

# Knowledge On Neonatal Danger Signs And Associated Factors Among Mothers Who Gave Birth In The Last One Year Prior To This Study In Debre Markos Town, East Gojjam, Northwest Ethiopia 2017: A Community Based Cross Sectional Study.

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## Research article

**Keywords:** Neonatal Danger Signs, Mothers' Knowledge, East Gojjam, Ethiopia

**Posted Date:** August 20th, 2019

**DOI:** <https://doi.org/10.21203/rs.2.13234/v1>

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# Abstract

**Abstract Background:** Neonatal mortality is a concern for global population especially in developing countries. The majority of neonatal mortality occurs at home where only few families recognize key danger signs of neonatal illness. Thus, we assessed the knowledge on neonatal danger signs of illness and associated factors among mothers who gave birth in the last one year prior to this study in Debre Markos town, East Gojjam, northwest Ethiopia. **Methods:** A community-based, cross-sectional study was conducted among 521 mothers. Cluster sampling technique was used to select the study participants and interviewed using structured and pre-tested questionnaire. Data were entered to Epi Info and exported to SPSS for analysis. Variables in binary logistic regression with a P value <0.2 were fitted to multivariable logistic regression. Significant variables were declared at 95% CI and a P value <0.05. **Results:** A total 473 participants were interviewed by making a response of 91.0%. The proportion of knowledgeable mothers was found to be 26.2% (95% CI 22.2, 30.4). Mother's secondary and tertiary education(AOR=3.64, 95% CI 1.14, 11.61 and AOR=3.80, 95% CI 1.25, 11.56), husband's secondary and tertiary education(AOR=4.22, 95% CI 1.53, 11.60 and AOR=4.34, 95% CI 1.52, 12.37) respectively, antenatal care attendance(AOR = 3.54, 95% CI 1.62, 7.75), postnatal care attendance(AOR = 2.41, 95% CI 1.13, 5.14), getting prepared for birth(AOR = 2.43, 95% CI 1.20, 4.89) and access for television(AOR = 2.06, 95% CI 1.01, 4.21) were found to be positively associated with being knowledgeable on neonatal danger signs. **Conclusion:** Mothers' knowledge on neonatal danger signs was low. The finding showed that, intervention modalities to increase parental education, both antenatal and postnatal care attendance, mothers' preparedness for birth and advocating the use of television might be helpful to improve mothers' knowledge on neonatal danger signs. **Key words:** Neonatal Danger Signs, Mothers' Knowledge, East Gojjam, Ethiopia

## Background

The first 28 days of life – the neonatal period – represent the most vulnerable time for a child's survival. Globally, 2.7 million deaths or roughly 45% of all under-five deaths occur during the neonatal period in 2015. Of these, almost 1 million neonatal deaths occur on the day of birth and close to 2 million die in the first week of life.

Although the highest absolute number of newborn deaths occur in Asia due to the high birth rate and population in its countries, Africa still accounts the highest rates of neonatal deaths (34 deaths per 1,000 live births in 2011) ever seen around the world(1). Particularly the Sub-Saharan Africa, accounts for 38% of the global neonatal death (2).

According to the world health report, every year in Ethiopia, 120,000 babies die in the first 4 weeks of life and the 2011 EDHS reported a 37% neonatal mortality rate (3). The majority of this new born deaths occur at home where a few families recognize signs of newborn illness and nearly all neonates are not taken to health facilities when they were sick(4).

Neonates often present with non-specific symptoms and signs that indicate severe illness. Such signs might be present at or any time after delivery within the neonatal periods, the first 28 days following birth. The signs include: not feeding well, convulsions, drowsy or unconscious, movement only when stimulated or no movement at all, fast breathing(60 breaths per min), grunting, severe chest in-drawing, raised temperature(> 38 °C), hypothermia(< 35.5 °C) and central cyanosis(5).

Recognizing the occurrence of these signs will results in high overall sensitivity and specificity to predict the need for seeking treatment of the new born(6).

Reducing neonatal mortality is increasingly important not only because the proportion of under-five deaths that occur during the neonatal period is increasing as under-five mortality declines but also because the health needed to address the major causes of neonatal deaths generally differ from those needed to address other under-five death(7). Neonates are more prone to show subtle signs of illness, and the three major causes of neonatal deaths worldwide are infections, diarrhea (36%), pre-maturity (28%) and birth asphyxia (23%)(8-10).

