Effect of Place of Birth on Knowledge of Neonatal Danger Signs and Associated Factors among Mother's in Meicha District, Northwest Ethiopia: A Community-based Comparative Cross-Sectional Study

Teferi Gebru Gebremeskel (✉ teferigebru12@gmail.com)

Aksum university <https://orcid.org/0000-0002-8276-5685>

Adino Tesfahun Tsegaye

university of gonder

Alehegn Bishaw Geremew

university of gondar

Teklit Grum

Aksumuniversity

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Abstract

Background: Danger signs in the neonatal period are non-specific and could be a manifestation of almost any newborn disease. Early recognition of these signs by mothers is a pre-request for increasing neonatal care-seeking behavior. There four this study aimed to assess knowledge of neonatal danger signs and associated factors among mothers who gave birth at home and health institutions in Meicha District, Northwest Ethiopia.

Methods: A community based comparative cross-sectional study was conducted among Home and Health institutions delivered mothers two months before the survey. A simple random sampling method was used to select the participants. Data was collected by face to face interviews of mothers. Binary logistic regression analysis was used to identify associated factors. The odds ratio with 95% CI was computed to assess the strength of the associations.

Result: A total of 650 (325 health institution delivered and 325 home delivered) mothers were interviewed. Among this, 50.7% (AOR=2.19, 95%, CI (1.594-3.003)) of the mother were knowledge of neonatal danger sign in the district. Mother knowledge of neonatal danger sign was higher among mothers who give birth health institution (60.1%) than home (41.1%). Age of the mother (AOR:3.99, 95% CI:(1.45-11.03)), age of new born (AOR:0.53, 95% CI:(0.36-0.78)), parity (AOR:1.27, 95% CI:(1.37-5.31)), postnatal care attendance (AOR=2.42,95% CI: (1.47, 3.96)), distance of health center (AOR:0.46,95% CI:(0.27,0.78)) were significantly associated with overall mother's knowledge of neonatal danger sign. Whereas, residence (AOR: 3.09, 95% CI:(1.44, 6.64)) and occupational status of husband (AOR:0.23, 95% CI:(0.201,0.67)) were significantly associated with health institution delivered mother. Age of new born (AOR: 0.50, 95% CI:(0.28,0.896)), parity(AOR: 0.29, 95% CI:(0.113,0.74)), antenatal care (AOR: 12.04, 95% CI: (5.9,24.65)) and postnatal care attendance (AOR:0.27,95% CI:(0.138,0.51)) was significantly associated with home delivered mother.

Conclusion: The overall mother's knowledge of neonatal danger signs was low. However, health institutions delivered mother more knowledge about danger signs than home-delivered mothers. Therefore, it is better if the district Health Office should investigate the implementation of educational programs in the community and strengthen the health extension program.

Background

Neonatal-mortality is one of the world's most neglected and still a significant public health problem. It is estimated that globally, four million deaths during the first 4 weeks of life occur annually, and 75% of neonatal deaths happen in the first week of life [1, 2]. Out of the whole neonatal deaths, 99% occur in low and middle-income countries, mostly in sub-Saharan Africa[1, 3, 4,5]. A majority of these newborn deaths occur at home, indicating that few families recognize signs of newborn illness, and/or a majority of the neonates are not taken to health facilities when they are sick [4]. Demographic and health survey data from 40 countries collected between 1995 and 2003 reported that more than 50 percent of neonatal deaths occur after home birth[6–8].

Different tools to facilitate the identification of these health problems and reduce neonatal mortality have been introduced into health programs in several countries [9]. Integrated Management of Newborn and Childhood Illness (IMNCI) developed by the WHO focuses on the assessment of general danger signs in the examination of neonates presenting with illness at health care centers [9]. The danger signs of severe illness included are history of difficult feeding, convulsion, respiratory rate of over 60 breaths per minute, severe chest in-drawing, body temperature above 37.5°C, body temperature below 35.5°C, movement only when stimulated, yellow soles (sign of jaundice), umbilical redness or draining pus, skin boils, eyes draining pus, and Vomiting [10]. Over the past several decades, the global incidence of under-five mortality has steadily decreased. Death during the neonatal period accounts for almost two-thirds of all deaths in the first year of life and 40 percent of death before the age of five [1, 11, 12]. Evidence shows that decreasing the proportion of deliveries conducted at home could reduce prenatal death by nearly half [1, 13, 14]. Despite the high burden of neonatal mortality, Africa has scored the slowest decrement in NMR with a decline of only 19% from 1990 to 2010, when it compares with 43% decline in these high income and developed countries and still accounts for 39% [10]. Nigeria is the leading country in Africa with the highest number of neonatal deaths. Annually, more than a quarter-million neonates die [15]. Ethiopia is one of the ten countries with the highest number of neonatal deaths globally, with an estimated 122,000 newborn deaths per year [4]. Close to 90% of delivery in Ethiopia takes place at home, this indicating that lack early recognition on the danger sign [11, 13]. Childhood mortality levels are decreasing in Ethiopia. According to the Ethiopian Demographic Health Survey 2016, Neonatal Mortality Rate is 29 per 1,000 live births. Infant mortality rate (IMR) is 48 deaths per 1,000 live births and Under-five mortality was 67 deaths per 1,000 live birth [16]. Recent studies identified that predictors for knowledge about neonatal danger signs were educational status, Health Institutions related and others, the consumption of maternal and child health (MCH) services, obstetric status, and place of births [17–20, 22, 26, 29]. As people attribute high neonate deaths to low utilization of neonatal care services at crucial stages of pregnancy, delivery, postpartum and post-natal periods, neonatal complications during birth or after the birth of a child greatly contribute to neonate mortality in developing nations [13]. If those factors affecting neonate danger signs are not well known and identified by the mothers, neonatal mortality and morbidity might continue and a challenge to the community as well as the government in the future. Therefore, improving maternal knowledge concerning neonatal danger signs is a key entry point.

