

# Neonatal Danger Signs: Knowledge and Its Correlates Among Mothers Attending Child Vaccination Program at Public Health Centers of Southwest Ethiopia

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**Abstract:** Neonatal danger signs are the indication of the presence of clinically significant risk of neonatal morbidity and mortality which pursues the need for the early assessment and therapeutic interventions. In this regards, the main aim of this study was to examine the status of knowledge about neonatal danger signs and its correlates among mothers attending child vaccination program at public health centers of south west Ethiopia. Facility based cross sectional study was conducted in November, 2020. Four hundred eleven participants were recruited through systematic random sampling. Pre-tested structured questionnaires were used to collect data. Data were entered into Epidata version 3.1 and analyzed by SPSS version 20. Binary logistic regression was employed and explanatory variables with P value < 0.25 in the bivariate logistic regression were included in the multivariable logistic regression model. Adjusted odd ratio was considered to determine association and P value < 0.05 was used to declare statistical significance. As the result indicated, about 34.3% (95% CI: 29-38.9) of participants reported to have good knowledge of neonatal danger signs. Maternal age between 29-32 year (AOR = 7.3, 95% CI: 3.7-14.5), being government employee (AOR=2.5, 95% CI: 1.3-4.9), ANC attendance (AOR = 3.95, 95% CI: 2.1-7.52), two or more ANC visits (AOR=3.79, 95% CI: 1.79-8.05) and having ≥ 3 PNC visit during the last delivery (AOR=4.3, 95% CI: 2.14-8.63) were significantly associated with good knowledge of neonatal danger signs. In conclusions, nearly two thirds of participants had poor knowledge of neonatal danger signs which indicates the need for the necessary intervention. Maternal age and occupation, and the trends of ANC and PNC visit were identified as the factors that had linked to the status of maternal knowledge about neonatal danger signs.

**Keywords:** Neonate, Danger Signs, Knowledge, Vaccination, ANC Visit, Southwest Ethiopia

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## 1. Introduction

Neonatal danger signs refers to the presence of clinical signs that indicate high risk of neonatal morbidity and mortality which pursues the need for early therapeutic intervention [1]. A mothers or care givers are the first person to recognize changes in neonates, regulate the child's behavior and treat them at the initial stage [2]. Studies have shown that most neonatal death take place at home related to

the lack of early recognition of danger signs and poor treatment seeking behaviors of mothers or care givers towards modern health care service [3].

Similarly, studies have identified as the early recognition of neonatal danger signs by the immediate care giver is an important step towards improving illness outcomes and reducing the neonatal mortality which highly influenced by the care giver's level of knowledge [4, 5]. The poor maternal knowledge on neonatal danger signs could also result in delay in seeking health care which may in turn affects the

progress of reducing neonatal mortality [5].

Worldwide, about 2.7 million deaths occur during the neonatal period, of which close to 2 million deaths occur in the first week of life, and this accounts for about 45% of all under-five deaths [6]. Despite the reduction of neonatal deaths from 5 to 2.5 million in the years of 1990 to 2018 globally, the burden of neonatal mortality is still significant in sub-Saharan Africa and southern Asia [7]. For instance, the recent 2019 Ethiopian mini demographic and health survey indicated that the neonatal mortality rate was 30 per 1000 live births [8].

Maternal knowledge of neonatal danger signs has significant contribution to increase the neonates' quality of life and survival rate, and in reducing the neonatal morbidity and mortality [9]. However, previous studies across different African countries have demonstrated that a substantial proportion of mothers fails to identify neonatal danger signs [2].

For instance, the study carried out in Uganda showed that only about 14.8% of mothers can identify two danger signs [3]. Supportively, the study conducted in central Ethiopia reported that 20.3% of mothers had good knowledge on the neonatal danger sign [10]. In another study conducted in northeast Ethiopia, only about 17.1% of mothers have good knowledge regarding the neonatal danger signs [11].

On the other hand, the study carried out in Ethiopia revealed that a substantial number of (94%) neonatal and 40% of under-five death occurred at home in which the poor maternal knowledge about neonatal danger signs was identified among the major contributors [7, 12].