Morbidity and mortality from these diseases can be reduced considerably if care is sought early. Thus, in low and middle income countries like Ethiopia, the ability of mothers to recognize the common danger signs of neonatal illness and seek appropriate care is instrumental in reducing under-five children deaths. This is only possible if mothers' knowledge regarding the neonatal danger signs is good enough to make decision to seek health care service

## Methods

A community based cross-sectional study was conducted from September 24 to October 16, 2017 in Debre Markos Town, which is found in East Gojjam zone, Amhara Nation Regional State. Menkoror was the former name of the town which was established in 1845 E.C. the town was established at the altitude of 2420 – 2509 meters above sea level and located 300 km away from Addis Ababa, the capital city of Ethiopia and 265 km from Bahir Dar, the Amhara region capital. The town has average annual temperature of 16 °C and average annual rain of 1308 mm<sup>3</sup>. The town is organized into 07 kebeles and based on 2007 E.C census the town has total population of 101, 582 of whom 52, 827 were women and 48,755 were men all allocated with an estimated area of 600 square kilometers. In the town there are 3 health centers, 7 health posts, 17 clinics, 21 drug dispensers and 01 referral hospital.

All mothers who gave birth within the last 12 months and who were living in Debre Markos town were source populations. The Study population for this study included all mothers who gave birth within the last 12 months in the selected 'kebeles' who were available during the study period. And then, all mothers who gave birth within the last 12 months in the selected 'kebeles', at household level were considered as study units.

Mothers who lived in the study area less than 6 months, mothers who had still birth for the recent delivery and those who were mentally and physically incapable to give response during the data collection were excluded.

The sample size was calculated by using the single population proportion formula with the assumption of 95 % CI, and 18.2% proportion of mothers' good knowledge on neonatal danger signs(11). Considering the design effect of cluster sampling (2) and possible non – response rate during the survey (10 %), the final sample size required was 504.

Cluster sampling technique was used to select the study units by considering kebeles as clusters. Out of 7 kebeles (clusters) in the town; three clusters (C2, C 4 and C 5) were selected by simple random sampling by using balloting method. Then all eligible mothers in the selected clusters (521) were included in the study. Tottery method was used to select one participant when two or more eligible mothers were available in the same household.

The independent variables were categorized into three sections: socioeconomic and demographic variables; (age, marital status, parents' educational status, occupational status, economical status, religion and ethnicity), obstetrics related factors: (parity, Ante natal care, BPCR, SBA, place of birth, mode of delivery and PNC) and other health related: (woman's' autonomy on health issues, income, source of information and access to media.

The dependent variable in this study was being knowledgeable or not for neonatal danger signs. Those study participants who mentioned as many danger signs as the calculated mean value (three) and above to unprompted knowledge related list of WHO identified danger signs.

Data was collected by face to face interview using a structured and pre-tested questionnaire. The questionnaire was first prepared in English and translated to Amharic, and then back to English after minimal amendment was done. Five diploma midwives were allocated to collect data. Two BSc midwives from Debre Markos hospital were assigned to supervise the data collection process. Both the data collectors and supervisors were given one day training before the actual work regarding WHO neonatal danger signs, the aim of study, procedures and collection techniques going through the questionnaires, art of interviewing and ways of collecting the data.

After obtaining oral informed consent, trained data collectors interviewed mothers regarding newborn danger signs. Mothers with children under-1 year were asked to list signs they considered serious health issues and could potentially endanger the life of neonates. They were also requested to list any of these signs they have had personally experienced and the initial actions they took. The danger signs listed by mothers were organized and grouped into eight WHO recognized danger signs(12).

Every day after data collection, questionnaires were reviewed and checked for completeness and relevance by the supervisors and principal investigator and the necessary feedback was offered to data collectors in the next morning and before end up incomplete questions were complete using pre-coded

and for controlling errors during data analysis, 10% of the questionnaire was double entered into the software and also frequency check was done.

Epi-Info 7 was used to input the raw data. Data cleaning was done. SPSS 20 was used for data analysis. Chi-square and logistic regression statistical instrument was also used to establish the relationship between knowledge of WHO recognized danger signs and other explanatory variables. Results were presented in percentages, odds ratios and 95% confidence intervals where appropriate. Statistical significance was set or considered at p-value <0.05.

