

Neonatal Resuscitation Practice and Associated Factors among Health Care Workers in Public Health Facilities in West Guji Zone, Southern Ethiopia

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ABSTRACT

Background: Although neonatal resuscitation has the potential to prevent neonatal mortality rates, several factors hinder its effectiveness. This study aimed to assess the neonatal resuscitation practice and associated factors among health workers in public health facilities in West Guji zone, Oromia, Ethiopia 2021.

Methods: A facility-based cross-sectional study design was conducted from February 01 to March 30/2021. Data were collected with a structured self-administered questionnaire and observational checklist. Finally, a convenience sampling technique was employed to select 407 study participants. Binary and Multivariable logistic regression analyses were conducted with 95% confidence intervals and statistical significance is declared at $P < 0.05$.

Results: Out of the 407 sampled study population, 402 healthcare workers were involved in the study with a 98.7% response rate and 270 (67.2%) of healthcare workers had good practice in neonatal resuscitation with a 95% confidence interval of 62.6% to 71.8%. Factors associated with neonatal resuscitation practice were the age of health care workers who are 30 to 34 (AOR= 3.52, 95%CI; 1.27 - 9.74) and 35 to 39 years AOR= 4.00, 95%CI; 1.24 -12.97), work experience (AOR= 5.72, 95%CI; 2.72 - 12.03, training on neonatal resuscitation (AOR=3.6,95%CI;2.16-6.00), availability of neonatal resuscitation guidelines (AOR= 2.29, 95%CI; 1.13 - 4.69), knowledge status (AOR=1.82, 95%CI; 1.0 -3.10), and attitude of healthcare workers towards neonatal resuscitation(AOR=2.18, 95%CI; 1.37 -3.48).

Conclusion: The finding shows the neonatal resuscitation practice was low compared with others. Factors associated with neonatal resuscitation practice were identified. Health institutions should organize healthcare providers on neonatal resuscitation by giving on-the-job training, providing guidelines, and supervising all health facilities to produce competent healthcare workers and reduce neonatal mortality and morbidity.

Keywords: Associated factors, Health care workers, Neonatal resuscitation, Practice, Southern Ethiopia, West Guji Zone

Introduction

The neonatal period is a period of extensive and continuous transition of the system from the uterine environment to the outside world and is the most vulnerable and riskiest period in life due

to the longer period of mortality and morbidity (1). About 10% of babies require basic resuscitation to start breathing at birth, and less than 1% require extensive resuscitation measures,

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such as heart compressions and medications(2). Neonatal resuscitation is a set of interventions used to assist a newborn's airways, breathing, and circulation after birth, and the essential intervention in one minute, so many babies can be saved (3,4). It requires specialized skills to initiate and stabilize the newborn's cardiopulmonary function and regular practice to maintain provider competence (5).

Globally, 5.2 million under five years old and 2.4 million in the first month of children died in 2019. Sub-Saharan Africa has the highest risk of death among the regions showing the least progress. A baby born in sub-Saharan Africa or South Asia is 10 times more likely to die in the first month than a baby born in a high-income country. Most neonatal deaths (75%) occur within the first week of life, and approximately 1 million babies die within the first 24 hours. Children who die within the first 28 days of birth suffer from conditions and diseases associated with a lack of quality care at birth or skilled care and treatment immediately after birth and in the first days of life (6). The three leading causes of neonatal deaths worldwide are infections of 36% (sepsis/pneumonia, tetanus, and diarrhea), preterm (28%), and asphyxia at birth (23%) (7).

The African region has the highest neonatal mortality rates in the world and has so far shown slower progress in reducing neonatal deaths. Birth asphyxia now accounts for more than a third of all regional childhood deaths and is associated with significant disabling morbidity among survivors (8). Countries such as Nigeria and Ethiopia with the greatest population estimates contribute the greatest to the regional burden of asphyxia (9). Although significant progress has been made in reducing infant mortality, the rate of reduction in neonatal mortality has been significantly slower. More efforts are needed to improve coverage and implementation of neonatal resuscitation to achieve the 2035 goal of eliminating preventable childhood deaths (10).

A large number of neonatal deaths can be prevented by effective neonatal resuscitation, immediate care including drying, aspiration, and necessary stimulation after evaluation, and positive pressure ventilation if the baby has not established spontaneous breathing. However, the lack of raw materials is one of the main bottlenecks found in health systems in low-resource settings (11).

Ethiopia is one of the countries with a high mortality burden in sub-Saharan Africa (12). In 2015, birth asphyxia was the first cause of

neonatal deaths (31.6%), followed by prematurity (21.8%) and sepsis (18.5%) (10). Effective resuscitation at birth can prevent 30% of these deaths and prevent 5-10% of deaths due to complications of preterm delivery (12). Neonatal resuscitation skills are essential for all health professionals involved in the delivery of newborns (13). It is impossible to know in advance which babies will need resuscitation and it must be taken into account that each baby may have difficulty breathing at birth. It is clear that the first minutes after birth are crucial to reduce neonatal mortality (14). The critical goal of neonatal resuscitation is to reduce newborn asphyxia by using drying, warmth, clearing the airway, stimulation to breathe, and bag and mask ventilation if necessary (15).