Previously carried out studies demonstrated that factors such as age, educational level of parents, occupation of mother and husband, ANC and PNC follow up, and birth preparedness are among the main contributing factors for mother's knowledge on neonatal danger signs [4, 13, 14].

Poor knowledge of neonatal danger signs has become a substantial problem in many developing countries including Ethiopia. Early detection of these signs is an important step towards improving newborn survival which requires the enhancement of maternal knowledge concerning the problem. Regarding this, there have been studies conducted so far in Ethiopia. However, majority of those studies were restricted to a single facility that limits its representativeness, and also the results were found to be varied across all settings [2, 5].

Moreover, most previous studies were carried out in urban settings, and the rural and semi-urban communities were not well addressed. In an attempt to address these, the current study has assessed the status of maternal knowledge concerning the neonatal danger signs and its correlates among mothers attending child vaccination program at public health centers of southwest Ethiopia.

## 2. Methods

### 2.1. Study Design, Period, and Setting

Facility-based cross-sectional study was conducted at public health centers in Ilu Ababor Zone, Southwest Ethiopia in November, 2020. Mettu, the zonal town is located at about

600km southwest of Addis Ababa, the capital city of Ethiopia. The zone has 2 hospitals, 40 health centers and 286 health posts which are providing preventive and curative health services for the surrounding communities.

### 2.2. Populations

The source populations were all mothers attending child immunization program at public health centers of Ilu Ababor zone; while those mothers who were available during the data collection period were study population. All mothers who aged  $\geq 18$  and had regular follow up were included; while those mothers who were critically ill and/or came with critically ill child and those unable to communicate for any reason were excluded from the study.

### 2.3. Sample Size and Sampling Technique

The sample size was calculated using single population proportion formula by considering 95% CI, 5% margin of error, 10% non-response rate, and 47.8% proportion of maternal good knowledge about neonatal danger signs [1] which yields 420 sample size finally. From a total of 40 health centers in the zone, twelve health centers (considering 30% as a thumb rule) were selected by simple random sampling; and the total sample size was proportionally allocated to each selected facility by considering the monthly average number of immunization service flow in the past six months for each. Finally, the study subjects were recruited using systematic random sampling depending on the different intervals (K) for each respective health center; and all participants were interviewed on their entry before getting the service to minimize bias.

### 2.4. Data Collection Instruments, Procedures and Study Variables

The structured questionnaires adopted from previous study were used to collect the data [15]. The questionnaires were translated to local language (Afaan Oromo) and pretested on 21 (5%) of the sample. The data collection instrument consisted of three parts (socio-demographic information, maternal health service and obstetric factors, and knowledge assessment questionnaire). The knowledge assessment questionnaire was contained 14 items and shown to have a Cronbach's  $\alpha$  of 0.87 in the current study. Data were collected by professional midwives through face-to-face interviews. Training was given to data collectors and supervisors concerning the objectives of the study, data collection instrument and infection prevention protocol. During data collection, data collectors and supervisors were tried to keep the safety of themselves and participants by wearing face mask, using alcohol rubbed hand sanitizer and keeping a physical distance of at least two meters [16].

The outcome variable was knowledge of neonatal danger signs (poor/good). The explanatory variables were socio-demographic variables (age, occupation, marital status, educational status, and place of residence), and reproductive health variables such as parity, place of delivery, antenatal

care, and postnatal care services.

### 2.5. Operational Definitions

*Good knowledge:* Scoring equal or above the mean of total 14 knowledge questions [4].

*Poor knowledge:* Scoring below the mean value of a total 14 knowledge questions [4].

### 2.6. Data Processing and Analysis

Data were entered into Epidata version 3.1 and analyzed using SPSS version 21. Binary logistic regression analysis was used and variables with P value < 0.25 in the bivariate analysis were included in the multivariable logistic regression.

Multicollinearity was checked by the variance inflation factor (VIF), and the Hosmer-Lameshow goodness-of-fit test indicated that the model was good enough to fit the data well. Finally, adjusted odd ratio was considered to test for association and variables with P value < 0.05 were considered to have significant association with the outcome variable.

