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Knowledge and health seeking practice of mothers on neonatal danger signs and its associated factors at East Belesa Woreda, Northwest Ethiopia 2020

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Abstract

Introduction: *neonatal mortality rate is remaining unchanged globally including Ethiopia in 2019, 54.55% of under-five death was in the neonatal period. Neonatal danger signs are predictors of neonatal death. The aim of this study was to assess mother´s knowledge and health seeking practice about neonatal danger signs and its associated factors at East Belesa Woreda Northwest Ethiopia 2020.* ***Methods:*** *a community-based cross-sectional quantitative supplemented with qualitative study was conducted among 624 respondents. Pre-tested structured interviewer-administered data collection was applied. For qualitative semi-structured in-depth interviewee guide was applied. A multi-stage sampling technique was used. Data was entered*

into epi-data version 3.1 then exported to SPSS version 23 for analysis. Binary logistic regression was used and both bivariable and multivariable regressions were done to identify the associated factors. P-value <0.05 at 95% CI was considered as a significant variable. For the qualitative part, data was transcribed then translated to write results in the form of textual form. ***Results:*** *the magnitude of mothers knowledge and health seeking practice towards neonatal danger signs were found to be 37.2%, 95% CI; (33.2 - 41.0) and 73.8%, 95% CI (68.8, 78.5) respectively. Being secondary education AOR=2.79 95% CI (1.25, 6.26), Having ANC at least once [AOR=1.72 95% CI: (1.05, 2.83)] and neonates started vaccine AOR=1.84: 95% CI: (1.22, 2.76); were predictors of knowledge. Whereas institutional delivery for the current birth [AOR=1.84; 95% CI (1.03, 3.26)) and having good essential newborn care practices AOR=1.85 95% CI (1.09, 3.31) were predictors of mothers health seeking practice on neonatal danger signs.* ***Conclusion:*** *mother´s knowledge and health seeking practices towards neonatal danger signs were found to be low. It is better to promote all mothers having ANC, delivered at health institution, starting vaccine for all neonates and address essential newborn care for all mother's special attention on mothers who were illiterate and home delivered.*

Introduction

Neonatal danger signs are nonspecific signs were a neonate manifest when they are sick on their neonatal period up to 28 days following delivery [1]. As integrated management of newborn care (IMNCI) program developed by the World health organization (WHO) identified the newborn danger signs of severe illness as, high grade fever >37.5°c, cold to touch, respiratory rate over 60bpm, severe chest in drawings, convulsions, umbilical discharge, unable to breastfeed, vomiting everything, yellow soles and eye draining. Assessment of these signs will result in high overall sensitivity and specificity for predicting the need for hospitalization or take to community health workers [2]. Child survival strategies in Ethiopia launch thirty-four packages to end up all preventable causes of neonatal death by addressing all health packages through the three health tier systems to save two-third of neonatal death [3]. So mother´s knowledge and health seeking practices are very sensitive to integrate their newborn care in to the three health tier systems. The first 28 days of life (the neonatal period) is the most vulnerable time for a child´s survival. Globally, 2.5 million neonates die in 2018; among these, 7,000 neonatal deaths every day - most of which close to 75% die in the first day after birth of these most die due to mothers lack of knowledge and recommended practices on their sick neonate [4].

Delivering successful neonatal health care interventions, health care facilities, and providers not only be available and accessible to reduce neonatal mortalities. However, mothers´ knowledge and health seeking practice towards neonatal danger signs (NDS) are a critical issue to end-up preventable causes of neonatal death [5]. Globally, 5.4 million under five years of age children died of which 2.5 million were neonates. The age distribution of the mortality of children shows that the highest risk of death is during the neonatal period [6]. A child born in sub-Saharan Africa or Southern Asia is ten- times more likely to die in the first month than a child born in a high-income country and the contribution of neonatal death was highly increased for child mortalities [7]. In Ethiopia child death achieves its millennium development goal in 2012 ahead of three years 2015. Even though neonatal death is reduced but not satisfactory as under-five mortality and it accounts almost 44% of child death [8]. According to the 2019 Mini Ethiopia Demographic Health Survey (MEDHS) report the neonatal mortality rate was 30 deaths per 1,000 live births almost it accounts 54.55% of under-five death and 69.80% infant death [9]. In Ethiopia, neonatal mortality was high in rural and less educated population with low monthly income especially in three agrarian regions (Amhara, Oromo, and SNNPR) share the higher

amount of neonatal death among that Amhara accounts the highest 47 neonates die per 1000 live birth from 2016 Ethiopian Demographic Health Survey (EDHS) report [10]. The aim of this study was to assess mother´s knowledge and health seeking practice about neonatal danger signs and its associated factors at East Belesa Woreda Northwest Ethiopia 2020.

Methods

Study design: community based cross-sectional quantitative supplemented with qualitative study design was carried out among mothers who gave birth within 1 years at Esat Belesa Woreda northwest Ethiopia, the study period from February to March 2020.