Neonatal resuscitation is one of the accepted standard methods involving simple forms of simulation and has been associated with improved Apgar scores, long-term neurodevelopmental outcomes, and mortality related to asphyxia at birth (16). A substantial proportion of children who survive birth asphyxia live with chronic neurodevelopmental morbidity, which includes cerebral palsy, mental retardation, and learning disabilities, although there is significant uncertainty regarding this estimate (17). However, more than two-thirds of newborns could be saved through existing maternal and child health programs though most deaths happened at home and they are invisible to the national and regional policies and programs(18).

Although neonatal resuscitation has the potential to prevent neonatal mortality rates, several factors hinder its effectiveness including provider characteristics, such as level of education, experience, and specialization; and institutional features such as training, guideline availability, and equipment availability affect neonatal resuscitation proficiency and neonatal outcomes.

Therefore, this study will aim to describe the practice of neonatal resuscitation and the associated factors among healthcare workers in public health facilities in the western Guji zone. The conceptual framework developed after reviewing different literature (19, 22, 24, 32) is shown Figure 1.

Methods

Study Area and Period

The study was conducted in public health institutions found in the west Guji zone, Oromia regional state, southern Ethiopia. West Guji zone

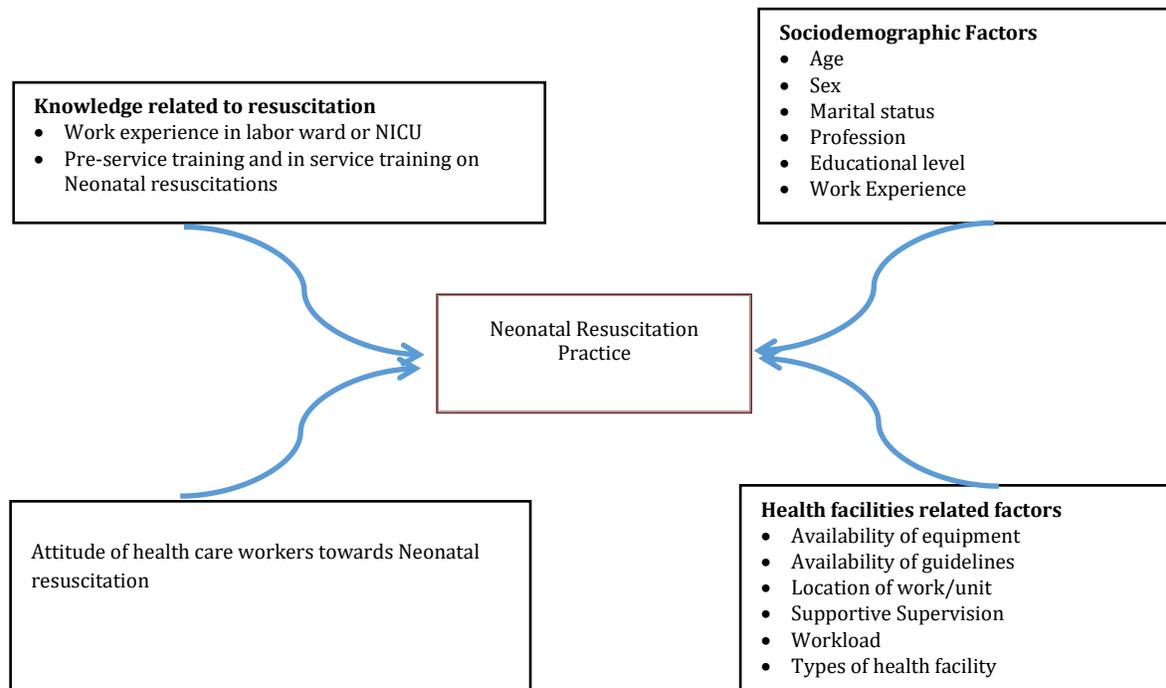


Figure 1. Conceptual framework developed after reviewing different literature

is one of 21 zones in the Oromia Region. The Zone has nine Woredas and two cities in the zone. Bule Hora town is a capital city of the West Guji zone which is located 467 km from Addis Ababa to the south direction at 5°35' N Latitude and 38°15'E Longitude. The zone has also 196 kebeles the lower administrative body, of these 166 are rural, and 30 are urban kebeles. It has an estimated population of 1,389,821 of whom 681,012 are male and 708,809 are females. West Guji Zone has one general Hospital, 2 primary hospitals, 42 health centers, and 166 health posts, and has 860 healthcare providers and 478 health extension workers. The study was conducted from February 01 to March 30/2021

Study Design

A facility-based cross-sectional study design was employed

Population

Source Population

Health care providers working in public health institutions in West Guji zone Oromia region Ethiopia.

Study Population

All healthcare providers working in the labour and delivery ward, Neonatal Intensive care Unit

(NICU), and pediatrics ward of selected public health institutions in the West Guji zone

Inclusion and Exclusion Criteria

Inclusion Criteria

All certified staff (Physicians, obstetricians, Nurses, midwives, health officers, and emergency surgery practitioners) working in selected wards were included.

Exclusion Criteria

Health professionals who are on annual leave, or maternity leave, and new employers recruited within the last six months were excluded.

