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## Research

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Assessment of knowledge about danger signs of neonatal illness and its associated factor among mothers who had children less than one year in Bule Hora town, southern Ethiopia: a cross-sectional study

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## Abstract

*Introduction: neonate danger signs are nonspecific and may be a symptom of almost any neonatal illness. Backbone interventions aimed at reducing neonatal mortality include early detection of neonatal danger signs by mothers, as well as timely and effective referral services. In Ethiopia, where the neonatal mortality rate is high, raising maternal awareness of neonatal danger signs and effective care seeking actions is critical to maintaining the gains made.* **Methods:** *a community-based cross-sectional study was conducted in Bule Hora town. A total of 363 mothers who had given birth during the previous 12 months were chosen using a simple random sampling technique. To collect data, a pretested structured and semi-structured Amharic version questionnaire was used. The data was entered, washed, and analyzed using SPSS version 23 statistical software after it was collected. The researchers used descriptive statistics. The relationship between the dependent and independent variables was investigated using multivariate logistic regression. The presence and strength of association was determined using COR and AOR with its 90%CI. Variables with p-value less than 0.05 were considered to declared statistically significant.* **Results:** *in this study, 65.6% of mothers have good knowledge about neonatal danger sign; place of birth, mothers´ educational status and family monthly income were the factors that significantly affect maternal knowledge about neonatal danger sign.* **Conclusion:** *despite the fact that more than half of mothers are well-informed. Thirty-four point four percent of mothers were illiterate. It is preferable to improve mother's educational status and increase institutional delivery to increase mother's awareness of neonatal illness.*

## Introduction

A newborn or neonate is an infant under the age of 28 days. The child is most at risk of death within the first 28 days of life. It is critical to provide adequate nutrition and treatment during this time to increase the child's chances of survival and to lay the foundations for a healthy life [1]. The presence of clinical signs that suggest a high risk of neonatal morbidity and mortality, as well as the need for early therapeutic intervention, is referred to as neonatal danger signs. Fever is described as an increase in body temperature above the normal daily range. It is one of the most well-known manifestations of disease, and it is the most common reason for children to seek medical help and visit doctors. Convulsions, a neonatal danger sign, occur when the brain experiences unexpected, irregular electrical activity. Lethargy and weak sucking are very significant and responsive indicators of neonatal illness, particularly in an infant who was feeding well previously. A rapid respiratory rate (greater than 60 per minute for at least one minute) and chest retractions suggest a serious problem. Vomiting and jaundice are both serious warning signs that need immediate medical attention [2].

The World Health Organization (WHO) described the newborn danger signs of serious illness as history of trouble eating, activity only when stimulated, temperature below 35.5°C, temperature above 37.5°C, respiratory rate above 60 breaths per minute, severe chest in drawings, and history of convulsions in the Integrated Management of Neonatal and Childhood Illness (IMNCI). When these signs are evaluated, they will have a high overall sensitivity and accuracy for predicting the need for neonatal hospitalization in the first week of life [3]. As a result, increasing parental perception of danger signs is considered one of the most critical components of the strategy to minimize newborn infant mortality. It was hoped that this would benefit by ensuring that medical help is sought as soon as possible in the event of an illness, lowering the risk of death [4]. Low-cost, easily scalable interventions involving educational programs in women's groups have been suggested [5]. The majority of infant morbidity and mortality could be avoided if mothers and babies were given proper treatment

during pregnancy, childbirth, and the postpartum period. Thermal care, exclusive breastfeeding, and clean cord and eye care are all important newborn cares. Furthermore, resuscitation of asphyxiated neonates, as well as the prevention and early treatment of infections, will save the lives of many newborns [2]. Furthermore, in order to offer effective neonatal health care interventions, health care facilities and providers must not only be available and affordable, but disease must first be understood and care desired by the neonate's caregiver, which is typically a parent or other family member. As a result, knowing care-seeking behaviors is critical for health programs to be effective [6]. The objectives of the study was to assess knowledge towards danger sign of neonatal illness among mothers who had less than one year age of neonate in Bule Hora town, southern Ethiopia, 2020.