Ethical clearance was obtained from Midwifery department through delegation from institutional ethical review board of university of Gondar. Formal letter of cooperation was written for Debre Markos health office and respective kebeles. Following this permission was obtained. Verbal informed consent was obtained from each study participants, each respondent was informed about the objective of the study that it would contribute to improve child health. Any involvement in the study was after complete consent obtained. Any mother who was not willing to participate in the study was not forced to participate. They were also informed that all data obtained from them would be kept confidentially by using codes instead of any personal identifiers and is meant only for the purpose of the study.

## Results

### Socio-demographic characteristics of study participants

A total of 521 mothers, who gave birth within the last one year prior to the data collection, were included in the study with 91.0% response rate. The largest proportion of respondents was between the ages of 25 and 34(59.40%). The minimum and maximum ages of the sample were 15 and 39 respectively with the mean age of 27.45 (SD  $\pm$  5.12) years (Table 1).

### Obstetrics related characteristics

Among the interviewees, 269(56.9%) had attended ANC for their last pregnancy and only 169 (35.7%) had four and above ANC attendance, which is the recommended number of visit. Eighty eight (18.6%) mothers gave birth at home. Of whom, 48 (54.6%) were attended by traditional birth attendants. Three hundred eighty-five (81.4%) mothers gave their last birth at a health institution (Table 2).

### Women's knowledge of newborn danger signs

Knowledge of at least one of the defined key danger signs was present in 72.5% of all women: however, only 37.2% could name at least two signs. Forty two (26.2%) mothers were knowledgeable about neonatal danger sign (95% CI 22.2, 30.4). At least four, five danger signs were correctly listed by 26.2, 17.3 and 6.3% of the respondents respectively while only 3.3 and 1.0 % correctly listed up to six and seven WHO recognized danger sign respectively (Table 3). The most commonly reported source of information was health professionals.

“Fever” was the most commonly known danger sign and referred to by 44.6% of the participants. The least known danger signs were “skin rash” and “convulsion”, stated by less than 10.0 % of the respondents (Fig. 1).

### **Women’s’ experience and health care practice**

One hundred twenty two (25.8 %) of the respondent had noticed one or more of the danger signs in their current child when s/he was a neonate. Of whom, 55.7 and 7.4% took their child to government hospital and private clinic immediately without any home intervention respectively. Eleven (9%) of these mothers did nothing while the remaining 34 (27.8%) did the following: gave self-medication without physician order 7 (5.7%), contact traditional healer 21(17.2%) and 6(4.9%) used other home interventions. ‘Other’ home interventions included sponging with cold water for fever, exposure to sunlight for jaundice, massage with oil for hypothermia, and bathing with rice water for rash (Fig. 2 and Fig. 3).

### **Factors associated with mothers’ knowledge about neonatal danger signs**

As shown in the logistic regression analysis table, on bivariate analysis the factors found to be significantly associated with mothers’ knowledge about neonatal danger signs were: parent higher educational achievement (mother and husband), parity, ANC practice, being prepared for birth, PNC follow up and accesses for mass media (radio and television).

From this factor variables, parent higher educational achievement, ANC practice, being prepared for birth, PNC follow up and access for television were significantly associated with the dependent variable in multivariate logistic regression analysis (Table 4).

## **Discussion**

This study revealed that, the proportion of knowledgeable mothers was found to be 26.2%. This finding is in line with neonatal danger signs knowledge level reported in Afghanistan (28%)(13) and four regions of Ethiopia (29%)(14) but it is higher than the knowledge level reported in India(13.9%)(15), Ethiopia (18.2%)(11) and Ghana (20.3%)(16). The inconsistency might be because of the unprompted questions used for assessing the danger signs and time, measurement and cultural differences.

Mothers’ education is an important determinant factor for the outcome variable. Mothers having secondary and tertiary level education were nearly four times (AOR=3.64, 95% CI 1.14, 11.61 and AOR=3.80, 95% CI 1.25, 11.56) more likely to be knowledgeable on neonatal danger signs as compared to mothers who can’t read and write. This could, possibly, be justified by the fact that educated mothers acquire general knowledge about family health issues through their formal education (11). However, this finding is dissimilar from studies reported in Uganda(17) and AIJRHASS(18). The variation might be due to the deference in study setting.