Sample Size Determination and Sampling Technique

Sample Size Determination

The sample size for 1st objective is determined by using the single population proportion formula. By considering the proportion of neonatal resuscitation practice was 59.5% in a study conducted in public hospitals of Addis Ababa (24). 95% confidence interval and a margin of error of 5% between the sample size and the underlying population were considered. The following single population formula was used:

$$n = \frac{(Z_{\alpha/2})^2 p (1-P)}{0.05^2} = \frac{1.96^2 * 0.595(1- 0.595)}{0.05^2} = 370$$

d^2

Where, n = sample size,

P = estimated prevalence of neonatal resuscitation practice was 59.5%

D = error allowed 5%,

$Z_{\alpha/2}$ = critical value at 95% CI is 1.96.

By adding 10% of the non-response rate
 $370 + 10\% = 370 + 37 = 407$

Sampling technique and sampling procedure

Among the total 3 Public hospitals and 42 health centers in Zone, all hospitals were selected purposefully, and 20 health centers were selected by simple random sampling technique. Hospitals selected for the study were Bule Hora General Hospital, Kerca Primary Hospital, and Melka Soda General Hospital which have 183, 72, and 59 healthcare workers respectively. Overall in Hospitals were 314 healthcare workers. Health centers selected for this study were Bule Hora, Rophi Magada, Garba, Ela Farda, Qarcaa, Eguu Abbay, G/Soke, Ela Dima, Dimmitu, Corso Golija, Tore, Mexaari, Dangoo, Guwanguwa, Dabaqaa Daboo, Buqqiisa, Fincaawa, Afalaata, Surro, and Hidha Korma which have a total of 323 HCW. The study participants were taken from the NICU ward, labor, and delivery ward, and pediatrics ward of each respective health facility purposefully.

Finally, a convenience sampling technique will be employed to select 407 study participants from selected wards. The sampling procedure is shown (Figure 2).

Study Variables

Dependent Variable

Neonatal resuscitation practice

Independent Variables

Sociodemographic factors: Sex, Age, marital status, religion, professional qualification, and work experience

Knowledge of care providers about Neonatal resuscitation: Pre-service training and in-service training on Neonatal resuscitations, Work experience in a labor ward or NICU

An attitude of healthcare workers: toward Neonatal resuscitation

Health facility-related factors: Availability of equipment, Availability of guidelines, Location of work/unit, Supportive Supervision, Workload, Types of health facility

Operational Definition

Health care providers: midwives, physicians, obstetricians, nurses (nurse midwife, generic nurse, and or clinical nurse) who provide care for women during labour and delivery.

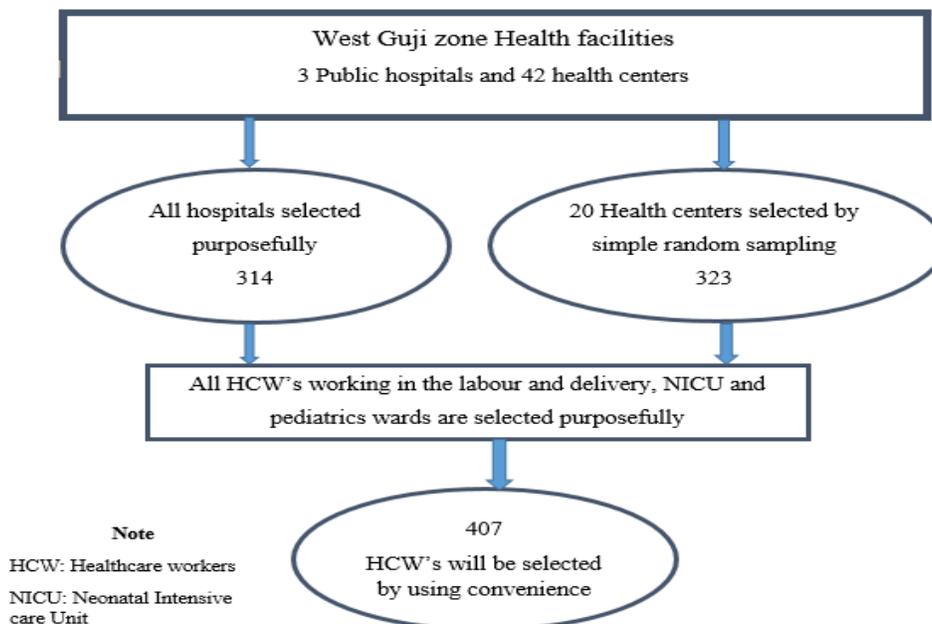


Figure 2. Sampling procedures to assess Neonatal Resuscitation Practice and Associated Factors among Health Care Workers in Public Health Facilities in West Guji zone, 2021

Resuscitation: Revive or restore life to a person with breathing and/or circulation difficulty (20).

Neonatal resuscitation: Intervention after birth to 28 days of the baby to assist in breathing and Circulation (20)

Practice: Appropriate response of health care workers about neonatal resuscitation those who scored above 80% were considered to have a good practice and those below 80 % were considered to have poor practice (21).