## Methods

**Study area and period:** the study was conducted in Bule Hora town, which is located 450km southern of the capital city of Ethiopia, which is Addis Ababa, Ethiopia, 2020. According to censes in 2020 the town has an estimated total population of 59,024. Among these 25396 are males and 25909 are females, females in reproductive age (15-49) are 11954 and number of pregnant are 1775. The numbers of children less than five years are 8009 and 1637 are less than one year. The town has a total of five Area, Adiss ketema, Hibret and Ediget, Kometa and Shesheka are found in Bule Hora Town. The town has one general hospital and one health center which provide health services to Bule-Hora town population. Study conducted at Bule Hora town, southern Ethiopia from April 1$^{st}$-May 30 2020.

**Study design:** a community based cross-sectional study design was conducted among mothers who have children less than one year of age residing in the selected Kebeles (areas) of Bule Hora town, southern Ethiopia.

**Population**

**Source population:** the source population was all mothers who have children less than one year of age in Bule Hora Town.

**Study population:** all sampled mothers who have children less than one years of age in Bule Hora Town during study period.

**Inclusion criteria and exclusion criteria**

**Inclusion criteria:** all sampled mothers those who had children less than one year who live in Bule Hora town, in the study period.

**Exclusion criteria:** mothers those who are severely ill during data collection period and unable to communicate was excluded from our study.

**Sample size determination:** the sample size in this cross-sectional survey was determined by using a single proportion formula as follows.

$$n = Z_{(\alpha/2)}^2 \, {}^*p{}^*(1\text{-}p) \, /d^2$$

Where: n = the required minimum sample size; z = is the standard normal deviate set at 1.96 (for 95% confidence level = is the desired degree of accuracy (taken as 0.05); P = proportion of mothers knowledge about neonatal danger sign (assumed to be 31.32%) [7]. Estimated non-response rate = 10% n = (1.96) 20.3132 (1-0.3132) 0.052 = 330. The minimum sample size for this study was 363 by adding 10% non-response rate, mothers who had children less than one-month age based on the above assumptions.

**Sampling procedure:** first the district was divided into two strata using the new administrative unit. First the Bule town from two areas and Hora town with three areas. From a total of 5 areas; two areas was selected randomly from the two areas (one from Bule and one from Hora). The sample size was proportionally allocated to each selected two Kebele (area) using sampling proportion to size technique. The sampling fraction of each

Kebele (area) was determined by proportional to the size of the total mothers who had children less than one year age in each Kebele. Then after calculate the sample, the data was collected by multistage sampling techniques, if more than one mother who have children less than one year in the same house, we had taken only one mother by lottery method. Total N° of children less than one year (CLOY) in Bule Hora town =1637. Multistage sampling method was used to select the study participants from Bule Hora town. The town composed of 2 administrative units and divided into 5 Kebele. The following 3-stage sampling procedure was performed; 1) We selected 2 Kebele (area) out of 5 by simple random sampling (40% of the total). 2) For each Kebele (area), we selected households by simple random sampling method (363 households in total). Here the total sample size was proportionally allocated to each Kebele (area) based on total number of households in each Kebele. 3) All mothers who have children less than one year in each household were interviewed. The total numbers of households who have children less than one year in sheshika and Addis Ketema (area) were 341 and 353 respectively. The total number of sample size in each Kebele (area) was proportionally allocated.

$$N1 = (n1/n1 + n2)n$$

N1= (341/341+353) 363=178 households was selected by simple random sampling from sheshika Kebele (area).

$$N2 = (n2/n2 + n1)n$$

N2=(353/353+341)363=185 households was selected by simple random sampling from Addis ketema kebele (area).

**Variables**

**Dependent variable:** knowledge about danger sign of neonatal illness.

**Independent variables:** marital status, educational status, age of mother, age of child, occupation, ethnicity, family monthly income, place of delivery, parity, gravidity, presence of communication media used communication media use, birth preparedness, ANC follow up, PNC visit, place of residence.

**Operational definition**

**Knowledge about danger sign of neonatal illness:** classified into two groups: *Good knowledge:* mothers who were mentioned three and above from the ten key danger signs. *Poor knowledge:* mothers who were capable of mentioned two and less key danger signs of neonate [8].