Study setting: Belesa Woreda is one of the Woreda from the central Gondar zone which is 173 km far from Bahir Dar and 743 km North West of Addis the capital of Ethiopia. According to the population report of the woreda offices there are estimated populations numbers of 144,815 of whom 49.80 are female. The Woreda has 35 kebeles, six health centers and one hospital to serve the whole population.

Participants: the source populations were all mothers who have children less than one year´s age at East Belesa Woreda and the study populations were all mothers who have children less than one year´s age from the randomly selected Kebles at East Belesa Woreda for knowledge and for health seeking practices those mothers whose neonate develops any neonatal danger signs were included. All voluntary mothers were included, and those severely ill and who cannot speak were excluded from the study participant.

Variables of the study

Dependent variables: knowledge about neonatal danger signs (good/poor) health seeking practice on neonatal danger signs (good/poor) independent variables: socio-demographic variables, obstetric related variables; family and neonatal related variables were included.

Measurements

For quantitative part: East Belesa Woreda has 35 kebeles (lower administrative unit in Ethiopia) the kebeles were stratified in to rural and urban making homogeneous the population. After stratifying the kebeles into rural and urban 10 kebeles were selected (proportionally from each stratum) one from three urban kebeles and nine from 32 rural kebeles were selected through the lottery method. After reviewing their family matrix book found from each kebele´s health post proportional allocation to each kebeles were done. The next systematic random sampling technique was applied to recruit individuals. Sampling interval (k) was determined by dividing the total number of mothers in the 10 kebeles 1433 divided by the calculated sample size 636. Which were 2.25 so the sampling interval was approximately two for each Kebeles. Therefore to recruit the individuals for the interviewee lottery method was done for the first two mothers. The 1^{st} and 2^{nd} mothers participated in the lottery after one is pike up from these, the data collector went to go home to home interviewer-administered every one another mother in the kebeles like 2^{nd},4^{th},6^{th},8^{th} who have children less than one year age. Only mothers whose neonate develops any illness during the neonatal period were included for practice measuring questions.

For qualitative part: individuals was recruited for in-depth interviewee purposively from mothers who have children less than one-year, religious leaders, and health extension workers were included. By considering who can teach more regarding the research questions.

Data collection instrument and procedure

For quantitative parts: pretested structured interviewer-administered data collection tool was used which is adapted and modified from previous similar literature. The questioner was prepared by English version and translated to Amharic version

to the local language of the mothers and finally translated to the English version to check its consistency. The questioner was included socio-demographic, obstetric related, knowledge measuring, practices measuring questions about newborn danger signs and essential newborn care practice measuring questions were asked. The data collector would go home to home visit in to every another mother. The questioners were applied for each individual at their home.

For qualitative: a semi-structured interviewee guide with a probe containing questions to explore knowledge and health seeking practice about neonatal danger signs were used based on the local context of respondents.

Data quality control

For quantitative part: one-day training focusing on understanding the research question, sampling technique, data handling, ethical conduct, and quality of data collection was given for data collectors and supervisors intensively to understand the tool step by step for each question. The tool was validated from 32 (5%) individuals before data collection and the collected data were reviewed daily by the supervisors and the principal investigator.

For the qualitative part: select private places, guides with probe, tape record for all individuals were assured before data collection starts to control missing data and to take the non-verbatim felling face to face conversation was go on. The data was written in the form of phrase, sentence, and record through tape recorder.

Sample size determination

The sample size for knowledge: sample size was determined by using single population proportion formula by considering the following assumptions: confidence interval 95%, non-response rate 10% and the margin of error (d=0.05) a similar cross-sectional study conducted on mothers knowledge at Chencha district was p= 50.3% [11] based on this assumption 636 sample was collected and for health seeking practices only mothers whose neonate develops any illness during the neonatal period were included.

For qualitative part: the sample size was determined by its nature of data saturation and redundancies starting by the in-depth interviewee for those who are not included in the quantitative parts were not conducted. Finally, data collection was ended up with the best saturation of this research question.

Operational definition

Good knowledgeable: a mother is considerable as "good knowledgeable on neonatal danger signs" if she can spontaneously mention at least three from ten WHO recognized neonatal danger signs and poor if they failed to mention three neonatal danger signs [12-14].

Good health seeking practice: a mother is considered as "having good health seeking practice about neonatal danger signs "if the mother seeks medical care when their neonate experience neonatal danger signs that WHO explains in-between her postnatal visits regardless of considering its severity and cost [15,16].

Poor health seeking practices about neonatal danger signs: refers to those mothers who seek traditional, spiritual and home remedies on their neonate during experiences of neonatal danger signs.

Good ENBC practices: mothers were asked about essential newborn care practices like early initiation of breastfeeding within one hour, colostrum feeding, baby bathing after 24hrs and exclusive breastfeeding for six months who were scored four out of four for these questions were considered as having good practices on ENBC (Essential Newborn Care) whereas who missed at least one was considered as having poor practice on ENBC [17].