### 2.7. Ethical Consideration

The ethical approval letter was obtained from the ethical review committee of college of health sciences, Mettu University. Letter of permission was taken from the respective health centers. Written informed consent was obtained from participants after they were informed about the aim of the study. Participants' right to refuse or discontinue the interview at any time they want was respected, and all information taken from the participants were kept confidential.

## 3. Results

### 3.1. Socio Demographic Characteristics of Study Participants

A total of 411 mothers were interviewed resulting in the response rate of 97.8%. The mean age of the participants was 27.9 (SD  $\pm 6.32$ ) and about one-third (30.2%) of them were in the age group of 29–32 years. Majorities (67.9%) of the mothers were married, and 7.5% of them had no formal education (Table 1).

**Table 1.** Socio-demographic characteristics of the mother attending child immunization at health center, Ilubabor zone, south west Ethiopia, 2020 (N=411).

Variables	Category	Frequency	Percentage
Age	18-23	107	26
	24-28	98	23.8
	29-32	124	30.2
	$\geq 33$	82	20
Educational status of mother	No formal education	29	7.5
	Primary (1-8)	51	12.4
	secondary (9-12)	174	42.3
	College and above	157	38.2
Occupation of	Housewife	97	23.6

Variables	Category	Frequency	Percentage
mother	Merchant	105	25.5
	Government employee	209	50.9
Residence	Urban	194	47.2
	Rural	217	52.8
Marital status	Married	279	67.9
	Divorced	84	20.4
	Widowed	42	10.2
	Single	6	1.5
If married, husband's educational status	No formal education	21	7.5
	Primary (1-8)	115	41.2
	Secondary (9-12)	21	7.5
	College and above	122	43.8

**Table 1.** Continued.

Variable	Category	Frequency	Percentage
If married husbands occupation	farmer	71	25.4
	Merchant	65	23.3
	Daily laborer	76	27.3
	Government employee	67	24
Family size	1-3	190	46.2
	4-6	121	29.4
	>7	100	24.4

### 3.2. Maternal Health Service and Obstetric Factors

Majority (72.1%) of the mothers had more than two ANC follow up. Most of them, 313 (76.2%) reported to be delivered at health center and majority of them 255 (62%) had at least one immediate post natal care follow up. Of those who had PNC, 103 (40.4%) had three or more PNC visits (Table 2).

**Table 2.** Maternal health service and obstetric factors among mother attending child immunization at health center, Ilubabor zone south west Ethiopia, 2020 (N=411).

Variables	Category	Frequency	Percentage
ANC follow up	No	70	17
	Yes	341	83
Frequency of ANC visit	< 2	95	27.9
	$\geq 2$	246	72.1
Place of delivery	Health Center	313	76.2
	Hospital	75	18.2
	Health post	12	2.9
	Home	11	2.7
Number of Parity	< 4	274	66.7
	$\geq 4$	137	33.3
Immediate PNC visit	No	156	38
	Yes	255	62
Frequency of PNC visit	<3	152	59.6
	$\geq 3$	103	40.4

### 3.3. Maternal Knowledge on Neonatal Danger Signs

A substantial number (84.4%) of participants were able to mention at least one neonatal danger signs. Among all, the most commonly reported sign by mothers was fever (59.9%); followed by fast breathing (50.1%). On the other hands, skin pustules was the least reported neonatal danger sign. Overall, about 34.3% (95% CI 29-38.9) of the participants had good knowledge on neonatal danger signs (Table 3).

**Table 3.** Knowledge on neonatal danger signs among mothers attending child immunization at health centers, Ilubabor zone, southwest Ethiopia, 2020 (N=411).

Knowledge assessment questions	Category	Frequency (N)	Percent (%)
Do you know about neonatal danger signs?	No	64	15.6
	Yes	347	84.4
Poor sucking or not able to breast feed	No	208	59.9
	Yes	139	40.1
Fever	No	139	40.1
	Yes	208	59.9
Fast breathing	No	173	49.9
	Yes	174	50.1
Difficulty of breathing	No	197	56.7
	Yes	150	43.3
Lethargic/unconscious	No	191	55
	Yes	156	45
Hypothermia	No	233	67.2
	Yes	114	32.8
Convulsion	No	245	70.6
	Yes	102	29.4
Umbilical infection/redness of the cord	No	263	75.7
	Yes	84	24.3
Yellowish discoloration of palms/soles	No	278	80
	Yes	69	20
Persistent vomiting	No	278	80
	Yes	69	20
Very small neonate	No	316	91.2
	Yes	31	8.8
Pus discharge or redness of eye	No	309	89.1
	Yes	38	10.9
No stool after 24 hours	No	325	93.7
	Yes	22	6.3
Skin pustules	No	328	94.4
	Yes	19	5.6