Methods

Study setting

A Community based comparative cross-sectional study design was conducted from March to April 2018 in Meicha District, northwest Ethiopia. It is located 35km and 543 Km far from the capital cities of the Amhara Region and Ethiopia, respectively. The District has 12 urban and 41 rural Kebeles. Based on Meicha District health office report, there are 1 hospital, 13 health centers, 3 ambulance service, 53 health post, 14 private lower clinics, and 8 private drug stores which deliver comprehensive health services to the communities in the district. There was a total population of 614,022 (male 308,765 and female 305,254),

115,225 households, 14,933 estimated live births, surviving infants of 6102, <5 years of 42028, estimated women with childbearing age of 131,717, estimated pregnancy/delivery of 7257 and new pregnant in fertile age of 47764. There are several 317 all types of health professionals of different disciplines in the district including HEWs. The local communities in the district largely depend on agriculture [21].

Participants

All mothers who were living in the selected kebeles of the Meicha district, and gave live birth two months before the data collection were considered. Mothers who lived at least 6 months in Meicha districts were included, while mothers who were not mentally competent or who had any psychiatric disorders and/or had serious illness were excluded.

Sample Size Determination

The total sample of the study was determined by using a double population proportion formula. Mother's knowledge of neonatal danger signs was determined by calculating for factors with Epi-info version 7.0 by taking factors from previous findings in Welkite town 41% [18], 95% confidence level (1.96), Power 80%. The sample size without design effect and non-response rate was calculated as $-206 + 206 = 412$. By considering the 1.5 design effect it was calculated as $-412 \times 1.5 = 618$. Then considering 5% non-response rate: $-618 + 32 = 650$. This sample size was divided into two groups, therefore, the final sample size for home-delivered was 325 and for Health institution delivered was 325.

Sampling Procedure

A simple random sampling technique was employed to select the study participants. From the 53 kebeles in the Woreda, 25 kebeles were selected by using simple random sampling (lottery method) having the total mothers who gave birth the last 2 months was 917 (381 at Home and 536 at Health institution). For each kebele sampling frame was developed by taking mothers who gave birth in the last two months before this study. Then based on the population, the sample size was allocated for each selected kebele proportionally. The allocated sample size for each kebele was selected using simple random sampling and study participants were interviewed at their home.

Operational Definitions

Good knowledge: A mother who asked to mention danger signs of the neonate, if she can mention three of the ten danger signs for neonate without prompt and three and greater danger signs with prompt [23, 26]. *Institutional delivery:* Is any delivery service, mothers who gave birth in the health facilities, including health posts attended by health extension workers. *Recently delivered mothers:* Mother who delivered before 2 months of the survey irrespective of how many births gave before.

Data Collection Methods and procedures

Data was collected by using face to face interviews with 8 interviewers who completed diploma Midwifery's and two Health officers supervised them. Data was collected using a structured interviewer-administered questionnaire. The questionnaire consisted of information on socio-demographic characteristics, Obstetric characteristics, Place of delivery, Maternal health service exposure, Health Institutions related factors and other questions. The data collector was organized into four pairs to minimize bias and errors during the data collection.

Data measurement methods

Mothers' knowledge was measured by mothers' capability of mentioning neonatal danger signs with and without prior prompt by the interviewer. Then knowledge was categorized into good knowledge and poor knowledge.

Data Quality Control

The data collection tool (questionnaires) initially prepared in English and translated to the local language and translated back to English by independent language expert was used to maintain consistency of meaning. Three days of training was given to data collectors and supervisors on data collection techniques, how to approach and collect the required information from the respondents. Data were collected under the supervision of the supervisors and the overall data collection process was supervised by the principal investigator daily. The pretest was conducted outside selected kebeles with 5% of the study subjects to test the quality of the data collection tool. Data were cleaned and checked for completeness daily.

Data Processing and Analysis

After checking data for completeness, coded manually data were entered into Epi -Data version 3.1 and exported into SPSS version 21 software for analysis. The results were expressed by text, tables, and charts Binary logistic regression model including Bivariate and multivariable logistic regression were fitted All independent variables having p-value <0.2 in the Bivariate logistic regression analysis were entered into a multivariate logistic regression analysis to control confounding effect. Appropriate model diagnostics and goodness of fit tests were done. Multicollinearity was checked to test correlation among predictor variables and Hosmer and Lemeshow test P-value (>0.2) were conducted to see model fitness. Odds ratio with 95% confidence interval was used to determine the presence, strength, and direction of the association between dependent and independent variables.

