4.72(1.3-17.11)**	0.29(0.016-5.43)
11-15years	22(64.7)	12(35.3)	3.67(0.91-14.74)	0.3(0.015-6.28)
16-20years	11(84.6)	2(15.4)	**11(1.6-15.5)**	3(0.21-42)
	4(33.3)	8(66.7)	1	1
Training				
No				
Yes	62(79.5)	16(20.5)	**3.53(1.7-7.36)**	**3.44(1.54-7.68)****
	34(52.3)	31(47.7)	1	1
Guideline				
No				
Yes	36(81.2)	13(18.8)	**3.66(1.72-7.8)**	**3.8(1.68-8.58)****
	40(54.1)	34(45.9)	1	1
Supervision				
No				
Yes	54(79.4)	14(20.6)	**3.03(1.44-6.38)**	**2.49(1.1-5.6)***
	42(56)	33(44)	1	1
Attitude				
Poor				
Good	54(79.4)	6(14)	**4.29(1.66-11.08)**	2.25(0.76-6.68)
	42(56)	41(41)	1	1
Field of study				
BSC nurse				
Pediatric nurse	20(66.7)	10(33.3)	0.88(0.36-2.1)	0.73(0.22-2.45)
Neonatal nurse	5(62.5)	3(37.5)	0.73(0.16-3.26)	0.48(-0.06-3.73)
Midwifery	7(53.8)	6(46.2)	0.51(0.16-1.66)	0.33(0.73-1.51)
	64(69.6)	28(30.4)	1	1
Education				
Diploma				
Degree	21(63.6)	12(36.4)	0.82(-0.36-1.85)	0.58(0.19-1.76)
	75(68.2)	35(31.8)	1	1
Working unit				
NICU				
Delivery	26(63.4)	15(36.6)	0.79(0.37-1.7)	0.83(0.14-4.8)
	70(68.6)	32(31.4)	1	1
Hospital level				
Primary				
Referral	66(68.8)	30(31.2)	1.25(0.6-2.6)	1(0.34-3.05)
	30(63.8)	17(36.2)	1	1
Equipment				
No				

	Yes	No	COR	AOR
Yes	45(71.4)	18(28.6)	1.42(0.7-2.9)	0.6(0.22-1.67)
	51(63.8)	29(36.2)	1	1
Work load				
Yes	55(70.5)	23(29.5)	1.4(0.7-2.82)	1.64(0.69-3.86)
No	41(63.1)	24(36.9)	1	1

Key: * = Significant, ** = highly significant, 1= reference, COR=Crude odds ratio, AOR=Adjusted odds ratio.

Table 4: Responses given by nurses and midwifes for selected practice questions toward neonatal resuscitation in public hospitals of northeast Ethiopia June 2018.

Questions	Response	
	Yes N (%)	No N (%)
Assess the new born for color.	131(91.6)	12 (8.4)
Dry the new born.	133 (93)	10 (7)
Provide tactile stimulation.	106 (74.1)	37 (25.9)
Clear the air way.	142 (99.3)	1 (0.7)
Ventilate the new born from 40 to 60 beats per minute.	135 (94.4)	8 (5.6)
Apply chest compression with ventilation/CPR in 3:1 ratio.	120 (83.9)	23 (16.1)
Administer epinephrine (0.1-0.3ml/kg of 1: 10,000) to the new born.	115 (80.4)	28 (19.6)

Table 5: Bivariate and multivariate result showing association of independent variables with the practice score of nurses and midwifes in public hospitals of northeast Ethiopia June 2018.

Variables	Practice Level			
	Poor n (%)	Good n (%)	COR(95%CI)	AOR (95% CI)
Age				
20-24	18(78.3)	5(21.7)	2.88(0.56-14.94)	1.17(0.16-8.29)
25-29	54(76.1)	17(23.9)	2.54(0.61-10.55)	1.94(0.35-10.75)
30-34	13(72.2)	5(27.8)	2.08(0.39-11.06)	0.61(0.08-4.72)
35-39	18(81.8)	4(18.2)	3.6(0.66-19.78)	0.53(25.61)
40-44	5(55.6)	4(44.4)	1	1
Sex				
Male	56(71.8)	22(28.2)	0.66(0.3-1.45)	0.44(0.17-1.17)
Female	50(79.4)	13(20.6)	1	1
Experience				
<5years	65(77.4)	19(22.6)	2.44(0.7-8.58)	0.8(0.026-24.53)
6-10years	25(73.5)	9(26.5)	2(0.5-7.87)	0.35(0.012-10.6)
11-15years	11(84.5)	2(15.4)	3.93(0.59-26.1)	1.44(0.08-27.1)
16-20years	7(58.3)	5(41.7)	1	1
Training				
No	65(83.3)	13(16.7)	**2.56(1.17-5.62)**	2.42(0.92-6.04)
Yes	43(66.2)	22(33.8)	1	1
Guideline				
No	39(85.5)	10(14.5)	**3(1.32-6.87)**	**2.83(1.12-7.15)***
Yes	49(66.2)	25(33.8)	1	1
Supervision				
No	61(89.7)	7(10.3)	**52(2.1-12.92)**	**5.28(1.86-14.96)****
Yes	47(62.7)	28(37.3)	1	1
Attitude				
Poor	38(88.4)	5(11.6)	3.26(1.17-9.1)	1.83(0.51-6.56)
Good	70(70)	30(30)	1	1
Field of study				
BSC nurse	21(70)	9(30)	0.53(0.21-1.36	0.36(0.12-1.11)
Pediatric nurse	5(62.5)	3(37.5)	0.38(0.82-1.74)	0.57(0.1-3.31)
Neonatal nurse	753.8)	6(46.2)	**0.26(0.79-0.89)**	**0.19(0.047-0.8)***
Midwifery	75(81.5)	17(18.5)	1	1
Education				
Diploma	26(78.8)	7(21.2)	1.27(0.5-3.24)	0.92(0.26-3.14)
Degree	82(74.5)	28(25.5)	1	1
Working unit				
NICU	27(65.9)	14(34.1)	0.5(0.22-1.12)	0.84(0.15-4.77)
Delivery	81(79.4)	21(20.6)	1	1
Hospital level				
Primary	74(77.1)	22(22.9)	1.29(0.58-2.85)	1.7(0.56-5.11)
Referral	34(72.3)	13(27.7)	1	1
Equipment				
No	59(73.8)	21(26.2)	1.25(057-2.7)	0.7(0.22-2.25)

