Exploring knowledge on danger signs of common childhood illnesses and associated factors among mothers of under-five children in Central Tigray, Ethiopia: a cross-sectional study

Senait Gebreslasie^{1,*}, Guesh Welu², Betiel Berhane³, Birhanu Gebresilassie⁴, Berhane Fseha⁵, Tesfay Tsegay⁶, Hadush Negash⁷

Abstract

Introduction Globally, a large number of under-five deaths have occurred from preventable and treatable common childhood illnesses. Therefore, early identification of general danger signs of common childhood illnesses and adhering to appropriate treatment helps to reduce morbidity and mortality. This study aimed to assess the knowledge of mothers and associated factors on general danger signs of common childhood illnesses of under-five children in Central Tigray, Ethiopia.

Methods A community-based cross-sectional study design was employed from February to March 2017. A total of 416 study participants were finally enrolled in the study using simple random sampling technique. A pretested and structured interviewer-based questionnaire was used. Data were entered, coded and analysed using SPSS 22.0. Multivariable logistic regression was used to control the effect of confounders.

Results In this study, 44.7% of the mothers had good knowledge of the general danger signs of common childhood illnesses. Mothers' educational status (AOR=1.93, 95%CI=1.09-3.44, $p=0.025$), occupation of mothers (AOR=5.94, 95%CI=3.17-11.12, $p\leq 0.001$), childbirth order (AOR=1.85, 95%CI=1.00-3.40, $p=0.005$) and source of information (AOR=2.19, 95%CI=1.23-3.87, $p=0.007$) were significantly associated with knowledge of mothers on general danger signs of common childhood illnesses.

Conclusions Maternal knowledge of general danger signs of common childhood illnesses was low. Therefore, intervention modalities focusing on improving the educational level, behavioural change communication activities, and access of mothers to health visits are needed.

Keywords General danger signs, knowledge, mothers, under-five children

Introduction

General danger signs are indicators of disease that have negative impact on the severe consequences of child health by increasing morbidity and mortality. The World Health Organization (WHO) established the Integrated

Management of Newborn and Childhood Illness (IMNCI) to focus on the assessment of general danger signs in the examination of children presenting with illness at health facilities.¹

According to IMNCI guidelines, general danger signs of under-five childhood illnesses are

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¹MSc, Department of Midwifery, College of Medicine and Health Science, Adigrat University, Adigrat, Ethiopia, P.O Box 50; ²MSc, Department of Midwifery, College of Medicine and Health Science, Adigrat University, Adigrat, Ethiopia, P.O Box 50; ³MSc, Department of Midwifery, College of Medicine and Health Science, Adigrat University, Adigrat, Ethiopia, P.O Box 50; ⁴MSc, Department of Midwifery, College of Medicine and Health Science, Adigrat University, Adigrat, Ethiopia, P.O Box 50; ⁵MSc, Department of Public Health, College of Medicine and Health Science, Adigrat University, Adigrat, Ethiopia, P.O

Box 50; ⁶MSc, Department of Nursing, College of Medicine and Health Science, Adigrat University, Adigrat, Ethiopia, P.O Box 50; ⁷MSc, Department of Laboratory, College of Medicine and Health Science, Adigrat University, Adigrat, Ethiopia, P.O Box 50.

*Corresponding author: Senait Gebreslasie, senaitgs42@gmail.com

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categorized as: unable to breastfeed, unable to drink or eat, vomiting everything, convulsion and lethargic/unconscious. Sick children with these danger signs need rapid management and after the pre-referral treatment urgent referral is mandatory and any delay in treatment exhibits child mortality.²

Globally, a large number of under-five deaths occurred from preventable and treatable diseases, such as: acute respiratory infections (ARI, 7%), diarrheal diseases (12%) and febrile illnesses (14%).³ Prompt diagnosis and appropriate management of the general danger signs of common childhood illnesses is mandatory for reducing morbidity and mortality.⁴

Reduction in the mortality rate of under-five children is improved from 1.8% by the year of 1990-2000 to 3.9% from 2000-2015 worldwide. Global community permitted Sustainable Development Goal (SDG) at the termination of Millenium Development Goal to reduce avoidable deaths of under-five children.³