Fathers’ education was also a significant factor for mothers to be knowledgeable. The odds of being knowledgeable about neonatal danger signs was four times among mothers whose husbands attained

secondary (AOR=4.22, 95% CI 1.53, 11.60) and tertiary education (AOR=4.34, 95% CI 1.52, 12.37). The best explanation for this could be fathers' status in decision-making might positively influence mothers' knowledge on neonatal danger signs.

ANC and PNC attendance generates a superior opportunity for the mothers to be knowledgeable about danger signs of neonatal illness. Antenatal and postnatal care attendant mothers were nearly four times (AOR = 3.54, 95% CI 1.62, 7.75) and more than two times (AOR = 2.41, 95% CI 1.13, 5.14) more likely to be knowledgeable towards neonatal danger sign as compared to non-attendant mothers respectively. This could be strongly accepted as mother's exposure to ANC and PNC package increased the knowledge of the mothers concerning newborn health issues.

Having BPCRPs was also found to be significantly associated with being knowledgeable on DSONIs. Mothers who had BPCRPs were more than two times (AOR = 2.43, 95% CI 1.20, 4.89) more likely to be knowledgeable as compared to their counterparts. This finding was supported by studies conducted in Ghana<sup>(16)</sup> and India<sup>(15)</sup>. This might be due to; mothers who had BPCRPs were having more exposure about child health issues.

Moreover, television accessed mothers were found to be knowledgeable on neonatal danger signs. Television accessed mothers were two times (AOR = 2.06, 95% CI 1.01, 4.21) more likely to be knowledgeable than their complement. This finding was supported by a study conducted in Ghana<sup>(16)</sup> and Gondar, Ethiopia<sup>(11)</sup>. This might be due to television airtime programs which are dedicated to teach the community about health issue of mothers and children.

## Limitations

Its cross-sectional nature affects the establishment of the cause and effect relationship between maternal knowledge regarding the danger signs and the factors that were identified. And also, the unprompted knowledge questions and relatively longer recall period might bias the true knowledge level of the mothers.

## Conclusions

The proportion of knowledgeable mothers (those mothers who listed at least three WHO identified key danger sign of neonatal illness) was found to be low. The most commonly reported source of information about WHO identified DSONI was health professionals and among the DSONIs, fever was the most known and most experienced or noticed by mothers.

Mothers' and husbands' higher educational achievement, attending ANC, having BPCRPs, receiving PNC package and access for television were found to be significantly associated with being knowledgeable on neonatal danger sign.

## Recommendations

Debre Markos Zonal Health Department shall promote antenatal and post natal care package utilization for all mothers who are pregnancy or after giving birth till 6wks, especially for the first one month. Debre Markos Zonal Education Bureau shall give a priority target for intervention modalities such as encouraging parent education, up to the level of college and above, so as to increase mothers' knowledge on DSONI.

Obstetric care providers should ensure that every pregnant and recently delivered woman needs to have a BPCR. It would also be helpful if a supplemental qualitative research is conducted, mainly focusing on reasons why mothers do prefer to seek care for sick neonates other than health facilities.

## Abbreviations

ANC: Ante Natal Care; BPCR: Birth Preparedness and Complications Readiness; FMH: Federal Ministry of Health; IMNCI: Integrated Management of Neonatal and Childhood Illness; MDG: Millennium Development Goal; MMR: Maternal Mortality Ratio; NGOs: Non-Governmental Organizations; NMR: Neonatal Mortality Rate; PNC: Post Natal Care; SBA: Skilled Birth Attendant; SDGs: Sustainable Development Goals; WHO: World Health Organization

## Declarations

- **Ethical approval and consent to participate**

Ethical approval was obtained from the Institutional Review Board of College of Medicine and Health Science, University of Gondar. Letter of permission was obtained from Amhara National Regional Bureau and Debre Markos town administration office. Both written and verbal consent was obtained from study participants after the purpose of the study was explained. Written consent was received from adult next-of-kin when the respondent was less than 18 years of age and verbal assent was obtained from less than 18 years age of participants. Participants were informed that participation was voluntary and they could withdraw at any time. Personal identifiers were not included in the questionnaires to ensure participant confidentiality.