**Neonatal danger signs:** the key neonatal danger signs include: not feeding since birth or stopped feeding, convulsion, respiratory rate of 60 or more (fast breathing), severe chest in-drawing (difficulty in breathing), temperature of ≥ 37.5 degree centigrade (fever), temperature ≤ 35.5 degree centigrade (hypothermia), only moves when stimulated or not even when stimulated (weakness or lethargy), yellow soles (sign of jaundice), umbilicus redness or draining pus, skin boils, or eyes draining pus (sign of local infection) and vomiting at least baby whose age is less than 28 days.

**Data collection instrument and procedure:** structured and semi-structured English version questionnaire was prepared from the literature review by principal investigators. Translation to Amharic version and again translated to English version were used by the principal investigators before starting the data collection time, it´s correctness was checked by BHU Amharic department lectures after we get their consents and before starting data collection time. It includes about mothers´ socio-demographic factors, maternal healthy related factors and socio-economic factors about danger sign of neonatal illness.

**Data collection instrument and methods:** the data collector was the group members. face to face interview held privately after verbal consent is

obtained from each participant. The data was collected until the required sample size achieved.

**Data quality control:** the quality of the data were assured through careful design standard data collection tool, retranslation and pretesting of the questionnaire were done in Kometa Kebele (area) before the actual data collection days on mothers who have children less than one year, the pretest was done on women having similar socio-demographic characteristics by considering 5% of the total sample size (18 individuals mothers who have children less than one year) in Kometa Kebele (area), proper handling of the data during data collection time. It was monitored frequently both in the field and during data entry that is all completed questionnaire were examined for its completeness and consistency during interview and at the end of each day. Data entry was also done carefully by the principal investigator.

**Data processing and analysis:** the coded data were entered to computer by using Statistical Package for Social Science (SPSS) version 23 statistical software for analysis. Cleaning were performed by using frequency distribution. Any error were corrected after revision of the original data using the code numbers of the questionnaires. Frequencies were computed for description of the study population in relation to socio-demographic and other relevant variables. The association between independent and dependent variable determined by odd ratio with 95% CI and P-value less than considered as statistically significance. All variables with P<0.2 in the bivariate analysis were included in the final model of multivariate analysis in order to control all possible confounders. The direction and strength of statistical association was measured by odds ratio with 95% CI. Adjusted odds ratio along with 95% CI was estimated to identify association factors for knowledge about neonatal danger signs by using multivariate analysis in the binary logistic regression. In this study P-value <0.05 was considered to declare a result as statistically significant association. The result presented by charts, figures, and tables.

**Ethical consideration:** the ethical clearance was obtained from Bule Hora University College of health and medical science. Permission letters were received from the Bule-Hora town administration office. The purpose of the study was briefly explained for the respondents and verbal consent was obtained. All the study participants were informed about the purpose of the study and their right to refuse was obtained from all study participants prior to the interview. The respondents were also being told that the information obtained from them was kept confidential and not link to third party and do not cause any harm on them.

## Results

**Socio-demographic characteristics:** in this study, a total of 363 mothers whose neonate less than one year were interviewed making the response rate to be 100%. The socio-demographic characteristic of the respondents is described in Table 1. More than half (57.3%) the respondents were in the age group 25-34 years, and the mean age was 28.64 years (SD ± 5.909). The largest ethnic group was Bench, (33.9%). Concerning the educational status of mothers, (33.88%) had attended primary school and (12.39%) had attend secondary school, (5.78%) attend above secondary school. The rest (25.07%) and (22.86%) were unable to read and write and able to read and write respectively. The majority of mothers were married, 326 (89.80%) and house wife by occupation was 181 (49.86%). Very small numbers 4 (1.1%) were farmers. Out of the total study subjects, 256 (70.50%) of mothers earn an average monthly income of higher than 2000 Birr. Study subjects were also asked about their husband´s educational status, 105 (28.9%) have attended primary school; whereas small number, 22 (6.1%) were unable to read and write. From a total of 326 married mothers, 130 (35.8%) of their husbands were merchants, small number, 32(9.8%) were farmers on their occupation (Table 1).