Data processing, analysis and interpretation: the collected data was entered, edited and cleaned using EPI data version 3.1, then exported to SPSS version 23 for analysis. Descriptive and analytical analyses were conducted. Binary logistic regression was executed to see the association between independent and dependent variables. All explanatory variables with p<0.25 in bivariable were transferred to multivariable logistic regression analysis and the significant association was identified based on P-value p<0.05 with 95% CI in multivariable logistic regression. The final model fitness was checked using the Hosmer-Lemeshow Goodness of Fit test if P> 0.05 the model is fitted.

For qualitative part: the notes and tape-recorded with audio was transcribed, translated then read, and read again to cut out the redundant ideas. The data was analyzed daily through text. Finally, results were reported through verbatim to narrate what they explained.

Ethical clearance: approval to carry out the study was sought and obtained from the Bahir Dar University Ethics Review Board. Written consent was taken from each study participants after a detailed explanation of the purpose of the study.

Results

Socio-demographic characteristics of the mothers: out of 636 samples a total of 624 respondents were interviewed making a response rate of 98.11%. The mean age of the respondents was 27.58 years with the standard deviation of ±5.259. About one-third of the respondents 33.0% were in the age group of (25-29). Five hundred and ninety-two (94.87%) of respondents were Orthodox Christian in their religion and the rest were Muslim. Four hundred 64.10% of respondents were not able to read and write in their educational status. Five hundred fifty-five 88.90% of respondents were housewives in their occupation. Regarding the respondents´ residences 551 (88.10%) of mothers were in the rural setting. Five hundred and ninety-three (95%) were married. Around one-fourth (23.56%) of the mothers have the availability of media in their home. Nearly half of the respondent's husband, 56.00% was cannot read and write in their educational status. Majority 78.20% of the respondent´s husband's occupation was a farmer and their living standard was based on agricultural setting (Table 1).

Obstetric characteristics of the mothers: among the respondents 447 (71.63%) were attended ANC for the last pregnancy of whom 126 (28.19%) attended greater than four times. Among mothers who have ANC follow up 252 (56.38%) gain information about NDS during their ANC follow up. Above half of the respondents (56.3%) mothers give birth at health institution. Three hundred sixty-five (58.5%) of the respondents had at least once Postnatal Care (PNC) follow up. Among respondents who had PNC, only 85 (23.29%) of them attended their PNC three times and two third of the mothers 66.2% of respondents infant start vaccinating during the interviewed time (Table 2).

Mothers knowledge about neonatal danger signs at East Belesa Woreda Northwest Ethiopia 2020: among 624 interviewed respondents 462 (74%) heard about NDS of whom one-third (37.2%); at 95% CI: (33.2, 41.0) had good knowledge about newborn danger signs. The most familiar neonatal danger sign mentioned by the mothers were high-grade fever 331 (53.05%), followed by unable to breastfeed 227 (46.4%) the least neonatal danger sign recognized by them were jaundice 56 (6.70%) and convulsion 42 (6.10%). This result is supported by the qualitative finding majority of In-depth Interview (IDI) mothers were explained fever and unable to breastfeed in other ways. Most mothers cannot explain convulsion and jaundices as a key neonatal danger signs (Figure 1).

Mothers health seeking practice on newborn danger signs at Este Belesa Woreda Northwest Ethiopia 2020: out of 624 interviewed mothers 317 (50.80%) of the mother´s neonate have experienced one or more neonatal danger signs. The respondent´s actions during the experiences of any neonatal danger sign on their neonate were

asked. About three fourth (73.80%) with 95% CI (68.8, 78.5) sought medical care during the experiences of any neonatal danger signs, whereas the remaining 83 (26.20%) were found non-medical care. Out of 317 mothers whose neonate was experienced one or more newborn illness the most neonatal danger signs which were experienced as they explained by the respondents were fever 143 (45.1%) and unable to breastfeed 114 (36%) (Table 3).

Mothers experiences during the occurrences of newborn illness at East Belesa Woreda Northwest Ethiopia 2020: two hundred thirty-four 73.80% of the respondents seek medical care. More than ten percent (13.00%) give a different type of home treatments and activities like giving honey," massage with enzirt for back pain" a regresa, "washing for fever" "sikel on their head for uvulities", ash/butter for umbilical discharge. About one fifth 9.20% of the mothers find traditional healer awaki bet for weakness/lethargy (aynet), traditional cutting for tonsil, and 13 (4.10%) finds spiritual healer like holy water (tsebel) and pray to God when their neonate experiences any neonatal danger signs (Figure 2). Out of respondents whose neonate develops one or more newborn danger signs 83 (26.20%) mothers prefer non-medical treatment for their sick neonate. All mothers who were not sought medical care for their sick neonate were asked about their reasons. The main reasons which can prevent the mothers from seeking medical care after they recognized any neonatal illness on their neonate was lack of knowledge about newborn danger signs treatment mechanisms 21 (25.30%) followed by to give home treatment 18 (21.70%) (Figure 3). Out of 317 mothers whose neonate develops minor to severe illness 234 (73.80%) of mothers preferred to seek medical care during the experiences of newborn illness of whom only 99 (42.31%) of mothers took their neonate to the health institution timely. The remaining 135 (57.70%) of the respondents taken action lately when their neonate experiences newborn danger signs and they try to give any home remedies or traditional herbal before they took to the health institution. The main reasons to have dallied to seek medical care for their sick neonate were asked. The responses were that mothers considered as neonate would be better by itself from its illness. Others explained as giving home and traditional treatment first before they taken to medical care will probably relive from their illness.