Now out of the 79 countries over 25 of them have under-five mortality and when the existing trend proceeds, 47 of the countries will not attain the SDG target by 2030.³ To accomplish this goal in reduction of childhood mortality, mothers' timely recognition of general danger signs of under-five child illnesses and getting appropriate medical access serve as a backbone.^{1,5}

Diarrhea, ARI and febrile illnesses are the primary causes of child mortality with the main difficulty occurring in the lowest as well as middle-income countries.⁶ Of the global under-five deaths, 98.7% have occurred in developing countries, with the highest numbers found in the South East Asian Region (SEAR) and in Sub Saharan Africa (SSA).^{3,7} Prompt diagnosis and appropriate management of the general danger signs of diarrhea, fever and ARI is crucial for reducing morbidity and mortality among under-five children.⁴

According to the Ethiopian Demographic Health Survey (EDHS) 2016, under-five mortality declined from 116 deaths per 1,000 live births from 2002-2006 to 67 deaths per 1,000 live births in the year of 2012-2016 and the most common diseases of under-five children were ARI, fever and diarrhea. In the Tigray region only

30.6% of children with ARI, 31.6% with fever and 49% of children with diarrhea received treatment from a health facility. Most neonatal deaths took place at home, thus indicating lack of an early recognition of the danger signs and low treatment-seeking practice of mothers towards modern healthcare service.⁸

In Ethiopia, to reduce under-five mortality, implementation of the IMNCI program and initiation of a number of essential public health initiatives were undertaken. Even with those activities, under-five childhood deaths are still high.⁹

The factors that affected childhood illnesses and mortality are: demographic status, economic conditions, physical, financial accessibility, disease pattern, lack of antenatal care utilization, unsupervised and poorly supervised home deliveries, health system inefficiencies, infrastructural and socio-economic constraints.^{4,10,12}

There is a scarcity of data regarding the knowledge and associated factors of childhood illnesses in Ethiopia. Therefore, this study was aimed to assess knowledge of mothers and associated factors on general danger signs of common childhood illnesses of children under the age of five years old.

Methods

Study area and design

The study was held in Adwa town, Tigray, Ethiopia, which is found in Central Tigray Regional state at a distance of 977 km away from Addis Ababa (the capital city of Ethiopia) and 190 kms from Mekelle (the capital city of Tigray). A community-based cross-sectional study design was employed among mothers who had ever had sick under-five children with a history of common childhood illness in 2017.

Sample size and sampling procedure

A total of 418 mothers who had ever had sick under-five children with a history of common childhood illness were included in the study. The sample size was determined using single population proportion formula, by using 95% confidence level, 5% margin of error, 10% of the non-response rate and considering 55.4%

proportion of mothers' health-seeking behaviour for common childhood illnesses.¹³

The sample size was allocated to the five kebeles of Adwa town by proportional allocation. The list of households of the under-five child with a common childhood illness six months prior to the survey was identified by health extension workers working in each kebele and the sampling frame was made from that; by using simple random sampling method (lottery method), the sample was selected.

Data collection procedure

Interviewer based structured questionnaires were used to collect the data. Questions were suitably translated to the local language, Tigrigna and then back to English for data entry. For data collection and supervision, five diploma nurses working outside the study area and three BSc health professionals working in Adwa town were recruited accordingly. The data collectors were trained for two days on information about data collection tools, techniques, approaching participants, ethical issues and advantage of collecting the actual data.

A pre-test was conducted among the 42 (10%) mothers from Axum, a place near to Adwa with similar study population, two weeks before the actual data collection period, for its clarity, understandability and completeness, and individuals who participated in the pre-test were excluded from the actual data collection. After that, the necessary corrections and modifications were made.

Confidentiality of the participants was kept throughout the study and the supervisors were controlling the data collection process and checked the data collection tool. At the end of each day, questionnaires were reviewed and cross-checked for their completeness, accuracy and logical consistency by the principal investigator and corrective measures were undertaken.