**Obstetric characteristics of the mothers:** study subjects were asked about their history of ANC visits during the last pregnancy, 296 (81.54%) and 21 (5.78%) of them were received ANC service at least once and more than four times during the last pregnancy respectively. 236 (85.4%) of the mothers were made birth preparedness by saving money, arranging transport, identifying skilled birth attendant and buying materials. One hundred and six (29.20%) mothers gave birth to their current child in health center were 209 (57.6%) of them were gave birth in hospitals and 47 (12.90%) gave birth in home. And more than half, 313 (87.2%) of those mothers were received advice on neonatal danger signs during the postnatal follow up (Table 2.

**Knowledge on neonatal danger signs:** 238 (65.6%) of mothers had good knowledge concerning neonatal danger signs and the rest 125 (34.4%) had poor knowledge. NB: **good knowledge**: those mothers listing three and above neonatal danger signs. **Poor knowledge:** those mothers list less than three of neonatal danger signs.

**Magnitude of mother´s knowledge about neonatal danger sign among mothers who live in Bule Hora town:** the result depicted in Table 3 illustrated that the proportion of mother who correctly responded to the knowledge question regarding the neonatal danger signs. More than 67.2% of the mothers knew that hyperthermia is one of the main neonatal danger sign, while more than 2.5% of them reported convulsion as one of the obvious neonatal danger sign (Table 3).

**Sources of information:** the sources of information of the women about neonatal danger signs were also investigated (Table 4). Respondents were asked to indicate if they had ever heard of neonatal danger signs, 265 (73%) of all the respondents reported that they had heard about neonatal danger signs before this investigation was brought to them. The main sources of information about neonatal danger signs were health professional (65%) and neighbors (25.9%) (Table 4).

**Bivariate and multivariate logistic regression analysis of factors associated with knowledge of mothers about neonatal danger signs:** in the multivariate analysis, adjusting possible confounding variables, after controlling for socio-demographic, economic, and maternal obstetric factors, family monthly income; place of birth, mother's educational status were the factors that significantly affect maternal knowledge about neonatal danger sign. Mothers having monthly income greater than 5000 ETB have good knowledge [A0R=0.356(95%CI=0.145, 0.878)] and [CI=0.253>A0R=0.489(95% CI=0.253,0.946)] than mothers having monthly income less than 2000 ETB. Place of birth in the last baby also significantly associated with mother´s knowledge. Mothers who give birth at health center were more knowledgeable than those delivered at the hospital. Similarly, educational statue of the mother´s also showed significant association with level of knowledge about their neonatal danger sign. More of those who is a literate (tertiary) had good level of knowledge compared to those who is an illiterate (unable to read and write) [adjusted OR = 0123(95% CI: 0.023, 0.653)] (Table 5).

## Discussion

The purpose of this study was to assess knowledge towards neonatal danger signs and associated factors among mothers who live in Bule Hora town. In this study, it was found that more than half (65.6%) of mothers were aware of at least three of ten listed neonatal danger signs. This result is very high when compared to the study in Kenya about knowledge of neonatal danger signs among mothers attending well baby clinic in Nakuru Central District, Kenya, cross-sectional descriptive study which is 64 (15.5%) [9]. As it compared to the study that was done in Ethiopia, it was more than study in Mekele city which is 50.6%, Amhara region at Gonder town which is18.2%, Wolkite Town, Gurage Zone, SNNPR which is 31.32%, Gamogofa zone which is 50.3% [8,10,11]. The result of this study was relatively higher than other studies, it may be due

to the study area was urban. This makes more knowledgeable than compared to other studies. Healthy education by healthy workers, the presence of media like TV, radio, makes them more knowledgeable. Mothers who give birth at a health institution were more knowledgeable than those who give birth at home.

This study showed that hyperthermia is the commonest known neonatal danger sign, which is reported by 67.20% of the mothers. Diarrhea is also found to be among the three most commonly reported neonatal danger signs in this study, which is reported by 63.6% of mothers. This study also found that lethargy, convulsion, yellow palms/soles and unable to pass stool or urine are the least known neonatal danger signs. Age, parity, educational status of husband, occupation of mother and father, number of ANC follow up and parity, were not significantly associated with knowledge about neonatal dangers signs. This is incongruent with studies done in Wolkte town, mekele city. The reason for this difference may be due to the case that HEWs and other health care providers deliver health information or counseling about neonatal danger signs regardless of age, parity and educational status of mother and the presence of TV, Radio in the home.