Attitude: Participants with a score greater than the mean score were considered to have good attitudes and those who scored less than the mean score were considered to have poor attitudes toward neonatal resuscitation (21)

Knowledge: Appropriate response of health care workers about neonatal resuscitation those who scored above 80% were considered to have good knowledge and those below 80% were considered to have poor knowledge (21).

Data collection technique and tools

Data Collection Instruments

The data collection tools were adapted from WHO guidelines and the Ethiopian Pediatric Association Guidelines and Training manual and also after reviewing different related literature (22-24). The data was collected by using a pretested structured self-administered questionnaire and observational checklist with data collector guidance. The questionnaire was initially prepared in English and then translated into Afaan Oromo and Amharic then back into English by fluent speakers to check its consistency. The tool contains socio-demographic, knowledge, attitudes towards neonatal resuscitation, and health facilities-related factors.

Data Collection Procedure

The data collection was conducted by 9 BSc nurses and 4 Master's degree holder nurses were assigned as supervisors of data collection. Two days of training were given for data collectors and supervisors on how they approach the study groups and fill out the questionnaires by the principal investigator. The overall supervision was carried out by the principal investigator and co-investigators. The selected participants were informed by data collectors about the importance of the study.

Quality control measures

A structured questionnaire developed in English in such a way that it includes all relevant variables to meet the objective; to keep the

consistency of the questionnaire, it was first prepared in English and then translated to both Afaan Oromo and Amharic by a fluent speaker of both languages and will then be translated back to English. Before the actual data collection, pre-testing was conducted on 5% of the sample size of healthcare providers working in the labor and delivery unit, NICU, and pediatrics ward of yabello Hospital. Based on the findings necessary amendments were made. Data collectors were trained for two days intensively on the instrument and data collection procedure that includes the relevance of the study, the objective of the study, confidentiality of the information, informed consent, and interview technique. The data collectors worked under the close supervision of the supervisors to ensure correct data collection procedures, the supervisors and investigator reviewed the filled questionnaires at the end of data collection every day for completeness.

Data processing and analysis

Data were cleaned, coded, checked for completeness and inconsistencies, entered into Epi-Data version 3.1, and exported to IBM SPSS Statistics Version 25 for analysis. Descriptive statistics were used to describe the data. Binary logistic regression analysis was employed to examine the statistical association between the practices of neonatal resuscitation and every single independent variable. In binary logistic regression analysis variables with p-value <0. 25 were entered into a multivariable logistic regression to identify statistically significant variables. Adjusted odds ratios (AOR) with 95% CI were estimated to assess the strength of associations and statistical significance was declared at a p-value < 0.05. Hosmer and Lemeshow test was done to check model fitness.

Ethical approval

Ethical approval for this study was obtained from the Institutional Review Board of Bule Hora University (reference no. BHU/PRD/1232/2021). Informed verbal consent was obtained from all respondents. All respondents were reassured about the confidentiality of their responses. Their voluntary participation and the right to take part or terminate at any time they wanted were assured. The data collectors were trained by the principal investigators on how to keep the confidentiality and anonymity of the responses of the respondents in all aspects.

Results

Socio-demographic characteristics of healthcare workers

Out of the 407 sample size, 402 healthcare workers were involved in the study with a 98.7% response rate. A majority (53.1%) of study participants were male and 43% of them were midwifery by profession. The mean age of HCW was 29.9 years with a 3.6-year standard deviation. The minimum and maximum respondents' ages were 22 and 38 years respectively. More than half (69.2%) of healthcare workers were degree by their level of education (Table 1).

Table 1. Socio-demographic characteristics of healthcare workers in public health facilities in west Guji zone, Oromia, Ethiopia 2021

Variables		Frequency	Percent
Sex	Female	233	46.9
	Male	264	53.1
Age	20-24	18	4.5
	25-29	169	42.0
	30-34	160	39.8
	35-39	55	13.7
Profession	Midwifery	173	43.0
	Nurse	159	39.6
	Medical doctor	31	7.7
	Health officer	13	3.2
	Integrated Emergency Surgical Officer	26	6.5
Level of education	Diploma	72	17.9
	Degree	278	69.2
	Masters	52	12.9
Experience	< 5 years	259	64.4
	6-10 years	127	31.6
	11- 15 years	16	4.0
Ward	NICU ward	107	25.6
	Labour ward	225	56.0
	pediatrics ward	70	18.4

Health facility characteristics

The majority 276(68.7%) of study participants were from hospitals and 126 (63.7%) of healthcare workers had taken training on neonatal resuscitation. According to the respondents, the majority (90.8%) of health facilities were equipped with resuscitation material and 88.6% of them have neonatal resuscitation guidelines. More than a quarter (37%) of health facilities provide supportive supervision (Table 2).