- **Consent for publications:** Not applicable
- **Availability of data and material:** The data sets generated during the study are available from the corresponding author upon request.
- **Competing interest:** The authors declare that they have no competing interests
- **Funding:** This work was funded by University of Gondar for data collection. The funder had no role in study design, data analysis, and interpretations of data or writing of manuscript.
- **Authors' contributions**

BWY wrote the proposal, led study design, analyzed the data, drafted the manuscript and ensured that all authors approved the manuscript before submission.



MBB revised subsequent drafts of the paper, approved the proposal and reviewing the manuscript.

TWG revised subsequent drafts of the paper, approved the design and reviewing the manuscript.

ATT approved the design and reviewing the manuscript.

GLA involved in data analysis and reviewed of the manuscript.

SAB approved the proposal and reviewed the manuscript.

All authors read and approved the final manuscript

- **Acknowledgements**

We would like to acknowledge University of Gondar, College of Medicine and Health Sciences, Department of Midwifery. Our sincere and deepest gratitude goes to Debre Markos town administration. We would also like to extend our thanks to data collectors, supervisors and study participants.

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## Tables

Table 1; Socio-economic and Demographic characteristic of mothers in Debre Markos town, East Gojjam, North West Ethiopia (N = 473), October 2017.

Variable	N (%)	Variable	N (%)
Age		Education	
Less than 24	129(27.3)	Can't read and Wright	87(18.4)
25-34	281(59.4)	Read and Wright	105(22.2)
35 and above	63(13.3)	Primary education	88(18.6)
Marital Status		Secondary Education	86(18.2)
Married	406(85.8)	Tertiary Education	107(22.6)
Widowed	23(4.5)	Occupation	
Divorced	21(4.4)	House Wife	248(52.4)
Single	23(4.9)	Merchant	54(11.4)
Religion		Goven't Employee	107(22.6)
Orthodox	348(73.6)	Private Employee	40(8.5)
Muslim	89(18.8)	Other***	24(5.1)
Protestant	21(4.4)	Husband's Education	
Other*	15(3.2)	Can't read and Wright	107(22.6)
Ethnicity		Read and Wright	108(22.8)
Amhara	375(79.3)	Primary education	95(20.1)
Oromo	37(7.8)	Secondary Education	81(17.1)
Tigray	52(11.0)	Tertiary Education	82(17.3)
Other**	9(1.9)	Husband's Occupation	
Monthly Income		Farmer	74(15.6)
≤ 1999	139(29.4)	Government Employee	153(32.3)
2000-3999	191(40.4)	Private Employee	102(21.6)
≥ 4000	143(30.2)	Merchant	116(24.5)
		Other***	28(5.9)

\* Includes; Catholic, Jewish and paganism \*\*\* Includes; jobless, student, tanner and carpenter

\*\* Includes; Guragie, Awi, Shenasha

Table 2; Obstetrics related characteristic of mothers in Debre Markos town, East Gojjam North West Ethiopia (N = 473), October 2017.

Variable	N (%)	Variable	N (%)
Parity		Place of birth	
Primiparus	104(22.0)	Home	88(18.6)
Multiparus	369(78.0)	Health institution	385(81.4)
		PNC Attendance	
No of alive children		No	204(43.1)
3 and bellow	246(52.0)	Yes	269(56.9)
4 and above	227(48)	Frequency of Visits	
ANC Attendance		0	204(43.1)
No	204(43.1)	1-2	177(37.4)
Yes	269(56.9)	3 and above	94(19.9)
Frequency of Visits		Birth Attendant	
0	204(43.1)	Family	15(3.2)
1-3	100(21.1)	Traditional birth attendant	48(10.1)
4 and above	169(35.7)	Health extension worker	25(5.3)
		Health professional	385(81.4)

Table 3; Mothers' Knowledge of key danger signs, Debre Markos Town, East Gojjam North West Ethiopia (N = 473), October 2017.