## Conclusion

When compared to a previous study conducted in Ethiopia, this study found that mothers had a greater understanding of neonatal danger signs. Despite the fact that 34.4 percent of mothers had a poor understanding of neonatal danger signs, the majority of respondents were unaware of lethargy, convulsion, yellow palms/soles, and inability to move stool or urine as neonatal danger signs.

*What is known about this topic*

- *Increased number of neonatal danger signs indicates in children;*

- *Methods of remedies to reduce children´s mortality and morbidity;*
- *Mothers ability to recognize about neonatal danger signs.*

*What this study adds*

- *A decrease in neonatal danger symptoms;*
- *Dissemination of information to mothers based on their requirements;*
- *Mothers will be educated on home treatment to danger signs.*

## Competing interests

The authors declare no competing interests.

## Authors' contributions

SS conceived and designed the study; AH, RP analyzed the data, SS and HP wrote the manuscript, SS, MM and HP drafted the report and advised the whole research paper and were involved in the interpretation of the data and contributed to manuscript preparation. All authors have read and approved the final version of the manuscript.

## Acknowledgments

## Tables

**Table 1**: sociodemographic characteristics of mothers at Bule-Hora town, Ethiopia

**Table 2**: obstetric characteristics of the mothers

**Table 3**: proportion of mothers who correctly responded to the knowledge questions regarding neonatal danger sign, Bule-Hora town, southern, Ethiopia

**Table 4**: source of information of the mothers about neonatal danger signs, Bule-Hora town, southern, Ethiopia

**Table 5**: bivariate and multivariate logistic regression analysis of knowledge on neonatal danger sign, Bule-Hora town, southern, Ethiopia

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| Table 1: sociodemographic characteristics of mothers at Bule-Hora town, Ethiopia | | | |
|---|---|---|---|
| **Variables** | **Category** | **Frequency** | **Percent (%)** |
| Age of the mothers | 15-24 | 95 | 26.2 |
| | 25-34 | 208 | 57.3 |
| | 35-45 | 56 | 15.4 |
| | >45 | 4 | 1.1 |
| Age of child | 1-7 | 2 | 0.6 |
| | 8-42 | 45 | 12.39 |
| | 43-70 | 76 | 20.93 |
| | 71-98 | 38 | 10.46 |
| | 99-252 253-365 | 104 98 | 28.65 26.99 |
| Marital status | Single | 3 | 0.8 |
| | Married | 326 | 89.8 |
| | Divorced | 26 | 7.2 |
| | Widowed | 8 | 2.2 |
| Ethnicity | Bench | 123 | 33.9 |
| | Amhara | 98 | 27.0 |
| | Keffa | 74 | 20.4 |
| | Oromo | 32 | 8.8 |
| | Tigre | 24 | 6.6 |
| | Other | 12 | 3.3 |
| Mother education | Unable to read and write | 91 | 25.1 |
| | Able to read and write | 83 | 22.9 |
| | Primary school(1-8) | 123 | 33.9 |
| | Secondary school(9-12) | 45 | 12.4 |
| | Tertiary (above 12) | 21 | 5.8 |
| Father education | Un able to read and write | 22 | 6.7 |
| | Able to read and write | 52 | 16.0 |
| | Primary school(1-8) | 105 | 32.2 |
| | Secondary school(9-12) | 97 | 29.8 |
| | Tertiary (above 12) | 50 | 15.3 |
| Mother occupation | House wife | 181 | 49.9 |
| | Merchant | 94 | 25.9 |
| | Civil servant | 34 | 9.4 |
| | Self-employer | 36 | 9.9 |
| | Daily labor | 14 | 3.9 |
| | Farmer | 4 | 1.1 |
| Father occupation | Merchant | 130 | 39.9 |
| | Civil servant | 71 | 21.8 |
| | Self-employer | 47 | 14.4 |
| | Daily labor | 32 | 9.8 |
| | Farmer | 4 | 1.1 |
| Family monthly income | <500 | 33 | 9.1 |
| | 501-1000 | 74 | 20.4 |
| | >1000 | 256 | 70.5 |