Operational definitions

General danger signs: according to WHO standard categorized as: unable to breastfeed, unable to drink or eat, vomiting everything, convulsion, and lethargic or unconsciousness.²

Good knowledge on general danger signs: referred for the mothers who mentioned mean score and above of the knowledge questions (≥ 3 general danger signs).^{14,16}

Poor knowledge on general danger signs: referred for the mothers who mentioned below the mean score of the knowledge questions (< 3 general danger signs).^{14,16}

Ever sick children with common childhood illnesses: the children had become ill with ARI, diarrhea and fever 6 months prior to the study.

Data analysis

Data were coded, entered and analysed using Statistical Package for Social Science (SPSS) version 22.0 software (IBM Corp., Armonk, NY, USA). Descriptive analysis was done by using frequencies and percentages. Bar graph and pie chart were used to describe the study participants in relation to relevant variables and association between independent and dependent variables were assessed using crude odds ratio with 95% confidence interval with respect to the p-value. If significant variables ($p < 0.2$) were detected at the bivariate logistic regression level they were entered to multivariable logistic regression.

The model of fitness was checked by Hosmer and Lemeshow test and its p-value was 0.917. Multicollinearity was checked using the Variance Inflation Factor (VIF) and those with VIF greater than 10 were excluded from the model. Finally, adjusted odds ratios (AOR) with 95% confidence interval (CI) and p-value less than 0.05 were considered as a significant association.

Ethical statement

Ethical approval was obtained from a research ethics committee of the College of Health Sciences of Mekelle University with a reference number of 0906/2017. Official letter of cooperation was written to Tigray Regional Health Bureau from the Department of Nursing. Support letter was obtained from the Tigray Regional Health Bureau and Adwa Woreda health office and respective selected kebeles before field activities. Informed verbal consent was obtained from study participants.

Confidentiality of results among the study participants was kept.

Results

Socio-demographic characteristics of respondents

A total of 416 mothers have participated with an overall response rate of 99.52%. Two mothers were excluded from the study due to critical illness.

The mean age of mothers was 30.07 (standard deviation (SD) ± 5.658) ranging from 16 to 49 years. One hundred and eighty-six (44.7%) of the mothers were in the age group of 25-29 years old and 283 (68%) of the participants were married (Table 1).

Table 1. Socio-demographic characteristics of mothers on recognizing the knowledge of mothers on general danger signs of common childhood illnesses in Central Tigray, Ethiopia, 2017 (N=416)

Variables	Frequency	Percentage
Age of mothers (years)		
15-19	17	4.1
20-24	31	7.5
25-29	186	44.7
30-34	98	23.6
35-39	60	14.4
>39	24	5.8
Marital status		
Single	83	20
Married	283	68
Divorced	35	8.4
Widowed	15	3.6
Religion		
Orthodox	314	75.5
Muslim	69	16.6
Catholic	15	3.6
Protestant	18	4.3
Educational status		
No formal education	136	32.7
Primary education	102	24.5
Secondary and above	178	42.8
Occupation		
House wife	194	46.6
Daily laborer	56	13.5
Civil servant	87	20.9
Merchant	50	12
Private organization	29	7

Demographic characteristics of under-five children

Out of 416 mothers, 157 (37.7%) mothers had a child in the age group of less than 12 months. About half of the children 213 (51.2%) were males (Table 2).

Table 2. Health service utilization and other factors related to under-five children in Central Tigray, Ethiopia, 2017 (N=416)

Variables	Frequency	Percentage
Child age (months)		
<12	157	37.7
12-23	67	16.2
24-35	82	19.7
36-47	57	13.7
48-59	53	12.7
Sex of the child		
Male	213	51.2
Female	203	48.8
Family size		
≤ 5	285	68.5
> 5	131	31.5
Number of under-five children		
1	117	28.1
> 2		
Childbirth order		
1 st	83	20
2 nd -3 rd	135	32.5
$> 3^{\text{rd}}$	198	47.5
ANC follow up		
Yes	358	86.1
No	58	13.9
Place of delivery		
Health institution	390	93.8
Home	26	6.2
PNC follow up		
Yes	256	61.5
No	160	38.5

ANC – antenatal care; PNC – postnatal care.