Knowledge of danger signs	n	(%)
None	130	27.5
At least 1	343	72.5
At least 2	176	37.2
At least 3	124	26.2
At least 4	82	17.3
At least 5	30	6.3
At least 6	16	3.3
At least 7	5	1.0
All signs	0	0.0

Table 4; Bivariable and Multivariable analysis of factors associated with mother's knowledge about neonatal danger signs, Debre Markos town, East Gojjam, North West Ethiopia (N = 473), Oct. 2017.

Factor variables	Knowledge of danger signs		COR (95% CI)	AOR (95% CI)
	Knowledgeable, n (%)	Not Knowledgeable, n (%)		
Educational Status				
Can't read and write	7(8)	80(92)	1	
Read and write	12(511.4)	93(88.6)	1.48(0.55-3.93)	0.71(0.20-2.56)
Primary education	10(11.4)	78(88.6)	1.47(0.53-4.04)	0.39(0.11-1.34)
Secondary Education	22(44.9)	50(58.1)	8.23(3.40-19.91)	3.64(1.14-11.61) **
Tertiary Education	59(55.1)	48(44.9)	14.05(5.94-33.24)	3.80(1.25-11.56) **
Husband Education				
Can't read and write	11(10.3)	96(89.7)	1	
Read and write	10(9.3)	98(90.7)	0.89(0.36-2.19)	2.69(0.89-8.15)
Primary education	17(17.9)	78(82.1)	1.90(0.84-4.30)	1.63(0.60-4.44)
Secondary Education	33(40.7)	48(59.3)	6.00(2.79-12.90)	4.22(1.53-11.60) *
Tertiary Education	53(64.6)	29(35.4)	15.95(7.38-34.48)	4.34(1.52-12.37) *
Radio				
No	22(19.1)	93(80.9)	1	
Yes	102(28.5)	256(71.5)	1.68(1.00-2.83)	1.58(0.75-3.32)
Television				
No	19(8.2)	212(91.8)	1	
Yes	105(43.4)	137(56.6)	8.55(5.02-14.58)	2.06(1.01-4.21) *
Parity				
Primiparus	19(18.7)	85(81.3)	1	
Multiparus	105(28.5)	264(71.5)	1.78(1.03-3.07))	0.92(0.42-2.01)
ANC Follow up Visit				
No	7(3.5)	191(96.5)		
Yes	117(42.5)	158(57.5)	10.32(5.60-19.03)	3.54(1.62-7.75) **
BPCR				
No	25(9.0)	252(91.0)		
Yes	99(50.5)	97(49.5)	10.29(6.26-	2.43(1.20-4.89) *

			16.92)	
PNC Follow up Visit				
No	14(6.9)	190(93.1)		
Yes	110(40.9)	159(59.1)	9.39(5.18-17.02)	2.41(1.13-5.14)**