The attitude of healthcare workers toward neonatal resuscitation

The majority of HCWs, 254 (63.2%) had a

Table 2. Distribution of characteristics of public health facilities in west Guji zone, Oromia, Ethiopia 2021

Variables		Frequency	Percent
Health facility	Health center	126	31.3
	Hospital	276	68.7
Training on Neonatal resuscitation	No	147	36.3
	Yes	255	63.7
Equipped with Neonatal Resuscitation	No	39	9.2
	Yes	363	90.8
Presence of Neonatal resuscitation guidelines	No	48	11.4
	Yes	354	88.6
Presence of supportive supervision	No	252	62.7
	Yes	150	37.3
Number of neonates served per day	2 neonates	98	24.4
	3 neonates	88	21.9
	4 neonates	87	21.6
	5 neonates	90	22.4
	6 neonates	31	7.7
	7 neonates	8	2.0
	Number of hours spent on neonatal care per day	6 hours	92
7 hours		4	1.0
8 hours		217	54.0
10 hours		43	10.7
12 hours		46	11.4

positive attitude towards neonatal resuscitation. More than half of the respondents 217(54%) strongly agreed not to delay resuscitation by perceiving the secondary role of doctors and 268 (66.7%) them were agreed to prepare for resuscitation irrespective of the presence or absence of risk factors (Table 3).

Knowledge of Neonatal Resuscitations

Regarding the Knowledge score, 319 (79.4%) HCWs had good knowledge of neonatal resuscitation. More than half of 219(54.5%) answered newborn resuscitation should be prepared for all newborns at every time, 175 (43.5%) and 8 (2%) of resuscitation should be prepared if resuscitation is needed and anticipated risk respectively. Regarding the initial assessment of newborns, the majority of HCW's 375(93.3%) initial assessment is needed for all newborns, and 27 (6.7%) only those who had perinatal /Intrapartum risk factors. Most of the respondents 189 (47%) said 30 seconds were allocated for the initial steps of resuscitation, 164 (40.8%) and 49 (12.2%) were allocated 60 seconds and 40 seconds for the initial steps of resuscitation respectively (Figure 3 and 4).

According to this study 195 (48.5%), respondents reported initial steps of resuscitation should be stopped when the baby is crying,

Table 3. Distribution of attitude of health care workers about neonatal resuscitation of public health facilities in west Guji zone, Oromia, Ethiopia 2021

Questions	SD	D	N	A	SA
	N (%)	N (%)	N (%)	N (%)	N (%)
Delay to resuscitation by perceiving the secondary role of the doctor is wrong	4(1%)	53 (13.2)	8 (2)	120 (29.9)	217 (54)
It is necessary to prepare for resuscitation irrespective of the presence or absence of risk factor	4 (1)	21 (5.2)	53 (13.2)	168 (66.7)	56 (13.9)
I think providers' motivation toward neonatal resuscitation may be related to incentives/benefits.	33 (8.2)	24 (6)	53 (13.2)	167 (41.5)	125 (31.1)
If I had good knowledge & practice in resuscitation, I would not hesitate to use it whenever needed	0	8 (2)	17 (4.2)	235 (58.5)	142 (35.3)
I support hospitals that have neonatal resuscitation teams.	0	4 (1)	0	144 (35.8)	254 (63.2)

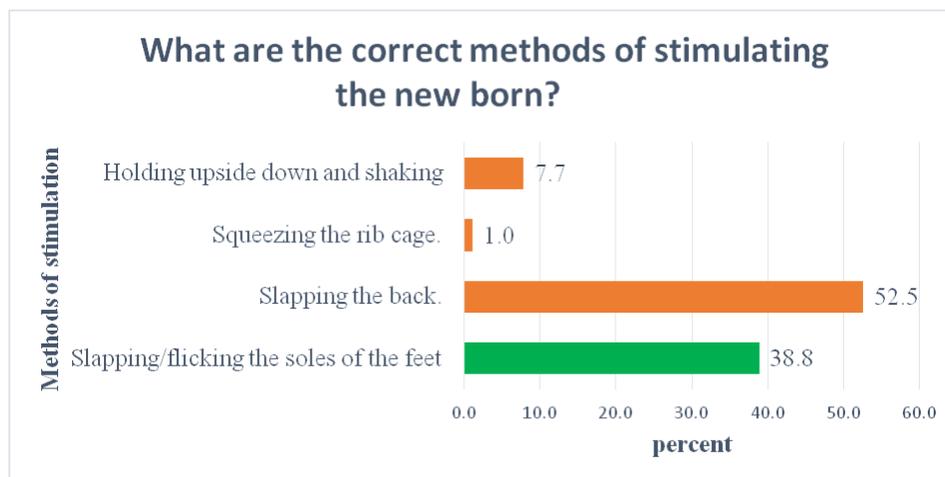


Figure 3. Methods of newborn stimulation reported by HCWs in public health facilities in west Guji zone, Oromia, Ethiopia 2021

116(28.9%) when the breathing rate is greater than 30beat/minute, 12 (3%) when the heart is less than 60beat/minute and 9(2.2%) when baby is grasping. 70(17.4%) answered initial steps of resuscitation should be stopped when the baby is

crying, breathing rate greater than 30 beats/minute, and the heart is < 60 beats/minute. The majority of respondents 376 (93.5%) responded correctly to the correct position of the baby's neck for resuscitation (Table 4).