Determinant factors of mother´s knowledge on newborn danger signs at East Belesa Woreda Northwest Ethiopia 2020: from the multivariable logistic regression variables which have significant association with the out came variable would be interpreted as follows. The mother's educational status who completed secondary school were 2.79 times more likely to had good knowledge as compared to mothers who were illiterate AOR=2.79, 95% CI (1.25,6.26). Mothers who had ANC follow up at least once were 1.72 times more likely to have good knowledge about NDS as compared to mothers who had no ANC follow up on their pregnancy period AOR=1.72 with 95% CI: (1.05, 2.83). Similarly, mothers who had ANC follow up 4th times and above had 3.27 times more likely to have good knowledge about NDS as compared to mothers who had no ANC follow up AOR=3.26: 95% CI (1.80, 5.87). This finding revealed that respondents who were delivered at health institution were 1.90 times more likely to had good knowledge of newborn danger signs as compared to respondents who were delivered at their home AOR=1.90: 95% CI;(1.28, 2.80). Respondents whose neonate started vaccine were 1.84 times more likely to had good knowledge of NDS as compared with respondents whose neonate did not started vaccine yet AOR=1.84 95% CI: (1.22, 2.76). Mothers those whose neonate develops any neonatal danger sign previously were 1.76 times more likely to mention three newborn danger signs as compared to mothers those whose neonate did no experienced newborn illness previously AOR=1.76: 95% CI: (1.21, 2.54). This study revealed that mothers those who had good ENBC practices were 1.65 times more likely to have good knowledge about NDS as compared to mothers those who had

poor ENBC practices AOR=1.64 95% CI: (1.14, 2.37) (Table 4).

Determinant factors of mothers with health seeking practices on newborn danger signs: mother´s age, residence, having antenatal care, place of delivery; distance to the health institution, mother´s knowledge about NDS and mother´s practices about ENBC were candidate variables for multiple regression from the bivariable regression. However only institutional delivery and having good ENBC practices show statistically significant association from the multivariable logistic regression model for neonatal danger signs health seeking practices. Respondents who delivered at health institution had about 1.84 times brought their sick neonate to the health institution as compared to respondents who were delivered at their home [AOR= 1.84 with 95% CI (1.03-3.26)]. Respondents who have good ENBC Practices were 1.85 times more likely to had good health seeking practices on NDS with their counterparts AOR=1.85 with 95% CI (1.09, 3.14) (Table 4).

Qualitative study result: eleven mothers, five Health Extension Workers (HEWs), three priests and two shahs a total of 21 individuals had participated in the in-depth interview. The respondent´s age range was in between 17-58 years. Most of the mothers were housewives and married. The mothers, priests and shahs of their ideas, opinion and experiences they do were written as follows.

Knowledge about neonatal danger signs: fever, unable to breastfeed, vomiting, cough, crying (irritability) and abdominal cramp, loose of yellow stool, and unable to urinate were some of the neonatal danger signs which were mentioned by mothers who were eligible for an in-depth interview. “A mother explained that neonates who experience fever, vomiting, and tonsil are considered as neonatal danger signs” *27 years old IDI participant*. “High grade fever, unable to urinate and crying (irritability) is neonatal danger signs” *36 years old IDI participant mother*.

The respondents practice on neonatal danger signs: mothers explained their treatment modalities were health institutions, traditional healers, home treatment and spiritual treatment depend on the causes they identify. “My neonate experiences neonatal illness then I took the neonate to traditional healer then as his diagnosis, the illness was due to tonsillitis and he cut out the tonsil” 18 years old mother IDI participant. “My neonate experiences fever and unable to breast feed then I was take to the health center” *22 years old mother IDI participant*. “If may neonate develops any illness I will take to the health institution or HEWs but traditional treatments also preferred for tonsil and uvulia due to reasons do not know medical treatments preferred for tonsil and uvulities”*41 years old mother IDI participant*. The priests divided NDS as religious and non-religious causes. As their explanation, non-religious causes include fever tonsil (Kimo) and descended vulva (Anker). The religious causes include: weakness, genetics, and evil which need religious treatments like giving holy water (tsebel). When their children become ill they took into health institutions, traditional healers or spiritual. “Our bible does not prevent to take sick neonates to health institution. My neonate developed uvulities then I took to the health institution and they [health workers] give medication. However it [the neonate] did not relive from its illness so, I was taken to a traditional healer. The traditional healer cut the uvulities and it [the neonate] relived immediately so, my recommendation a traditional healers should be integrated into the modern medication system because they became strengthen” *57 years old priest IDI participant*. “Quran does not protect mothers to take their neonate to health institution. But traditional belief on neonatal illness. Mothers that whose newborn is sick in the first 10 days treatment-seeking outside of the home was uncommon. Due to reasons by fear of attack by malevolent spirit and exposure to the sun, wind, or evil spirit” *45 years old sha IDI participant*. If mothers go out of home before 40 or 80 days we will be attacked by bad evil and wind. The main causes of not to seek medical care were

medical treatments do not give immediate responses, going out of home in the first 10 days is risk for mothers. Babies would be better by it; distances and having false belief prevent the mothers to take neonates to the health institution early.