### 3.4. Factors Associated with Maternal Knowledge About Neonatal Danger Signs

Maternal age, mother's occupation, and the number of ANC and PNC visits were the factors that significantly predicted the status of maternal knowledge on neonatal danger sign in the final model. Subsequently, mothers in the age range of 29-32 years were about 7.3 times (AOR =7.3, 95% CI: 3.7-14.5) more likely to have a good knowledge when compared to those aged 18-23 years old. Government employed mothers (AOR=2.5, 95% CI: 1.3-4.9) and those who had attended ANC during their last pregnancy (AOR =

3.95, 95% CI: 2.1-7.52) were observed to have a greater odd of good knowledge about neonatal danger signs than their references.

Similarly, those participants who had  $\geq 2$  ANC visits during their last pregnancy were 4.3 times (AOR=4.3, 95% CI: 2.14-8.63) more likely to have a good knowledge about neonatal danger signs. Furthermore, mothers who had three or more PNC visits during their last delivery were observed nearly four times (AOR=3.98, 95% CI: 2.32-6.82) more likely to have a greater odd for good knowledge concerning the neonatal danger signs when compared to their references (Table 4).

**Table 4.** Factors associated with maternal knowledge on neonatal danger signs among mothers attending child immunization at public health centers, Ilubabor zone, southwest Ethiopia, 2020 (N=411).

Variables	Knowledge status		COR (95%CI)	AOR (95%CI)
	Poor N (%)	Good N (%)		
Age				
18-23	85 (79.4)	22 (20.6)	1	1
24-28	75 (76.5)	23 (23.5)	1.2 (0.611, 2.297)	0.81 (0.38, 1.73)
29-32	44 (35.5)	80 (64.5)	7.02 (3.87, 12.75)*	7.3 (3.7, 14.5)**
$\geq 33$	66 (80.5)	16 (19.5)	0.94 (0.46, 1.92)	0.8 (0.36, 1.8)
Occupation of the mother				
Housewife	74 (76.3)	23 (23.7)	1	1
Merchant	71 (67.6)	34 (32.4)	1.54 (0.83, 2.9)	1.45 (0.7, 3.1)
Governmental Employee	125 (59.8)	84 (40.2)	2.16 (1.3, 3.7)*	2.5 (1.3, 4.9)**
Educational status of mother				
No formal education	23 (79.3%)	6 (20.7%)	1	1
primary (1-8)	129 (74.1%)	45 (25.9%)	1.34 (0.512, 3.5)	0.531 (0.155, 1.817)

Variables	Knowledge status		COR (95%CI)	AOR (95%CI)
	Poor N (%)	Good N (%)		
secondary (9-12)	38 (74.5%)	13 (25.5%)	1.3 (0.44, 3.93)	0.280 (0.068, 1.158)
college and above	80 (51.0%)	77 (49.0%)	3.7 (1.43, 9.6)*	1.3 (0.38, 4.43)
ANC follow up				
No	60 (85.8)	10 (14.2)	1	1
Yes	196 (57.4)	145 (42.6)	4.4 (2.56, 7.90)*	3.95 (2.1, 7.52)**
Frequency of ANC visit				
<2	81 (85.1)	14 (14.9)	1	1
≥2	143 (58.2)	103 (41.8)	4.2 (2.33, 7.19)*	4.3 (2.14, 8.63)**
PNC frequency				
<3	111 (73)	41 (27)	1	1
≥3	57 (55.4)	46 (54.6)	2.2 (1.41, 3.24)*	3.98 (2.32, 6.82)**
Educational status of husband				
No formal education	43 (75.4%)	14 (24.6%)	1	1
primary (1-8)	153 (70.5%)	64 (29.5%)	1.3 (0.66, 2.5)	1.74 (0.73, 4.13)
secondary (9 to 12)	51 (56.0%)	40 (44.0%)	2.4 (1.2, 5)*	2.1 (0.8, 5.5)
college and above	23 (50.0%)	23 (50.0%)	3.1 (1.3, 7)*	2.3 (0.7, 7.34)