Yes	49(77.8)	14(22.2)	1	1
Work load				
Yes	59(75.6)	19(24.4)	1.01(0.47-2.18)	1(0.37-2.74)
No	49(75.4)	16(24.6)	1	1

Key: * = Significant, 1= Reference, COR=Crude odds ratio, AOR=Adjusted odds ratio, CI=Confidence interval.

Figures

Figure 1

Knowledge level of the nurses and midwifery towards neonatal resuscitation in public hospitals of northeast Ethiopia June 2018.
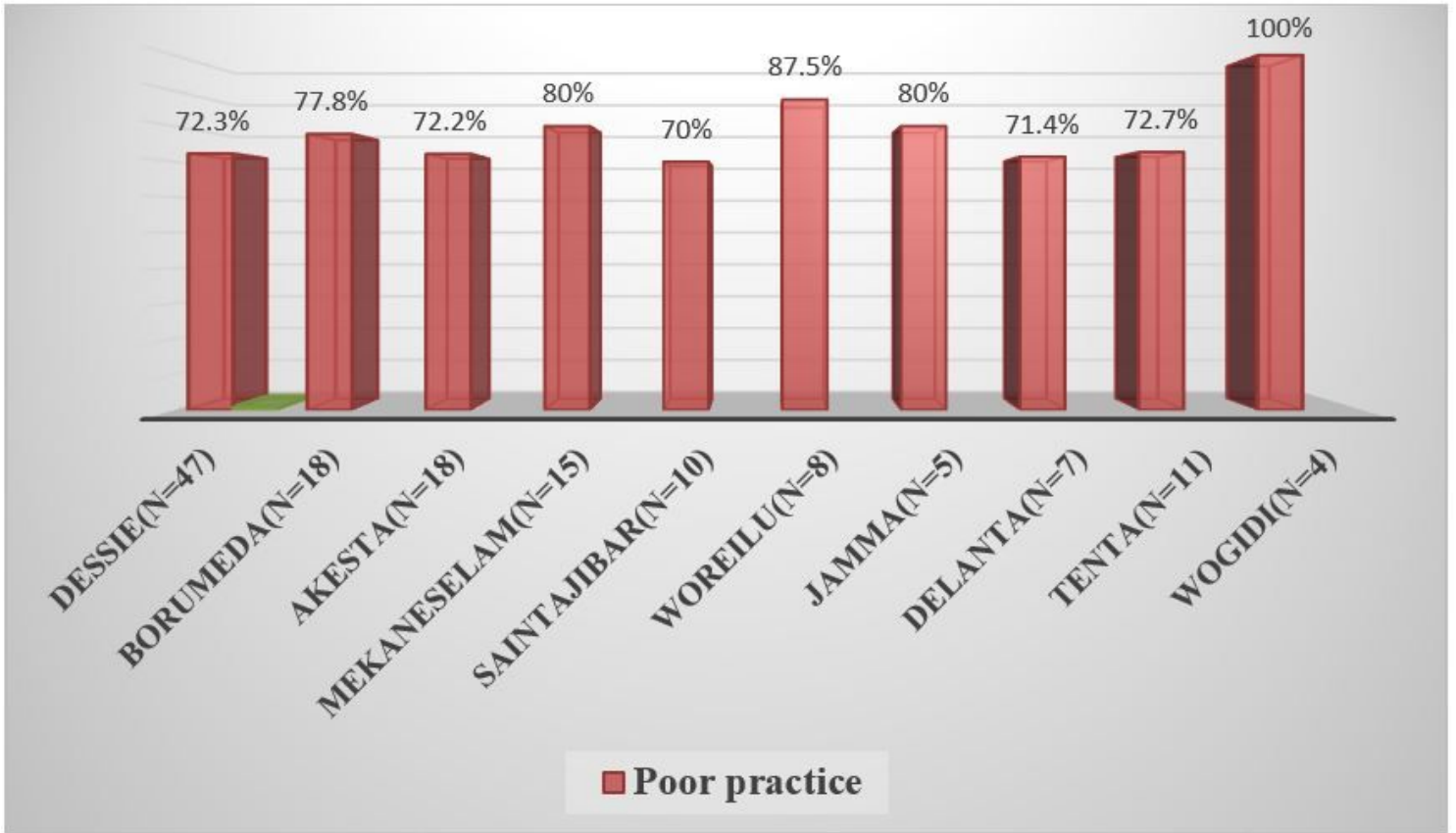
Figure 2

Practice level of nurses and midwifes toward neonatal resuscitation in public hospitals of northeast Ethiopia June 2018.