## Figures

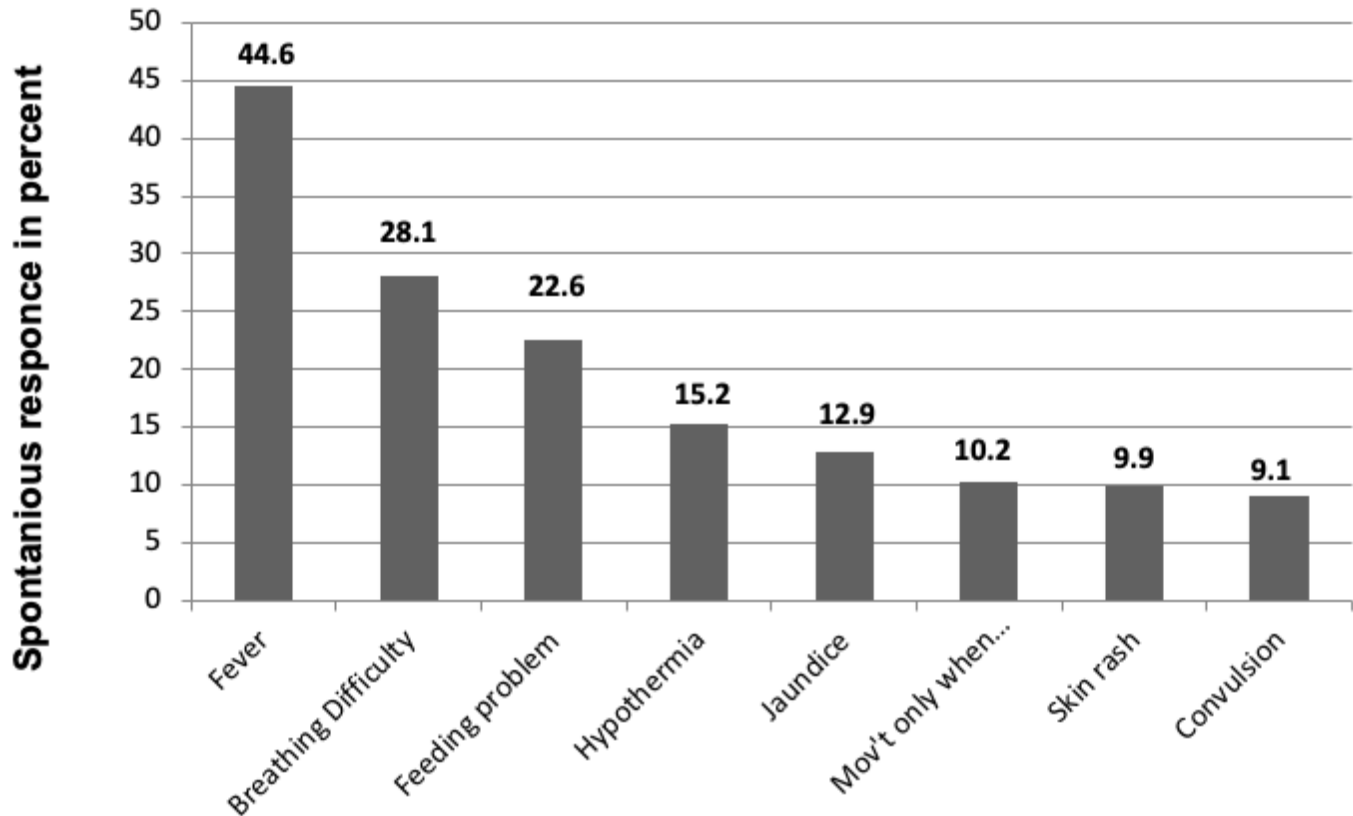


Figure 1

Pattern of Mothers' Knowledge on key danger signs, Debre Markos town, East Gojjam North West Ethiopia, October 2017.