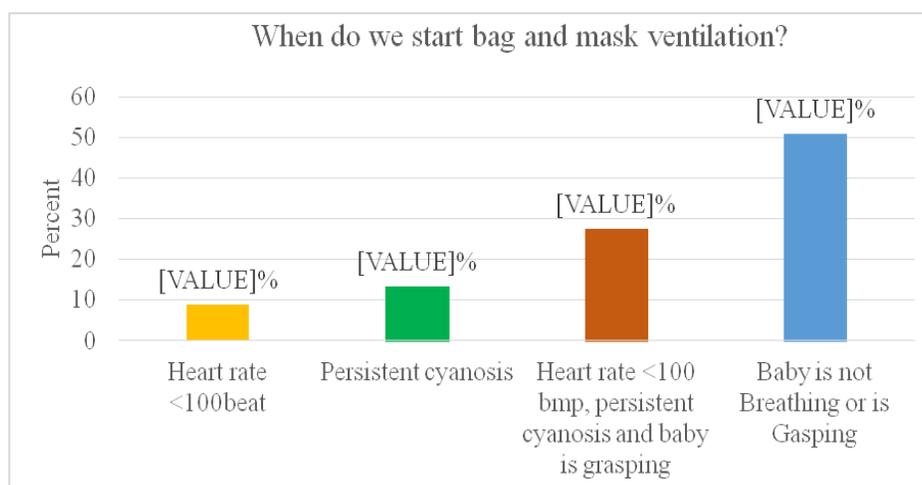


Figure 4. Health care worker's responses on the time when they start bag and mask ventilation in public health facilities in west Guji zone, Oromia, Ethiopia 2021

Table 4. Distribution of knowledge of health care workers about neonatal resuscitation of public health facilities in west Guji zone, Oromia, Ethiopia 2021

SNO	Statements used to assess the knowledge of healthcare workers	Correct	Incorrect
1.	Preparation of resuscitation materials	219(54.5%)	183(45.5%)
2.	All newborn needs an initial assessment	375(93.3%)	27(6.7%)
3.	Time allotted for the initial steps of resuscitation	156(38.8%)	246(61.2%)
4.	The correct methods of stimulating the newborn	189(47.0%)	213(53%)
5.	The time to stop the initial steps of resuscitation	195(48.5%)	207(51.5%)
6.	Time to start Bag and mask ventilation	204(50.7%)	198(49.3%)
7.	Reasons for failure of bag & mask ventilation	46(11.4%)	356(88.6%)
8.	The correct position of the baby's neck for resuscitation	376(93.5%)	26(6.5%)
9.	Appropriate mask size for resuscitations of term & preterm babies	336(83.6%)	66(16.4%)
10.	The procedure of neonate resuscitation by bag and mask	377(93.8%)	25(6.2%)
11.	Indications of chest compressions during neonatal resuscitations	292(72.6%)	110(27.4%)
12.	The recommended technique of chest compression	103(25.6%)	299(74.4%)
13.	The recommended ratio of chest compression to ventilation	369(91.8%)	33(8.2%)
14.	The length of cardio-pulmonary resuscitation continued before reassessing the heartbeat.	47(11.7%)	355(88.3%)
15.	The depth of chest compression provided to produce the required pressure	259(64.4%)	143(35.6%)
16.	The indications to start medications during neonatal resuscitations	345(85.8%)	57(14.2%)
17.	The preferred medication during resuscitation	383(95.3%)	19(4.7%)
18.	The length of time to see the effects of epinephrine	103(25.6%)	299(74.4%)

Neonatal resuscitation practice

In this study, 270 (67.2%) of HCWs had good practice in neonatal resuscitation with a 95% confidence interval of 62.6% to 71.8%. Almost all of them 390 (97.0%) collect the resuscitation materials before delivery and 377 (93.7%) healthcare workers checked the functionality of the equipment. On the other side majority of healthcare workers, 276 (68.7%) did not wash their hands and 258(63.7%) them were did not tell to their mother what was going to be done (Table 5).

Factors Associated with Neonatal Resuscitation Practice

The binary logistic regression analysis was performed to identify variable candidates for multivariable logistic regression analysis with the neonatal resuscitation practice. Consequently, the factors significantly associated with neonatal

resuscitation practice in binary logistic regression were age, work experience, wards/working unit, training on neonatal resuscitation, availability of resuscitation equipment, availability of resuscitation guidelines, availability of supportive supervision, the number of neonates served per day/workload, numbers of an hour spent on neonatal care per day, knowledge status and attitude of health care workers towards neonatal resuscitation.

In multiple logistic regression age, work experience, training on neonatal resuscitation, availability of resuscitation guidelines, knowledge status, and attitude of health care workers towards neonatal resuscitation were positive and significant associations with neonatal resuscitation practice. Healthcare workers aged 30 to 34 and 35 to 39 years were 3.52(AOR= 3.52, 95%CI; 1.27 - 9.74) and 4.00 AOR= 4.00, 95%CI; 1.24 -12.97) times more likely to practice neonatal resuscitation

Table 5. Distribution of neonatal resuscitation practice of health care workers in public health facilities in west Guji zone, Oromia, Ethiopia 2022