Results

Socio-demographic characteristics of the participant's

A total of 637 mothers' (321 home delivered and 316 institutions delivered mothers have participated in this study representing a response rate of 98% (98.8% and 97.2% for home-delivered and institution delivered mother, respectively). Out of the total participated women 316(49.6%) were from Health Institution delivered and 321(50.4%) from Home deliver women's mean age of the study participants was 29.59(SD = + 6.52) years. (Table 1).

Maternal and Child Health service and obstetric factors

Approximately three-fourth of participants 471(72.5%) had at least one ANC follow up for their recent birth. Out of the total participants, 384(53.5%) have four and more ANC visits. (*Tabel 2*)

Health Institutional factors related and others

Out of the total participants, three hundred eighty-four (53.5%) have four and more ANC visits. Among the interviewees, six hundred one five (94.6%) of mothers have the accessibility of modern health facilities in their local. (*table 3*).

Mother's knowledge of Neonatal danger Signs between Health Institution and Home delivery

Health professional was the most common source of information were 392(73.7%) mother's heard or counseled about neonatal danger sign (*figure 1*).

The majority of participants five hundred twelve (83.4%) had information heard about neonatal danger signs for their recent birth. Out of the total participants, 80.5% of mothers knew at least one danger sign. (*See table 4*)

The overall Knowledge of neonatal danger sign was 50.7% (AOR = 2.188, 95%,CI = 1.594,3.003) at p-value <0.001. The proportion of mothers having good knowledge of neonatal danger sign was 60.1%(95%, CI = 55.1,65.8)among health Institutions delivered and 41.1%(95%, CI = 35.8,46.1)among home-delivered mother(*figure 2*).

Factors associated with the mother's knowledge of neonatal danger sign

We have fitted three different models to assess the mother's knowledge of neonatal danger signs. The first model was fitted to assess the overall factors of the mother's knowledge of neonatal danger signs. Variable such as Age, postnatal follow-up, parity, age of the newborn and far from health center was

significantly associated with mothers' knowledge of neonatal danger sign for the whole mothers irrespective of Age. Mothers who were 15–19 years had 4 times more knowledgeable (OR: 3.99, 95%CI (1.45, 11.03)) than that of >35 years mother and mothers' who attend postnatal follow up were 2.42 times more knowledgeable (OR: 2.42, 95% CI (1.47, 3.96)) than that of not attend postnatal follow up. mothers who give birth four and above were 1.27 times more knowledgeable(OR:1.27,95% CI (1.37,5.31)).than that of who gives birth two up to four times. Additionally, mothers' who were >30 days age newborn had decreased knowledge by 47% (OR: 0.53,95 % CI (0.36, 0.78)) when compared with that of <30 day age of newborn. Mothers far more than 10 km had decrease knowledge by 54% (OR: 0.46, 95% CI (0.27, 0.78) when we compared that far less than 10KM. (*Table 5*)

The second model was fitted only for Health institution delivered mothers. Accordingly,the residence and occupational status of the Husband showed a significant association. Health institution delivered mothers with relatively being urban residence was 3 times (AOR = 3.09, 95% CI (1.44, 6.64 more likely to know neonatal danger sign compared to counterparts. Mothers had farmer occupation were 77% less likely (AOR = 0.23 95% CI (0.207, 0.67) to have good knowledge of neonatal danger sign than government employed (*Table 6*).

The third model was fitted for Home delivered mother's age of newborn, parity, ANC and PNC. As a result, Age of newborn, being below 30-day mothers' was 50%(AOR = 0.50, 95% CI = 0.28,0.896) less likely knowledgeable about neonatal danger sign than those age 30 and above day. Mothers had one-time giving birth decrease knowledge by 71% (0.29, 95% CI = 0.113,0.74) when compare that giving birth four times and above. Mothers with ANC follow up were twelve times (AOR = 12.04, 95% CI = 5.9, 24.65) more likely to have good knowledge of neonatal danger signs than mothers who had no ANC. Mothers who did not attend PNC follow up were 73% less likely(AOR = 0.27, 95% CI = 0.138, 0.51)to have good knowledge of neonatal danger signs than mothers who had PNC follow up (*Table 6*).

Discussion

Mother's early identify neonatal danger sign has a great potential to reduce neonatal mortality. In this study, the overall Knowledge of neonatal danger sign was 50.7% (AOR = 2.188, 95%, CI = 1.594, 3.003). There was a significant difference in mothers' knowledge of neonatal danger signs with the place of birth at health institutions (60.1%) and home-delivered (41.1%). Mothers who give birth at health institutions were 46 times knowledgeable about neonatal danger signs than mothers who give birth at home. The possible reason might be health institutions may provide an adequate education for mothers to deliver theirs about neonatal danger signs. It could be also due to the accessibility of information about neonatal danger signs.