Discussion

Mother´s knowledge on neonatal danger signs: the aim of this study was to assess the mother´s knowledge of NDS and their health seeking practices during the experiences of any neonatal danger signs on their neonate because neonatal mortality rate cannot achieve as child mortality rate in the world including Ethiopia. So mother´s knowledge and their health seeking practice are an entry point to end up all preventable causes of neonatal death. The magnitude of good knowledge towards neonatal danger signs in this finding is 37.2%; 95%; CI (33.2, 41.0). This study finding is congruent with the study done at Arbaminch (40.9%) [18] and Saudi Arabia (37%) [19]. This study finding is higher than a study done in Gondar 18.2% [20] Mekedella 28.2% [21] and Kenya 15.5% [22]. The possible justification for this may be due to time differences, 4-6 years back the health care delivery system also updated through time to increase their health-seeking behaviors by WHO child survival strategies proposed at 2016. Also it may be due to different sample sizes of the study and differences in socio-demographic characteristics. This study finding is lower than which was reported from Arerti hospital 47.8% [23] since this finding is community based. Northwest Ethiopia Fogera 64.1% [12], Southwest Ethiopia Chincha District 50.3% [11] Baghdad and Iraq 81% [24]. The possible justification may be sample size and their health care delivery system may be qualified when we compared with our study setting. It may also the socio-economic setting and the mechanism of question administration as open-ended or closed-ended to list the key newborn danger signs.

In this study finding high-grade fever the most neonatal danger sign explained by respondents. This is consistent with a study done at Wolida [25], Kenya [22] and Baghdad Iraq [24]. Respondents who had secondary educational status were 2.79 times more likely to had good knowledge on NDS as compared to illiterate. This finding is congruent with a study done at Wolida [25], Gondar [20] and Harar [26]. The possible justification might be those mothers would gain knowledge through their academy, different social media, can made decisions on the need of their newborn and due to their innovation. Respondents who had ANC follow up at least once 1.73 times more likely to had good knowledge as compared to respondents who had no ANC follow up. This finding is supported by a study done at northern Ethiopia [20], Wolida [25] and Iraq [24] means that there is positive association between ANC follow up and mother´s knowledge on NDS. The possible justification for this mothers gain NDS information during ANC services from their attendants. Mothers who delivered at health institution were 1.90 times more likely to had good knowledge about NDS as compared to mothers who delivered at their home. The plausible justification for mothers who delivered at the health institution may be informed about NDS and their management before they exit from the health institution and when they turn back by health professionals. This finding also supported by a study done at Wolkite [13] Mekedella [21] and rural Bangladesh [27].

Mother's health seeking practice on neonatal danger signs: following knowledge, the mother´s health seeking practice for their sick neonate is very essential to save the neonate from their illness. The magnitude of having good health seeking practice found to be (73.8%) at 95% CI (68.8, 78.5). This study finding was congruent with a study done at Jeldu District, Southwest Ethiopia 74.6% [28]. This study finding is higher than a study done at South West Ethiopia 58.45% [29] and Nigeria 47.7% [14]. The possible justification for this result might be due to time differences. The WHO and FMOE are updating mothers health-seeking practices by

adding thirty-four packages to end up all preventable causes of neonatal death starting 2016 by strengthening the community through health development army and HEWs trained for community based newborn care, health professionals and their delivery system like increasing frequency of ANC follow-up up to eight times, schedule of PNC follow up times and mothers conference to increase their health seeking practice. It may also sample size and socio-demographic characteristics of the mothers. This study finding also lower than a study done in Dessie referral hospital [15], community-based study in Tiro Afeta District and Southwest Ethiopia 92.8% take to health center [30]. Peri-Urban Wardha all newborns with danger signs were taken to the medical doctor and only two mothers consulted faith Healer for treatment [31] and India 90.56% [32]. The possible justification for these differences maybe the study respondents in this study were done in rural 88.1% living mothers whereas the study done in Dessie referral hospital institutional based with small sample size 68% of the respondents were living in the urban setting whereas in this study only 11.9% mothers were in the urban setting.