SNO	Statements used to assess the practice of healthcare workers	Done (%)	Not done (%)
1	Hand wash	126(31.3%)	276(68.7%)
2	Tell the mother what is going to be done.	146(36.3%)	256(63.7%)
3	Collect the necessary materials.	390(97%)	12(3%)
4	Check the functionality of the equipment.	377(93.7%)	25(6.3%)
5	Provide continual emotional support	303(75.4%)	99(24.6%)
6	Assess for gestational age.	299(74.4%)	103(25.6%)
7	Assess for color.	332(82.6%)	70(17.2%)
8	Assess for muscle tone.	376(93.5%)	26(6.5%)
9	Assess breathing.	362(90%)	40(10%)
10	Assess for amniotic fluid.	370(92%)	32(8%)
11	Dry the newborn.	370(92%)	32(8%)
12	Position the newborn	366(91%)	36(9%)
13	Maintain thermo-regulations.	368(91.5%)	34(8.5%)
14	Provide tactile stimulation.	348(86.6%)	54(13.4%)
15	Clear the airway.	391(97.3%)	11(2.7%)
16	Assess the need for ventilation.	370(92%)	32(8%)
17	Place the baby's face up on a flat surface with the neck slightly extended	373(92.8%)	29(7.2%)

Table 6. Binary and multiple logistic regression analysis between the neonatal resuscitation practice and associated factors among health care workers in public health facilities in west Guji zone, Oromia regional state, Ethiopia 2022

Categorical variables	NR Practice		95% CI% COR	p	95% CI AOR	p	
	Good	poor					
Age	20-24	10	8	1	1		
	25-29	131	38	2.76(1.02-7.48)	.04	2.69 (.99 - 7.34)	.052
	30-34	131	29	3.61(1.31-9.95)	.01	3.52(1.27 - 9.74)	.015
	35-39	49	6	4.09(1.27-13.21)	.01	4.00 (1.24 -12.97)	.021
Work experience	≤5 years	193	66	1	.03	1	
	6-10 years	117	10	4.00(1.98-8.09)	< 0001	5.72 (2.72 - 12.03)	<.0001
	11- 15 years	8	8	.34 (.12 -.95)	.03	.31 (.10 -.93)	.037
Wards	NICU	91	16	2.12(1.02 -4.48)	.04	1.98 (.92 - 4.28)	.080
	Labor	176	49	1.34(.72 -2.47)	.35	1.43 (.76 -2.69)	.275
	Pediatrics	51	19	1		1	
Training on NR	Yes	216	39	3.28(1.96 -5.28)	< 0001	3.60 (2.16 -6.00)	<.0001
	No	102	45	1		1	
Availability of resuscitation equipment	yes	198	65	4.36(2.20 -8.62)	< 0001	1.74 (.82 -3.71)	.149
	No	20	19	1		1	
Availability of Guideline	yes	290	64	3.24(1.72 -6.10)	< 0001	2.29 (1.13 -4.69)	.022
	No	28	20	1		1	
Supportive supervision	yes	129	21	2.05(1.19 - 3.52)	.01	1.34 (.78 -2.28)	.286
	No	189	63	1		1	
Number of neonates served per day	< 5 neonates	208	65	1		1	
	≥5 neonates	110	19	1.81(1.03 -3.17)	.03	.96(.55-1.67)	.870
Hours spent per day	8hours	65	24	1		1	
	>8hours	253	60	.65 (.40 -1.06)	.08	.65(.38 -1.10)	.105
Knowledge of NR status	Good	257	60	2.05(1.26-3.34)	.004	1.82(1.07 -3.10)	.028
	poor	61	24	1		1	
Attitude status on NR	Positive	206	48	2.02 (1.32 -3.09)	.001	2.18(1.37 -3.48)	.001
	Negative	112	36	1		1	

respectively than those 20 to 24 years after controlling confounding factors. Work experience is also another significant factor associated with neonatal resuscitation practice. Those who had 6 to 10 years of work experience were 5.72 (AOR= 5.72, 95%CI; 2.72 - 12.03) times more likely to practice neonatal resuscitation than those less than five years. However, those who had 11 to 15 years of work experience were 69 % (AOR= 0.31, 95%CI; 0.10 - 0.93) less likely to practice neonatal resuscitation compared with those with less than five years of experience.

Study participants who had neonatal resuscitation training were 3.6 (AOR= 3.6, 95%CI; 2.16 -6.00) times more likely to practice neonatal resuscitation than those who don't and the availability of neonatal resuscitation guidelines was 2.29 (AOR= 2.29, 95%CI; 1.13 -4.69) times more likely practice neonatal resuscitation than counterpart after controlling others factors. Knowledge of neonatal resuscitation procedures

was significantly associated with the practice of neonatal resuscitation. Having good knowledge of neonatal resuscitation procedures was 1.82(AOR= 1.82, 95%CI; 1.07 -3.10) times more likely to practice neonatal resuscitation compared with those who had poor knowledge of neonatal resuscitation procedures. Also, healthcare workers who had positive attitudes towards neonatal resuscitation were 2.18(AOR= 2.18, 95%CI; 1.37 -3.48) times more likely to practice neonatal resuscitation compared with negative attitudes after adjusting for confounding factors (Table 6).

Discussion

The current study aims to assess neonatal resuscitation practice and associated factors among healthcare workers in public health facilities in the West Guji zone, Oromia regional state southern Ethiopia. According to this finding, the level of neonatal resuscitation

practice was 67.2%. This study is lower than studies done in different countries like 83% in the United States (25), 69.8% in India (26), 72.2% in Kenya (27), and 72.2% from the analysis of the 2016 National Emergency Obstetric and Newborn Care Survey in Ethiopia (22), and 71.1% in Southern Ethiopia (23).