\* P < 0.25 \*\* P < 0.05

## 4. Discussion

Early detection of neonatal illness is an important step towards improving newborn's quality of life, increasing the survival rate and in reducing the neonatal mortality which highly depends on the maternal knowledge of danger signs of the illness [17]. In light of this, the present study has assessed the knowledge of neonatal danger signs and its contributing factors among mothers attending child vaccination program at public health centers.

Consequently, in this study, the prevalence of maternal good knowledge on neonatal danger signs was found to be 34.3% (95% CI: 28.9-38.7). This finding is lower than the study conducted in Nigeria [18] and Bangladesh [19]; in which about 56.2% and 51% of the participants had reported good knowledge about neonatal danger signs. The discrepancy was might be due to the differences in the demographic factors such as educational profiles of the participants and the structure of health service systems.

In the contrast, this finding was found higher than the studies done in Uganda [3], and Ethiopia [10, 11]. The observed variation was probably due to the difference in the tools used to assess the knowledge, socioeconomic and cultural differences, and the residences of the participants.

In the current study, majority of the mothers (59.9%) were reported fever as neonatal danger sign which is supported by the findings of the studies conducted in Nigeria [20] and Kenya [21] in which majority of the participants had reported fever as neonatal danger sign. The possible explanation is partly due to the fact that this symptom can be easily felt by mothers when they touch their neonates, and it is a recurring and common symptom for a number of systemic infections.

On the other hands, the finding of this study has revealed that the maternal age is one of the significant predictors for the status of maternal knowledge about the neonatal danger signs. Hence, those mothers who had aged between 29-32 years were about seven times more likely to recognize neonatal danger signs than those in the age range of 18-23

years which was in-line with the previous study carried out in Bangladesh [19]. This might be related to the fact that with the increasing age, mother's knowledge and understanding about the symptoms' experience of her child/neonate could be advanced due to the chances of multiple parities and child rearing exposure.

Consistent with the previous study [22], the present study indicated that government employed mothers were about two times more likely to identify neonatal danger signs than housewives. This probably explained by the fact that government employed mothers have the greater chance to access the health information and might have better educational status when compared to housewives.

Additionally, the finding of the current study has demonstrated the significant association of maternal knowledge and the frequency of ANC visit which was in agreement with the previous studies [2, 5]. In this regards, those mothers who had reported to have two or more ANC visits were observed about four times more likely to have a good knowledge about neonatal danger signs. This might be evidenced by the recurrent health education and suggestions received during their repeated ANC visits. Similarly, mothers who had three or more PNC visits had about four times odds of good knowledge than those with fewer than three PNC visits as supported by one previous study [2]. This probably resulted from the better access to the general health information during their repeated PNC visits.

## 5. Conclusion

As the current study has highlighted, nearly two-third of the participants had poor knowledge of neonatal danger signs. This figure appeared sufficient enough to raise the need for an intervention towards the advancement of maternal knowledge to minimize the detrimental effects of its counterpart. From the findings of this study, we had also able to identify that the maternal age, occupational status, and the frequency of ANC and PNC had significant relation with the status of maternal knowledge. In light of this, the current

study has research and practical implications in supporting the service providers and influencing the policy planners. From the above points of views, it is better for health care givers to widen the scope of their health information towards the enhancement of maternal knowledge during each ANC and PNC visit. Additionally, the interested researcher can plan any helpful future intervention approach to boost the maternal knowledge concerning the topic under study in more sophisticated ways.

## Declaration of Conflict of Interest

Authors declare that there is no conflict of interest.

## Ethical Approval and Consent to Participate

Ethical clearance was obtained from research review committee of College of Health Sciences, Mettu University and the study was carried out in accordance to the principles of declaration of Helsinki. Written informed consent was obtained from each participant. All study participants were informed about the purpose of the study and the right to withdraw from the interview; and all the information were kept confidentially.

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