**Table 2**: obstetric characteristics of the mothers

| Variables | Category | Frequency | Percent (%) |
|---|---|---|---|
| Parity | 1 | 87 | 24 |
| | 2-4 | 247 | 68.04 |
| | 5 and above | 29 | 7.98 |
| History of ANC follow-up | Yes | 317 | 87.32 |
| | No | 46 | 12.67 |
| ANC visit | 1-4 | 78 | 24.60 |
| | 4 above | 239 | 75.39 |
| Birth preparedness | Yes | 236 | 65.0 |
| | No | 127 | 35.0 |
| Place of delivery | Home | 47 | 12.90 |
| | Hospital | 209 | 57.60 |
| | Health centre | 106 | 29.20 |
| | Others | 1 | 0.30 |
| History of PNC Visit | Yes | 313 | 86.22 |
| | No | 50 | 13.78 |
| Number of PNC Visit | 1-3 | 144 | 46.01 |
| | >3 | 169 | 53.99 |
| Note: ANC-antenatal care, PNC-post natal care | | | |

**Table 3**: proportion of mothers who correctly responded to the knowledge questions regarding neonatal danger sign, Bule-Hora town, southern, Ethiopia

| Variable | Frequency | Percent (%) |
|---|---|---|
| Hyperthermia | 244 | 67.2 |
| Diarrhea | 231 | 63.6 |
| Persistent vomiting | 183 | 50.4 |
| Poor feeding | 167 | 46. |
| Difficulty of breathing | 120 | 33.1 |
| Umbilical redness or puss | 44 | 12.1 |
| Unable to pass stool or urine | 25 | 6.9 |
| Yellow palms or soles | 13 | 3.6 |
| Lethargy | 12 | 3.3 |
| Convulsion | 9 | 2.5 |

**Table 4**: source of information of the mothers about neonatal danger signs, Bule-Hora town, southern, Ethiopia

| Variable | Frequency | Percent (%) |
|---|---|---|
| Health professional | 236 | 65.00 |
| Media | 115 | 43.29 |
| Neighbours | 94 | 25.9 |
| Friends | 46 | 12.7 |
| Reading books | 30 | 8.33 |
| Others | 4 | 1.1 |

**Table 5**: bivariate and multivariate logistic regression analysis of knowledge on neonatal danger sign, Bule-Hora town, southern, Ethiopia

| Variable | Overall knowledge | | | |
|---|---|---|---|---|
| | Good | Poor | Crude OR (95% CI) | Adjusted OR (95% CI) |
| **Family monthly income** | | | | |
| <500 | 10(30.3) | 23(69.7) | 0.13(0.59,0.289)* | 0.356(0.145,0.878)* |
| 501-1000 | 31(41.9) | 43(58.1) | 0.216(0.125,0.373)* | 0.489(0.253,0.946)* |
| >1000 | 197(77.0) | 59(23.0) | 1 | 1 |
| **Place of birth** | | | | |
| At home | 13(27.1) | 35(72.9) | 0.358(0.170,0.751)* | 0.459(0.193,1.087) |
| At HC | 171(81.8) | 38(18.2) | 4.33(2.581,7.276)* | 2.665(1.469,4.834)* |
| Hospital | 54(50.9) | 52(49.1) | 1 | 1 |
| **Age of mother** | | | | |
| 15-24 | 50(52.6) | 45(47.4) | 3.33(0.335,33.205 | 2.774(0.136,56.757) |
| 25-34 | 148(71.2) | 60(28.8) | 7.4(0.755,72.562) | 7.658(0.382,153.402) |
| 35-44 | 39(69.6) | 17(30.4) | 6.882(0.667,71.003) | 9.931(0.467,211.278) |
| >45 | 1(25.0) | 3(75.0) | 1 | 1 |
| **Family monthly income** | | | | |
| <500 | 10(30.3) | 23(69.7) | 0.13(0.59,0.289)* | 0.356(0.145,0.878)* |
| 501-1000 | 31(41.9) | 43(58.1) | 0.216(0.125,0.373)* | 0.489(0.253,0.946)* |
| >1000 | 197(77.0) | 59(23.0) | 1 | 1 |
| Note: * statistically significant at 95% CI, P < 0.05; 1 = reference, OR-Odd ratio | | | | |