About half 50.80% of the mothers said that their children had at least one or more newborn danger signs experiences which is lower than a study done at Dessie referral hospital 69.71% [15], Tanta District, Northeast Ethiopia 76.7% (33)and Nigeria 69.95% [14]. The possible justification might be mothers in the rural cannot identify neonatal danger signs as whom lives in the urban setting with higher education sample size, mothers level of exposure for information and socio-demographic characteristics can affect its magnitude. Mothers who delivered the current child at a health institution were nearly 2 times more likely to seek medical care for their sick neonate. The possible justification might be mothers would acquire important information on how to treat if their neonate experiences any neonatal danger signs following delivery before they exit the health institution from health professionals. From the qualitative finding also “mothers who delivered at home should not out of home until their 10 days following delivery” *45 years old sha IDI participant*. This finding is supported by a study done at Tanta district North-Eastern Ethiopia [33], Tiro Afeta District [30] and Wolkite [13]. From these finding mothers who had good practices on ENBC were 1.85 times more likely to bring their sick neonate to the health institution as compared to their counterparts. The possible justification mothers will be informed about NDS during delivery by their delivery attendant. This study finding is consistent with a study done at Tanta District (33). Mothers who had good practice on optimal thermal care were 2.52 times more likely to seek their sick neonate to the health institution. The possible justification might be mothers who had good practices on essential newborn care have the ability to easily identify the illness and bring their neonate to health institution. Essential newborn care practices, neonatal danger signs and recommended NDS practice were the three inseparable things that all mothers need to be familiar.

Conclusion

The magnitude of good knowledge and good health seeking practice were low in the area as compared to the WHO standards. Mother´s secondary education, Mothers having antenatal care follow up, delivered at the health institution, mother´s neonate started vaccine, mothers´ neonate develops newborn illness previously, and having good ENBC practices were statistically associated with mother's knowledge of neonatal danger signs. In other ways, mothers who delivered at health institution, and having good practices on ENBC were predictors on mothers´ good treatment seeking practice during the experiences of neonatal danger signs. There are so many malpractices like traditional healers, spiritual and home treatment modalities on the experiences of neonatal danger signs based on their cultural, beliefs and norms in contrary to the WHO recommendation. Neonatal day should prepare nationally and tailored health message should forward for mothers those who

have children less than one year with special concern on rural, all mothers should have ANC, ENBC training for all mothers. And those who were unable to read and write should gain special concern. All neonates should have started vaccine early.

What is known about this topic

- *What is the sign and symptoms of neonatal danger sign;*
- *Mothers Knowledge about Neonatal danger sign in Hospital setting.*

What this study adds

- *Mothers knowledge about neonatal danger sign in community setting;*
- *Mothers practice about Neonatal danger sign.*

Competing interests

The authors declare no competing interests.

Authors' contributions

All authors participated from the conception to the final write-up of the study. All authors read and approved the final manuscript. All the authors have read and agreed to the final manuscript.

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Tables and figures

Table 1: socio-demographic characteristics of mothers who have children less than one year's age at East Belesa Woreda Northwest Ethiopia, 2020

Table 2: obstetrics characteristics of the mothers who have children less than one-year age at East Belesa Woreda Northwest Ethiopia, 2020

Table 3: experienced newborn danger signs in their neonate of mothers who have children less than one year´s age at East Belesa Woreda Northwest Ethiopia 2020

Table 4: factors associated with mother´s knowledge on neonatal danger signs at East Belesa Woreda Northwest Ethiopia 2020 (n=624)

Figure 1: mother´s recognition of newborn danger signs at East Belesa Woreda, Northwest Ethiopia 2020

Figure 2: actions taken for their sick neonates of mothers at East Belesa Woreda Northwest Ethiopia 2020 (n=317)

Figure 3: reasons for mothers to not seek medical care at East Belesa Woreda Northwest Ethiopia 2020

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Table 1: socio-demographic characteristics of mothers who have children less than one year's age at East Belesa Woreda Northwest Ethiopia, 2020				
Variables	**Categories**	**Frequency**	**Percentage (%)**	**N**
Respondents age	≤24	172	27.6	624
	25-29	206	33.0	
	30-34	163	26.1	
	≥35	83	13.3	
Residence	Rural	550	88.1	624
	Urban	74	11.9	
Mothers educational status	Cannot read and write	400	64.1	624
	Can read and write	125	20.0	
	Primary school	64	10.3	
	≥Secondary school	35	5.6	
Mothers occupation	House wife	555	88.9	624
	Merchant	44	7.1	
	Govt employed	20	3.2	
	Others	5	0.8	
Marital status	Married	593	95.0	624
	Unmarried	31	5.0	
Husband education	Cannot read and write	332	56.0	593
	Can read and write	145	24.5	
	Primary school	60	10.1	
	Secondary and above	56	9.4	
Family size	1-4	271	43.4	624
	≥5	353	56.6	

Table 2: obstetrics characteristics of the mothers who have children less than one-year age at East Belesa Woreda Northwest Ethiopia, 2020

Variables	Categories	Frequency(no)	Percentage (%)	N
ANC	Yes	447	71.63	624
	No	177	28.37	
Frequency of ANC	No	177	28.37	624
	1-3	321	51.44	
	≥4^{+}	126	20.20	
Counseled during ANC	Yes	252	56.38	447
	No	195	43.62	
Place of delivery	Health institution	351	56.3	624
	Home	273	43.7	
Delivery attendant	Health professional	385	61.70	624
	TBAs and family	239	38.3	
PNC	Yes	365	58.5	624
	No	259	41.5	
Frequencies of PNC	<3	280	76.71	365
	≥3+	85	23.29	
Infants started vaccine	Yes	413	66.2	624
	No	211	33.8	
Times required to reach health institution	< 1hrs	252	40.4	624
	1 -2 hrs.	200	32.1	
	≥2 hrs.'	175	27.6	
Parity	1-4	491	78.7%	624
	≥5	133	21.3	