The discrepancy might be neonatal resuscitation practice in the United States of America was too high. This is due to having essential resuscitation materials, skillful personnel, and advanced technology for the diagnosis and management of both newborns as well as mothers. Also, the reason for high neonatal resuscitation practice in India and Kenya was due to the high awareness of care providers on resuscitation and availability of necessary materials, sufficient staff, and quality of training and exposure of the participants to advanced neonatal resuscitation procedures.

The differences from the previous finding in Ethiopia were due to different study settings, especially the previous one was conducted in hospitals, but the current one is both hospitals and health centers. On the contrary, studies conducted in Tanzania (32.4 %) (4), Nigeria (49.7%) (28), Addis Ababa (59.9 %)(26), and Nigeria (5%) (29) were lower than the current findings. The possible explanation for the difference could be due to increased antenatal care, low attention could be given to the importance of neonatal resuscitation procedures, or a high level of negative attitude toward neonatal resuscitation.

In this study factors associated with neonatal resuscitation practice were the age of healthcare workers, work experience, training on neonatal resuscitation, and availability of neonatal resuscitation guidelines, knowledge status, and attitude of healthcare workers towards neonatal resuscitation. The age of health care workers who are being in 30 to 34 years was 3.52 times and those aged belongs to 35 to 39 years were 4.00 times more likely to practice neonatal resuscitation compared with those between 20 to 24 years after controlling confounding factors. There is a similar finding from a study conducted in Southern Ethiopia (23) which was health care workers aged 25 to 34 years practice neonatal resuscitation, and also a study done in Kenya (30). The reason behind this might be as the age of HCWs increases their experience also increases and the chance of getting training on neonatal resuscitation is also high.

According to this finding, work experience is significantly associated with neonatal

resuscitation practice. There was a similar study done in Amhara (31), East Ethiopia (19), and Nigeria (32) that work experience had a significant association with neonatal resuscitation practice. The similarity might be that HCWs who had experience might have an awareness of the consequences of an immediate reaction and delaying neonatal resuscitation. So having previous experiences can have a significant impact on the outcome of neonatal resuscitation and the practices of healthcare workers.

Healthcare workers who had trained in neonatal resuscitation were 3.6 times more likely to practice neonatal resuscitation. This is in line with studies done in south Ethiopia (23), Addis Ababa Ethiopia (24), Amhara Ethiopia (31), analysis from the Ethiopian national emergency obstetric and newborn care survey (33), Tanzania (34), and Kenya (30). The similarity may be during training HCWs will get sufficient knowledge about the procedures, and skills and are equipped with necessary materials, and even they will get information about how to save a life with available materials without waiting for advanced technology.

The availability of neonatal resuscitation guidelines was another predictor significantly associated with the practice of neonatal resuscitation. A consistent study was conducted in Addis Ababa Ethiopia (24), analyzed from the Ethiopian national emergency obstetric and newborn care survey (33) and rural Tanzania (34). Globally, about a quarter of all neonatal deaths are caused by asphyxiation at birth, and effective resuscitation at birth can prevent many of these deaths. Therefore, clinical guidelines on neonatal resuscitation, suitable for contexts with limited resources, are universally recognized (35).

Knowledge of neonatal resuscitation procedures was significantly associated with the practice of neonatal resuscitation. This is similar to reports from findings in south Ethiopia (23), Addis Ababa (24), Amhara Ethiopia (31), and Kenya (30). Knowing neonatal resuscitation before practice is essential as newborn resuscitation is a life-saving procedure for newborns and an emergency procedure focused on supporting approximately 10% of newborn children who do not readily begin breathing. Through positive airway pressure, and in severe cases chest compressions, medical personnel certified in neonatal resuscitation can often stimulate neonates to begin breathing on their own, with attendant normalization of heart rate.

Healthcare workers who had a positive

attitude toward neonatal resuscitation were 2.18 times more likely to practice neonatal resuscitation compared with a negative attitude after adjusting for confounding factors. A similar result was reported in Addis Ababa Ethiopia (24). The justification of similarity was health care workers who have positive attitudes might work neonatal resuscitation from the bottom heart and help to decrease neonatal mortality and morbidity by providing correct procedures of neonatal resuscitation practice.

This study was not without limitations. In the study area due to security problems, some health facilities were closed and to compensate for that some health facilities were added. The study design was a cross-sectional design which makes it difficult to establish cause-and-effect relationships. During observation, some observer bias may be introduced.

Conclusion

The finding shows that neonatal resuscitation practice was low compared with other findings. Factors associated with neonatal resuscitation practice were the age of healthcare workers, work experience, training on neonatal resuscitation, and availability of neonatal resuscitation guidelines, knowledge status, and attitude of healthcare workers towards neonatal resuscitation. Policymakers and health planners should organize healthcare providers on neonatal resuscitation by giving on-the-job training, providing guidelines, and supervising all health facilities to produce competent healthcare workers and reduce neonatal mortality and morbidity.

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Conflicts of interest

The authors declare that they have no competing interests.

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