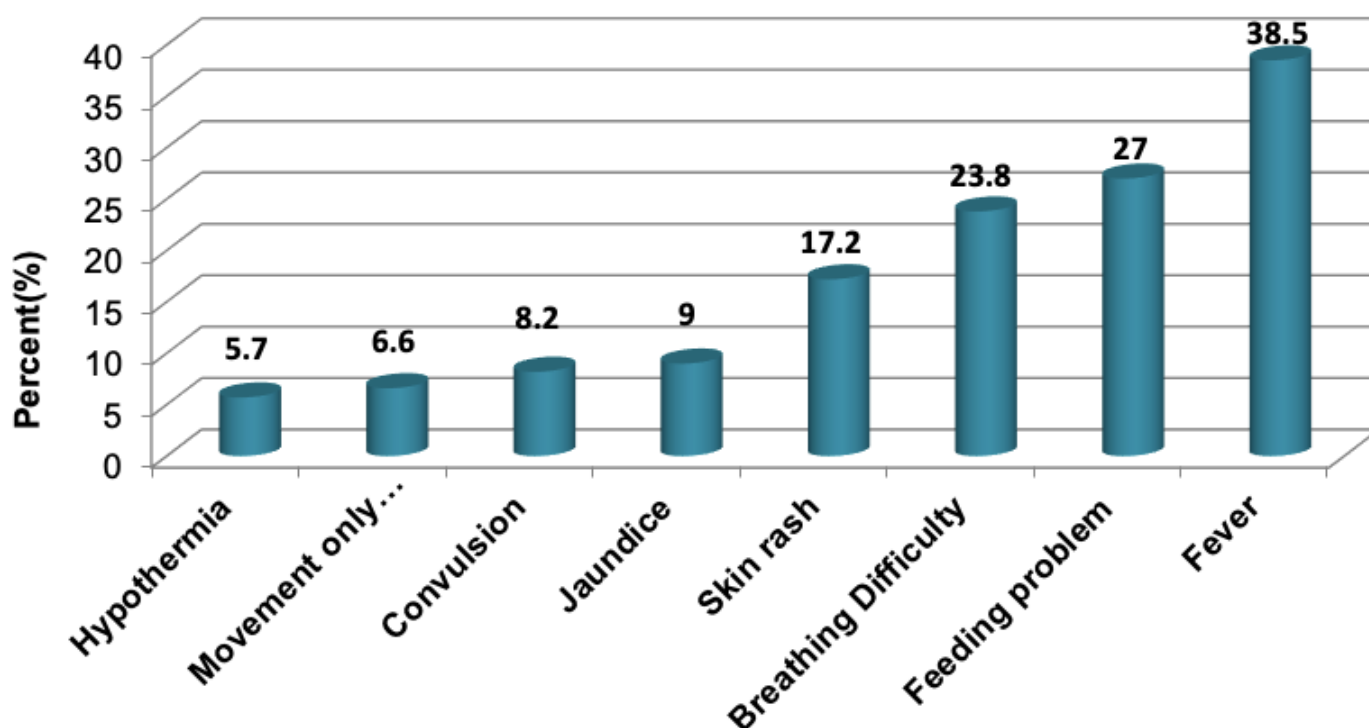


Figure 2

Key danger signs noticed by mothers form ill neonate, Debre Markos Town, East Gojjam North West Ethiopia (N = 122), Oct. 2017.

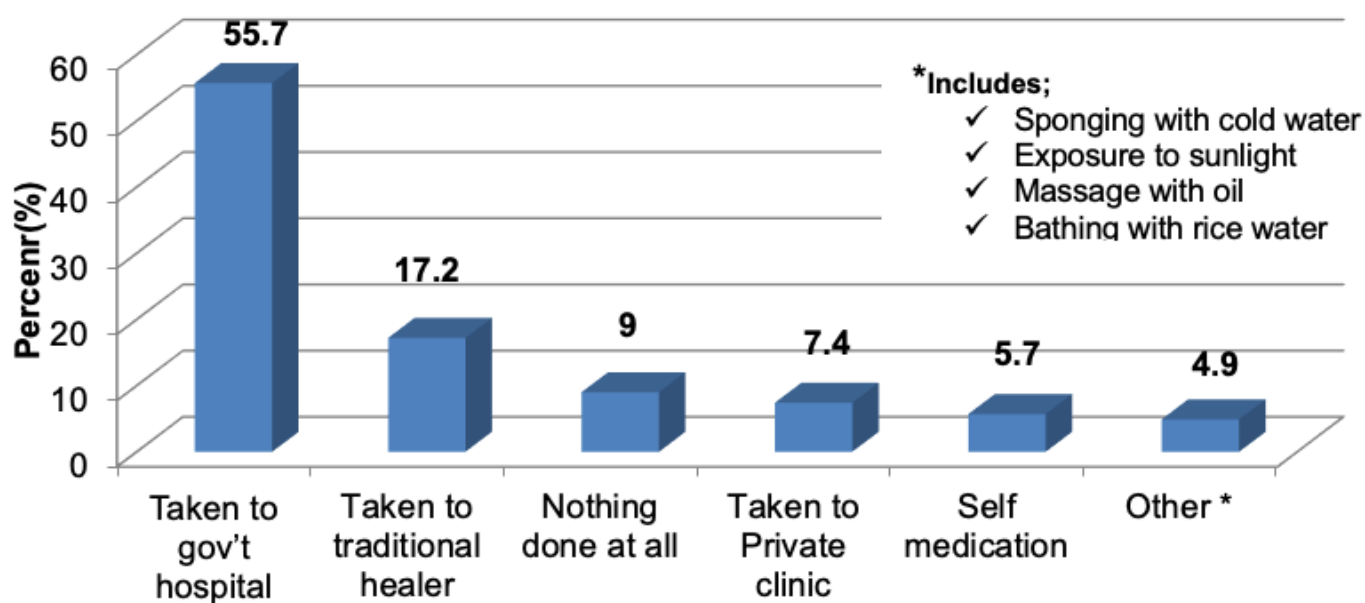


Figure 3



Mothers' reaction after recognizing key danger signs on their neonate, Debre Markos Town, East Gojjam North West Ethiopia (N = 122), Oct. 2017.