Table 3: experienced newborn danger signs in their neonate of mothers who have children less than one year's age at East Belesa Woreda Northwest Ethiopia 2020			
Variable	**Categories**	**N**	**%**
Neonate experienced neonatal danger signs	Yes No	317 307	50.80 49.20
Type of experienced neonatal danger signs (n=317)	Hotness (high grade fever)	143	45.1
	Hypothermia(cold to touch)	47	14.8
	umbilical discharge	18	5.7
	unable to breast feed	114	36
	(chest in-drawing)	35	11
	Weakness	22	6.9
	Convulsion	8	2.5
	vomiting every thing	75	23.7
	eye discharge\	31	9.8
	Jaundice	4	1.3
	Diarrhea	32	10.1
	irritability/abdominal cramp	57	18.0

Table 4: factors associated with mother's knowledge on neonatal danger signs at East Belesa Woreda Northwest Ethiopia 2020 (n=624)

Variables	Response	Knowledge		COR(95%CI)	AOR(95%CI)
		Good (%)	Poor (%)		
Mothers educational status	Illiterate	128	272	1	1
	Literate	52	73	1.51(1.00, 2.29)	1.23(0.77,1.95)
	Primary	29	35	1.76(1.03, 3.01)	1.25(0.70, 2.22)
	Secondary	23	12	4.07(1.96, 8.44)	2.79(1.25,6.26)*
Availability of media	Yes	71	76	1.83(1.26,2.67)	1.11(0.72,1.72)
	No	161	316	1	1
ANC	No ANC	34	143	1	1
	1-3 ANC	124	197	2.65(1.71,4.10)	1.72(1.05, 2.83)*
	≥4th	74	52	5.99(3.58,10.02)	3.26(1.80,5.87)***
Place of delivery	Health institution	168	183	2.99 (2.11,4.25)	1.90(1.28, 2.80)**
	Home	64	209	1	1
PNC	Yes	164	201	2.29(1.62,3.24)	1.11(0.73, 1.69)
	No	68	191	1	1
Neonate started vaccine	Yes	182	231	2.54 (1.75,3.68)	1.84(1.22, 2.76)**
	No	50	161	1	1
History of NDS	Yes	149	168	2.39(1.71,3.35)	1.76(1.21,2.54)**
	No	83	224	1	1
ENBC practices	Good	142	212	1.34(0.96,1.86)	1.64 (1.14,2.37)**

Key: 1= reference group, *= p-value < 0.05, **= p-value <0.01. ***=p-value <0.001

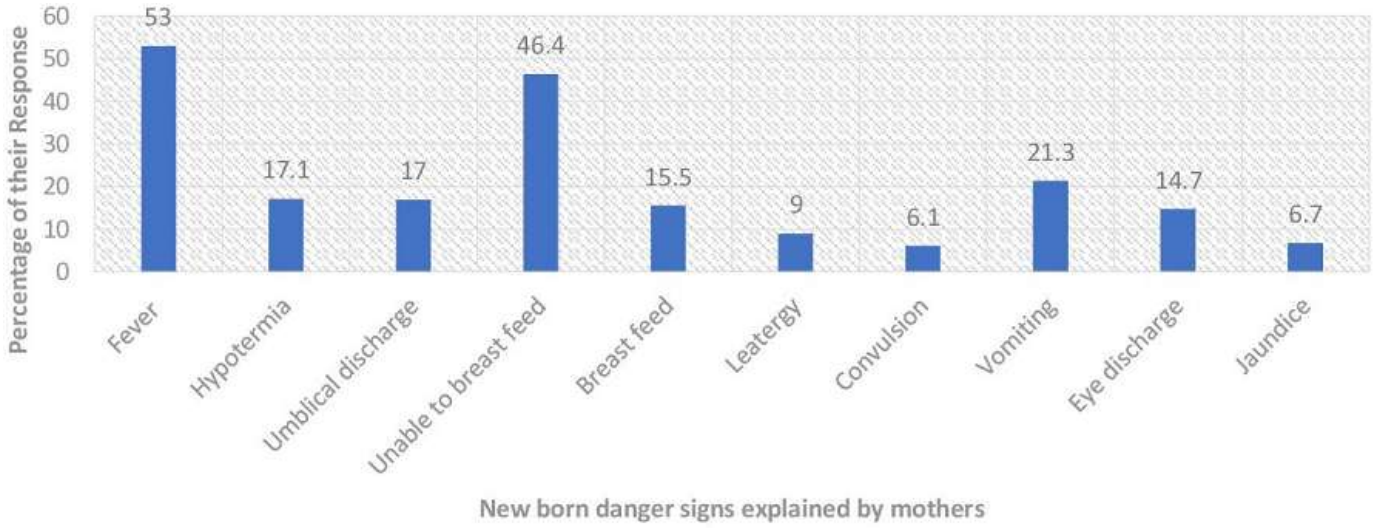

Figure 1: mother's recognition of newborn danger signs at East Belesa Woreda, Northwest Ethiopia 2020