Overall mother's knowledge of neonatal danger sign (for total 637 mothers) was 50.7%. The overall mother knowledge of neonatal danger sign this study, is lower than the study conduct in Egypt and Ghana were (68–70%), 71.9% respectively [23, 27]. but this result was in line with the study conducted in Bangladesh, Mekele Ethiopia and Chinchu district southern Ethiopia which showed mothers knowledge

neonatal danger sign of 51, 50.6 and 50.3% respectively[17, 20, 25]. However, this finding is higher than the study conducted in Nigeria (30.3), Uganda (poor), Kenya (15), Gonder Northwest Ethiopia (18.2), For region of Ethiopia was (29.3), Gedio zone (32.4), Welkite(31.3%)[15, 19, 26, 28]. The possible reason for the observed difference might be due to the extensive work of HEWs in the community and different health care institutions in awareness creation on neonatal danger signs. The other possible reason might be study period difference, time gap(this study included less than two-month newborns, but in the other study included more than 4 months which leads to recall bias), residence and socio-demographic and cultural variation which may negatively or positively affect the level of knowledge neonatal danger sign. Among the socio-demographic variables, only residence and occupational status husband of mothers makes a significant association with knowledge neonatal danger sign at Health Institution delivered while none of them showed a statistically significant association at Home delivered mothers. The reason for this difference might be mothers who live in urban were more seek to health care and health information from different sources as compared to mothers who lived in rural parts. For health institution delivered mothers, urban women were 3 times more likely to know neonatal danger signs when compared to rural mothers. In agreement with this, studies revealed that the mother's residence determines their level of knowledge of neonatal danger signs [17, 29]. For example, the study conducted in Chincha towards mother knowledge neonatal danger sign with residence showed that mothers who lived in urban were two times more likely known as compared to mothers who lived in a rural area. For health institutions that delivered mothers, the husband occupation level was associated with knowledge of neonatal danger signs. Those respondents whose husband occupation farmer was 77% less likely to know neonatal danger signs as compare to Governmental employees. This may due to Governmental employ husband are more informed about neonatal danger signs. In this study parity of mother was statistically associated with the level of knowledge neonatal danger sign. Mothers who were giving birth one times had 71% less likely knowledgeable as compared to mothers who give birth four and above at the home-delivered. Comparably, in the overall model of mothers' knowledge neonatal danger sign, mothers who had to give birth four and above had two times more likely knowledgeable about neonatal danger sign than mothers who gave birth two up to four times. This finding was supported by studies in Egypt showed, mothers being primi Para are more likely to have poor knowledge about newborn care than multi parity[18].

This study has shown the age of the newborn was found to be a determinant to affect knowledge of neonatal danger sign at home delivered mothers'. Whose age below 30 days newborn 50% less likely knowledgeable about neonatal danger sign than whose age was 30 and above days newborn. This might be due to mothers exposure to Immunization package, might get information on neonatal danger sign. Comparably, in the overall model of mothers knowledge neonatal danger sign, mothers who had newborn age 30 and above day had decreased knowledge by 47% when compared with mothers who had newborn age below 30. In the present study having ANC follow up was twelve times more likely to know neonatal danger sign as compared to women had no ANC follow up. This finding is supported by finding in Uganda and Gonder, north Ethiopia[15, 19]. The possible and the best reason for this could be mother's exposure to ANC package, might get information on neonatal danger sign.

In this study is no attendance PNC follow up was a significant factor to affect knowledge of neonatal danger sign of Home delivered mothers those who had no PNC follow up in their last child were 73% less likely knowledgeable when compared to those who attend PNC follow up care. Similarly, with finding studies in Mekele city, Tigray [20]. Those mothers who had postnatal follow-up and who received advice regarding neonatal danger signs were 4 times more likely to know the defined neonatal danger signs as compared to their counterparts. The possible reason might be mothers have no attended PNC follow up are did not receive counseled about neonatal danger signs; this decrease knowledge of the mother concerning the neonatal danger signs. Comparably, in the overall model of mothers knowledge neonatal danger sign, mothers who had to attend PNC follow up had two times more likely knowledgeable about neonatal danger sign than mother who had not to attend PNC follow up. Mothers' those who were knowledgeable about neonatal danger sign by age 15–19 years old were four times more knowledgeable than that of counterparts in the overall model of mothers knowledge neonatal danger sign. This study is far from the health center was a significant association in the overall model of mothers' knowledge of neonatal danger signs. Those who reside in greater than 10 km 54% less likely knowledgeable when compared to those who raised less than 10 km. This is due to the physical proximity of health facility affects the utilization of services. In this study to the overall model of mothers' knowledge neonatal danger sign, residence, frequency ANC visit, and place of birth were not showed statistically significant association which is supported by studies done in rural Wardha, Uganda, Mekelle Ethiopia[15, 20, 30].

Conclusion

Place of birth affects the mother's knowledge about neonatal danger signs.

In this study mothers' knowledge of neonatal danger signs at Meicha district in both health institution and home-delivered as well as for the overall model of mothers' knowledge, neonatal danger signs were to below.

The percentage of mothers' knowledge of neonatal danger signs at health institutions and home-delivered mother of the district was statistically different.

Age of the mother, antenatal care and postnatal care attendance showed a significant associated with home-delivered mother's knowledge neonatal danger signs. Were as a residence and occupational status of Husband showed a significant associated with health institution delivered mother's knowledge neonatal danger signs. It is better to give infancies, especially for home-delivered mothers to create awareness regardless of neonatal danger signs and to strengthen the health extension program.