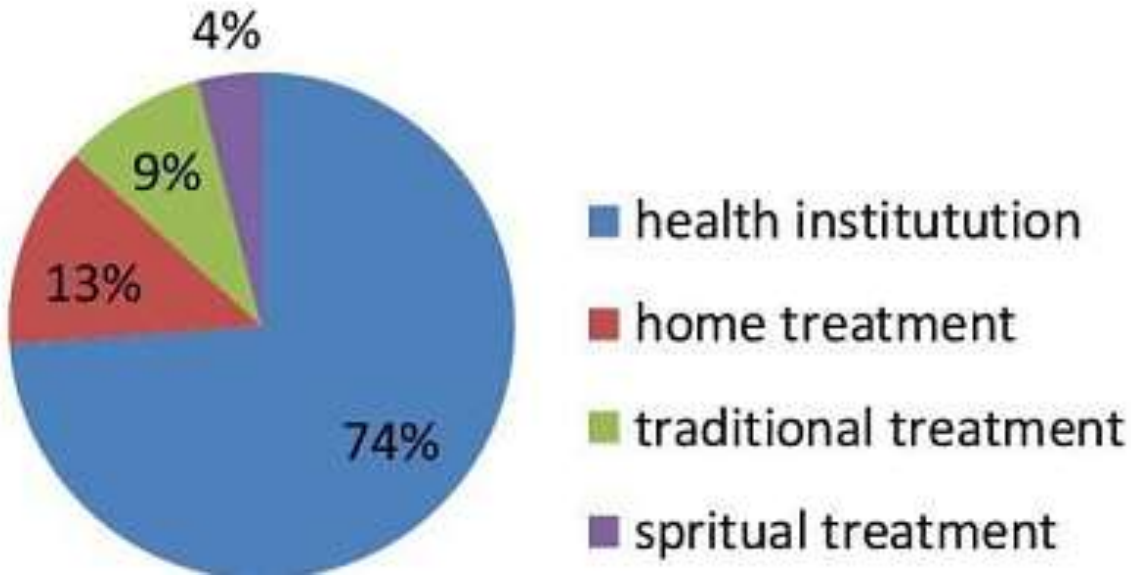

Figure 2: actions taken for their sick neonates of mothers at East Belesa Woreda Northwest Ethiopia 2020 (n=317)

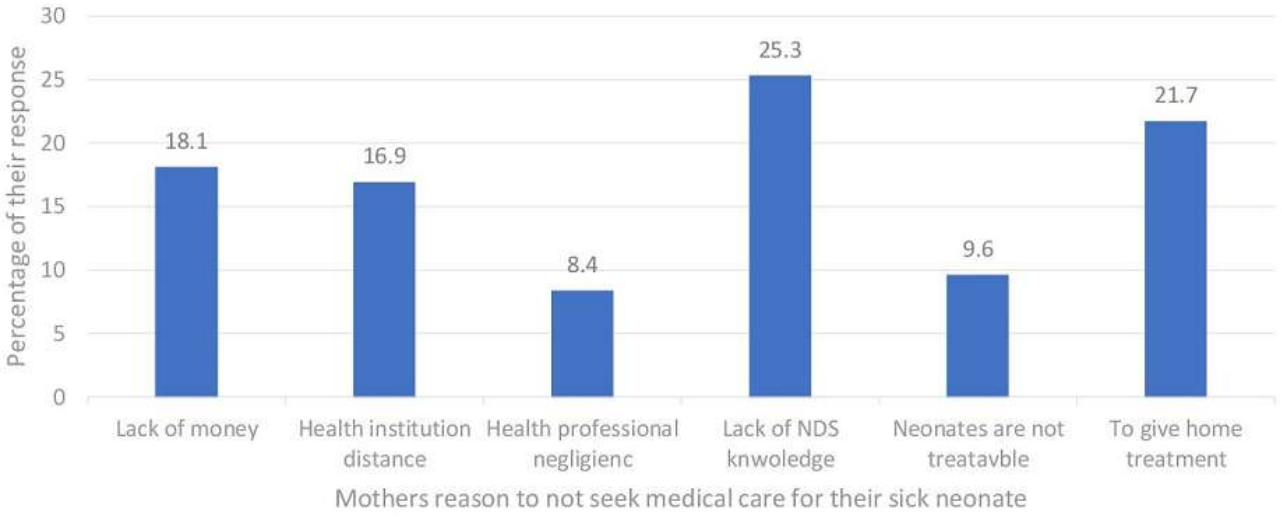

Figure 3: reasons for mothers to not seek medical care at East Belesa Woreda Northwest Ethiopia 2020