Abbreviations

ANC-Antenatal Care; CSA-Central Statistically Agency; EDHS-Ethiopia Demographic Health Survey; ENC-Essential New-born Care; HC-Health Center; HEWs- Health Extension Workers; IMNI-Integrated Management of Newborn and Childhood Illness; IMR-Infant Mortality Rate; MCH-Maternal and Child

Health; NMR-Neonatal Mortality Rate; PNC-Postnatal Care; SBA-Skilled Birth Attendant; TBA Traditional Birth Attendant; TTBA-Trained Traditional Birth Attendant; UNESCO-United Nations Educational, Scientific and Cultural Organization; UNICEF United Nation Children's Emergency Fund; WHO-World Health Organizations

Declarations

Ethics approval and consent to participant

Ethical clearance was obtained from the Institute of Public Health, College of Medicine and Health Sciences, University of Gondar. Formal letter of permission was obtained from administrative bodies of the West Gojam zone Health Department, Meicha district and selected kebeles. A letter of cooperation from kebeles administrators was also secured. Finally, Written and verbal consent was obtained from every study participant included in the study during data collection time after explaining the objectives of the study and the right to withdraw from the study at any time. The confidentiality of respondents was also assured by excluding personal identifiers like the name. Written informed consent was obtained from a parent or guardian for participants under 16 years old.

Consent for publication

Not applicable

Availability of data and materials

The datasets used during the current study available from the corresponding author on reasonable request.

Competing interest

The authors declare that they have no competing interests.

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Authors' contributions

TG designed the study, performed statistical analysis, and drafted the paper. AT, AB and TG participated in the paper writing. All authors contribute to the data analysis and read and approved the final paper.

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Authors' details

Teferi Gebru Gebremeskel (MPH): Department of Reproductive Health, College of Health Sciences, Aksum University, Aksum, Ethiopia. Email: teferigebru12@gmail.com

Adino Tesfahun Tsegaye (MPH): Department of Epidemiology and Biostatistics, Institute of Public Health College of Medicine and Health Sciences, Gonder University, Gonder, Ethiopia. **Email:** atesfahun1@gmail.com

Alehgen Bishaw Geremew (MPH): Department of Reproductive Health, Institute of Public Health College of Medicine and Health Sciences, Gonder University, Gonder, Ethiopia. **Email:** alexbishaw@gmail.com

Teklit Grum (MPH): Department of Reproductive Health, College of Health Sciences, Aksum University, Aksum, Ethiopia. Email: teklitvip@gmail.com

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Tables

Table 1 shows socio-demographic characteristics of study participants with respected Knowledge of neonatal danger sign among Health Institutional and Home delivery, in Meicha Woreda, northwest Ethiopia 2018.

Characteristics	NO(%) N=637	Health Institution Delivery		Home Delivery	
		Knowledge of neonatal danger sign		Knowledge of neonatal danger sign	
		Good	Poor	Good	Poor
Age in years(29.59±6.525)					
15-19	56(8.8)	11(55.0)	9(45.0)	11(30.6)	25(69.4)
20-24	106(16.6)	34(73.9)	12(26.1)	25(41.7)	35(58.3)
25-29	139(21.8)	59(61.5)	37(38.5)	12(27.9)	31(72.1)
30-34	162(25.4)	44(62.9)	26(37.1)	46(50.0)	46(50.0)
35+	174(27.3)	43(51.2)	41(48.8)	38(42.2)	52(57.8)
Total	637(100)	191(60.4)	125(39.6)	132(41.1)	189(58.9)
Marital status					
married	597(93.7)	181(60.7)	117(39.3)	120 (40.1)	179(59.9)
single	40(6.3)	10(55.6)	8(44.4)	12(54.9)	10(45.5)
Total	637(100)	191(60.4)	125(39.6)	132(41.1)	189(58.9)
Residence					
Urban	92(85.5)	59(81.9)	13(18.1)	12(60.0)	8(40.0)
Rural	545(14.5)	132(54.1)	112(45.9)	120(39.9)	181(60.1)
Total	637(100)	191(60.4)	125(39.6)	132(41.1)	189(58.9)
Educational Status of the Mother					
Able to read and write	348(54.6)	74(46.8)	84(53.2)	69(36.3)	121(63.7)
Cannot read and write	125(19.6)	29(63.0)	17(37.0)	43(54.4)	36(45.6)
Grade(1-8)	95(14.9)	47(83.9)	9(16.1)	14(35.9)	25(64.1)
Grade(9-12)	52(8.2)	32(82.1)	7(17.9)	6(46.2)	7(53.8)
College and above	17(2.7)	9(52.9)	8(47.1)	0 (0.0)	0(0.0)
Total	637(100)	191(60.4)	125(39.6)	132(41.1)	189(58.9)
Educational Status of the Husband					
Able to read and write	253(39.7)	55(45.1)	60(52.2)	53(38.4)	85(61.6)
Cannot read and write	219(34.4)	62(63.3)	31(33.3)	57(45.2)	69(54.8)
Grade(1-8)	86(13.5)	31(64.6)	17(35.4)	10(26.3)	28(73.7)
Grade(9-12)	45(7.1)	20(71.4)	8(28.6)	11(64.7)	6(35.3)
College and above	34(5.3)	23(71.9)	9(28.1)	1(50.0)	1(50.0)
Total	637(100)	191(60.4)	125(39.6)	132(41.1)	189(58.9)
Occupation status of Mothers					
Governmental employee	13(2.0)	12(100)	0(0.0)	1(100.0)	0(0.0)
Private employee	42(6.6)	22(81.5)	5(18.5)	3(20.0)	12(80.0)
Housewife	265(41.6)	98(61.6)	61(38.4)	60(56.6)	46(43.4)
Farmer	272(42.7)	37(43.0)	49(57.0)	63(33.9)	123(66.1)
Merchant	31(4.9)	19(73.1)	7(26.9)	3(60.0)	2(40.0)
Student	14(2.2)	3(50.0)	3(50.0)	2(25.0)	6(75.0)
Total	637(100)	191(60.4)	125(39.6)	132(41.1)	189(58.9)
Occupation status of Husbands					
Governmental employee	18 (2.8)	14(100)	0(0.0)	1(25.0)	3(75.0)
Private employee	208(32.7)	89(71.8)	35(28.2)	42(50.0)	42(50.0)
Farmer	266(41.8)	35(43.8)	45(56.2)	63(33.9)	123(66.1)
Daily laborer	81(12.7)	24(42.9)	32(57.1)	15(60.0)	10(40.0)
Merchant	64(10.0)	29(69.0)	13(31.0)	11(50.0)	11(50.0)
Total	637(100)	191(60.4)	125(39.6)	132(41.1)	189(58.9)
Monthly Income					
Less than 1200 ETB	136(21.4)	44(57.9)	32(42.1)	12(20.0)	48(80.0)

1200-3000 ETB	207(32.5)	47(59.1)	32(40.9)	66(54.1)	56(45.9)
3001- 5000 ETB	215(33.8)	66(66.7)	33(33.3)	44(39.6)	67(60.4)
Greater than 5000 ETB	79(12.4)	34(54.8)	28(45.2)	10(35.7)	18(64.3)
Total	637(100)	191(60.4)	125(39.6)	132(41.1)	189(58.9)

Table 2 shows maternal and child health service and obstetric factor of study participants with respected Knowledge of neonatal danger sign among Health Institutional and Home delivery, in Meicha district, northwest Ethiopia 2018.

Characteristics'	No (%) N= 637	Health Institutional Delivery		Home Delivery	
		Knowledge of neonatal danger sign		Knowledge of neonatal danger sign	
		Good	Poor	Good	Poor
Age of newborn in day					
≤ 30 day	307(48.2)	81(62.8)	48(37.2)	85(47.8)	93(52.2)
31-60 day	330(51.8)	110(58.8)	77(41.2)	47(32.9)	96(67.1)
Total	637(100)	191(60.4)	125(39.6)	132(41.1)	189(58.9)
Parity					
1	100(15.6)	30(53.6)	26(46.4)	11(25.0)	33(75.0)
2-4	344(54.0)	123(64.1)	69(35.9)	54(35.5)	98(64.5)
≥4	193(30.2)	38(55.9)	30(44.1)	67(53.6)	58(46.4)
Total	637(100)	191(60.1)	125(39.6)	132(41.1)	189(58.9)
ANC attendance					
Yes	471(72.5)	179(65.3)	95(34.7)	120(60.9)	77(39.1)
No	166(25.5)	12(28.6)	30(71.4)	12(9.7)	112(90.3)
Total	637(100)	191(60.1)	125(39.6)	132(41.1)	189(58.9)
Frequency of visit ANC					
<4	289(44.5)	80(54.1)	68(45.9)	75(53.2)	66(46.8)
≥4	384(53.5)	111(66.1)	57(33.9)	57(31.7)	123(68.3)
Total	637(100)	191(60.1)	125(39.6)	132(41.1)	189(58.9)
Mode of delivery					
Spontaneous vaginal delivery	507(79.6)	99(53.2)	87(46.8)	132(41.1)	189(58.9)
Episiotomy					
Instrumental delivery	84(13.2)	65(77.4)	19(22.6)	0(0.0)	0(0.0)
Cesarean delivery	23(3.6)	14(60.9)	9(39.1)	0(0.0)	0(0.0)
Total	23(3.6)	13(56.5)	10(43.5)	0(0.0)	0(0.0)
	637(100)	191(60.1)	125(39.6)	132(41.1)	189(58.9)
Faced complication during delivery					
Yes	116(17.8)	32(56.1)	25(43.9)	34(57.6)	25(42.4)
No	521(80.2)	159(61.4)	100(38.6)	98(37.4)	164(62.6)
Total	637(100)	191(60.1)	125(39.6)	132(41.1)	189(58.9)
PNC attendance					
Yes	351(54.0)	165(60.4)	108(39.6)	56(71.8)	22(28.2)
No	286(44.0)	26(60.5)	17(39.5)	76(31.3)	167(68.7)
Total	637(100)	191(60.1)	125(39.6)	132(41.1)	189(58.9)
Frequency of visit PNC					
<3	606(95.1)	187(60.3)	123(39.7)	117(39.5)	179(60.5)
≥3	31(4.9)	4(66.7)	2(33.3)	15(60.0)	10(40.0)
Total	637(100)	191(60.1)	125(39.6)	132(41.1)	189(58.9)
Assistance of delivery					
Health Professional	316(48.6)	190(60.5)	124(39.5)	2(100.0)	0(0.0)
HEW	7(1.1)	1(100.0)	0(0.0)	2(33.3)	4(66.7)
TBA	165(25.4)	0(0.0)	0(0.0)	56(33.9)	109(66.1)
Relative(friend)	149(22.9)	0(0.0)	1(0.0)	72(48.6)	76(51.4)
Total	637(100)	191(60.1)	125(39.6)	132(41.1)	189(58.9)

Table 3: shows Health Institutional factors related and others of study participants with respected Knowledge of neonatal danger sign among Health Institutional and Home delivery, in Meicha district, North West Ethiopia 2018.

Characteristics		Health Institutional Delivery				Home Delivery	
		Knowledge of NDS		Knowledge of NDS			
		Good	Poor	Good	Poor		
N=637							
Accessibility of modern health facility							
Yes	615(94.6)	188(61.0)	120(39.0)	126(41.0)	181(59.0)		
No	22(3.4)	3(37.5)	5(62.5)	6(42.0)	8(57.1)		
Total	637(100)	191(60.4)	125(19.6)	132(41.1)	189(58.9)		
Type of accessible modern Health facility							
Health Post	488(75.1)	139(61.5)	87(38.5)	110(42.0)	152(58.0)		
Health Center	147(22.6)	52(57.8)	38(42.2)	22(38.6)	35(61.4)		
Hospital	1(0.2)	0(0.0)	0(0.0)	0(0.0)	1(100.0)		
Private Clinic	1(0.2)	0(0.0)	0(0.0)	0(0.0)	1(100.0)		
Total	637(100)	191(60.4)	125(19.6)	132(41.1)	189(58.9)		
Distance from Health center							
<10Km	508(78.2)	175(62.9)	103(37.1)	115(50.0)	115(50.0)		
≥10km	129(19.8)	16(42.1)	22(57.9)	17(18.7)	74(81.3)		
Total	637(100)	191(60.4)	125(19.6)	132(41.1)	189(58.9)		
Price of health service affects to choice							
Yes	127(19.9)	34(51.5)	32(48.5)	29(47.5)	32(52.5)		
No	510(80.1)	157(62.8)	93(37.2)	103(39.6)	157(60.4)		
Total	637(100)	191(60.4)	125(19.6)	132(41.1)	189(58.9)		
Health care staffs have a good approach for patients							
Yes	606(93.2)	185(62.1)	113(37.9)	124(40.3)	184(59.7)		
No	31(4.8)	6(3.3)	12(66.7)	8(61.5)	5(38.5)		
Total	637(100)	191(60.4)	125(19.6)	132(41.1)	189(58.9)		

Table 4: Shows Mother's knowledge of Neonatal danger Signs between Health Institution and Home delivery in Meicha district, northwest Ethiopia 2018.

Characteristics	No (%) N= 637	Health Institution	Home Delivery
		Deliver	
		Knowledge of KND Yes%	Knowledge of KND Yes%
Fever	421(66.1)	237(75.0)	184(57.3)
Poor sucking or not able to breastfeeding	389(61.1)	232(73.4)	157(48.9)
Information heard NDS	531(83.4)	300(56.5)	231(43.5)
Difficulty breathing	285(44.7)	167(52.8)	118(36.8)
Lethargy or unconscious or weakness	172(27.0)	97(30.7)	75(23.4)
Vomiting	163(25.6)	84(26.6)	79(24.6)
Umbilical cord redness or pus	121(19.0)	72(22.8)	49(15.3)
Hypothermia	97(15.2)	55(17.4)	42(13.1)
Fast breathing	78(12.2)	41(13.0)	37(11.5)
Jaundice or Yellowish of palms /soles/eye)	53(8.3)	38(12.0)	15(4.7)
Convulsion	33(5.2)	20(6.3)	13(4.0)

Table 5 Bi-variate and multi-variable logistic regression analysis showing factors affecting overall mothers knowledge of neonatal danger sign between Health institutional delivery and Home delivery among women who delivered in the last two month in Meicha Woreda, Northern Ethiopia,2018(n=637)

Variable	Knowledge neonatal danger sign			
	Total N=637		COR(95% CI)	AOR(95% CI)
	Poor	Good		
Age of mothers				
15-19	31(81.6)	7(18.4)	3.9(1.61,9.2)*	3.99(1.45,11.03)*
20-24	47(44.3)	59(55.7)	0.74(0.43,1.13)	0.81(0.43-1.54)
25-29	70(47.6)	77(52.4)	0.79(0.51,1.23)	1.011(0.57,1.79)
30-34	73(42.4)	99(57.6)	0.64(0.42,0.98)	0.66(0.395,1.12)
35+	93(53.4)	81(46.6)	1	1
Total	314(49.3)	323(50.7)		
Residence				
Urban	289(52.4)	263(47.6)	1	1
Rural	25(29.4)	60(70.6)	0.38(0.23,0.62)	0.74(0.36,1.51)
Total	314(49.3)	323(50.7)		
Age of new born				
<30 day	166(54.1)	141(45.9)	1	1
≥30 day	157(47.6)	173(52.4)	0.77(0.64,0.93)	0.53(0.36,0.78)**
Total	323(50.7)	314(49.3)		
Distance of health center				
≥10k	290(57.1)	218(42.9)	0.26(0.2,0.33)	0.46(0.27,0.78)*
<10k	33(25.6)	96(74.4)	1	1
Total	323(50.7)	314(49.3)		
Para				
1	88(45.6)	105(54.6)	0.89(0.63,1.27)	0.68(0.43,1.07)
2-4	171(48.4)	182(51.6)	1	1
≥4	55(60.4)	36(39.6)	1.63(1.02,2.60)*	1.27(1.37,5.31)**
Total	323(50.7)	314(49.3)		
ANC				
<4 visit	168(48.3)	180(51.7)	1	1
≥4 visit	155(53.6)	134(46.4)	1.24(1.03,1.49)	0.95(0.68,1.33)
Total	323(50.7)	314(49.3)		
Place of delivery				
Institution delivery	132(41.1)	189(58.9)	1	1
Home delivery	191(60.4)	125(39.6)	2.19(1.59,3.03)	1.21(0.71,2.04)
Total	323(50.7)	314(49.3)		
PNC				
Yes	221(63.0)	130(37.0)	1	1
No	102(35.7)	184(64.3)		
Total	323(50.7)	314(49.3)		

Note: *-significant results, 1-reference category **p-value<0.001, *p-value≤0.05

Table 6 *Bi-variable and multi-variable analysis showing factors associated knowledge of neonatal danger sign between Health institutional and Home delivery among mothers who delivered in the last two month in Meicha district, Northern Ethiopia,2018*

1. Health Institution Delivery				
Variable	Knowledge of NDS		COR(95% CI)	AOR(95% CI)
	Poor n (n%)	Good n(n%)		
Residence			1	1
Rural	13(18.1)	59(81.9)	3.85(2.01-7.39)*	3.09(1.44-6.64)*
Urban	112(45.9)	132(45.9)		
Total	125(39.6)	191(60.4)		
Occupation status of Husbands				
Governmental employee	10(41.7)	14(58.3)	1	1
Private employee	13(31.0)	29(69.0)	0.63(0.22-1.78)	0.599(1.95-1.84)
Farmer	25(21.9)	89(78.1)	0.39(0.16-0.99)	0.23(0.207-0.67)*
Daily laborer	32(57.1)	24(42.9)	1.87(0.71-4.92)	1.15(0.37-3.63)
Merchant	45(56.2)	35(43.8)	1.8(0.72-4.54)	0.91(0.30-2.75)
Total	125(39.6)	191(60.4)		
Distance from Health center				
<10Km	103(37.1)	175(62.9)	0.43(0.22-0.85)	0.52(0.24-1.12)
>=10km	22(57.9)	16(42.1)	1	1
Total	125(39.6)	191(60.4)		
Monthly Income			0.88(0.45-1.74)	0.59(0.25-1.37)
<1200 ETB	32(42.1)	44(57.9)	0.83(0.42-1.62)	0.70(0.31-1.58)
1200-3000 ETB	32(40.5)	47(59.5)	0.61(0.32-1.17)	0.44(0.21-0.93)
3001- 5000 ETB	33(33.3)	66(66.7)	1	1
>5000 ETB	28(25.2)	34(54.8)		
Total	125(39.6)	191(60.4)		
Frequency of visit ANC				
<4	68(45.9)	80(54.1)	1.66(1.05-2.61)	1.518(0.913-2.53)
≥4	57(33.9)	111(66.1)	1	1
Total	125(39.6)	191(60.4)		
1. Home Delivery				
Variable	Knowledge of NDS		COR(95% CI)	AOR(95% CI)
	Poor n (n%)	Good n (n%)		
Age newborn in day				
<30 day	93(52.2)	85(47.8)	0.536(0.339-0.845)*	0.50(0.28-0.896)*
≥30day	96(67.1)	47(32.9)	1	1
Total	189(58.9)	132(41.1)		
Residence			1	1
Urban	12(54.5)	10(45.5)	1.79(0.750-4.275)*	1.035(0.376-2.85)
Rural	120(40.1)	179(59.9)		
Total	132(41.1)	189(58.9)		
Monthly Income			2.22(0.82-6.034)	1.82(0.522-6.33)
<1200 ETB	48(80.0)	12(20.0)	0.47(0.201-1.104)	0.44(0.144-1.32)
1200-3000 ETB	56(45.9)	66(54.1)	0.85(0.36-2.002)	0.772(0.25-2.373)
3001- 5000 ETB	67(60.4)	44(39.6)	1	1
>5000 ETB	18(64.3)	10(35.7)		
Total	189(58.9)	132(41.1)		
Parity			0.605(0.28-1.29)	0.425(0.17-1.09)
1	98(64.2)	54(35.5)	0.289(0.134-0.622)	0.29(0.113-0.74)*
2-4	58((46.4)	67(53.6)	1	1
≥4	33(75.0)	11(25.0)		
Total	189(58.9)	132(41.1)		

ANC attendance				
No	12(9.7)	112(90.3)	1	1
Yes	120(60.9)	77(39.1)	14.55(7.51-28.16)**	12.04(5.9-24.65)**
Total	132(41.1)	189(58.9)		
PNC attendance				
Yes	167(68.7)	76(31.3)	0.18(0.102-0.314)**	0.27(0.138-0.51)**
No	22(28.2)	56(71.8)		
Total	189(58.9)	132(41.1)		

Note: *-significant results, 1-reference category **p-value<0.001, *p-value≤0.05

Figures

Figure 1

Diagramatic presentation of source information with mother the last two month giving birth at home and health institution in Meicha Woreda, north west Ethiopia2018

Figure 2

Diagramatic presentation of mother’s knowledge of neonatal danger sign between Health Institution and Home delivered mothers in Meicha Woreda, north west Ethiopia2018.