Health service utilization and obstetrics related factors

Three hundred and fifty-eight (86.1%) of the participants had an antenatal care (ANC) follow-up for their last pregnancy and 256 (61.5%) of the respondents had postnatal care (PNC) follow-up (Table 2).

Childhood illnesses of under-five children

Of the total 416 sick children with childhood illnesses 6 months prior to the study, 78.6% of the children experienced two or more symptoms of those common childhood illnesses (Table 3).

Table 3. Reported common childhood illnesses on recognizing the knowledge of mothers on general signs of common childhood illnesses in Central Tigray, Ethiopia, 2017 (N=416)

Variables	Frequency	Percentage
Diarrhea		
Yes	307	73.8
No	109	26.2
Fever		
Yes	185	44.5
No	231	55.5
Acute respiratory infection		
Yes	251	60.3
No	221	39.7

Knowledge of mothers on general danger signs of common childhood illnesses of under-five children

Concerning WHO standard general danger signs of common childhood illnesses, vomiting everything 305 (73.3%) was the most commonly mentioned danger sign. The mothers who mentioned 1, 2, 3, 4, 5 and 6 WHO standard general danger signs of common childhood illnesses of under-five children were 40 (9.6%), 190 (45.7%), 23 (5.5%), 81 (19.5%), 57 (13.7%) and 25 (6%) respectively (Table 4).

On the other hand, among the 19 (4.6%) non-WHO standard general danger signs (others); 6 (31.6%) of the respondents mentioned eye problem, 2 (10.5%) ear problem, 2 (10.5%) low body temperature, 7 (36.8%) irritability, 1 (5.3%) tonsillitis and 1 (5.3%) constipation mentioned as a key general danger signs of under-five child illnesses (Table 4).

Regarding mothers' knowledge, more than half of them, 230 (55.3%) had poor knowledge of WHO standard general danger signs of common childhood illnesses (Fig 1).

Table 4. Knowledge of mothers for general danger signs of common childhood illnesses in Central Tigray, Ethiopia, 2017 (N=416)

Variables	Frequency	Percentage
Unable to breastfeed		
No	132	31.7
Yes	284	68.3
Unable to drink or eat		
No	176	42.3
Yes	240	57.7
Vomiting everything		
No	111	26.7
Yes	305	73.3
Convulsion		
No	216	51.9
Yes	200	48.1
Lethargic		
No	289	69.5
Yes	127	30.5
Unconsciousness		
No	324	77.9
Yes	92	22.1
Others (tonsillitis, abdominal cramps, headache)	19	4.6

Factors associated with knowledge of mothers for general danger signs of common childhood illnesses

Variables with a p-value less than or equal to 0.2 in the bivariate analysis were entered to the multivariable logistic regression model: educational status of mothers, childbirth order, occupation of mothers and source of information were found to be significantly associated with knowledge of mothers on general danger sign of under-five common childhood illnesses.

Mothers with primary education were 1.93 times more likely to know about general danger signs than mothers who were illiterate (AOR=1.93, 95%CI=1.09-3.44, p=0.025). Mothers with occupational status of governmental and non-governmental employees were 5.94 and 2.29 times more likely to know about general danger signs of common childhood illnesses than housewives (AOR=5.94, 95%CI=3.17-11.12, p≤0.001 and AOR=2.29, 95%CI=1.19-4.42, p=0.014, respectively).

Figure 1. Knowledge of mothers concerning general danger signs of common childhood illnesses of under-five children in Central Tigray, Ethiopia, 2017

Table 5. Factors associated with knowledge of mothers concerning general danger signs of common childhood illnesses in Central Tigray, Ethiopia, 2017 (N=416)

Variables	Knowledge		cOR (95%CI)	aOR (95%CI)	P-value
	Poor	Good			
PNC attendance					
Yes	133	123	1.42 (0.95-2.13)	1.08 (0.69-1.71)	0.729
No	97	63	1	1	
Educational status of mothers					
No formal education	90	46	1	1	
Primary education	56	46	1.61 (0.95-2.72)	1.93 (1.09-3.44)*	0.025
Secondary and above	84	94	2.19 (1.38-3.47)	1.43 (0.84-2.45)	0.191
Occupation of mothers					
House wife	129	65	1	1	
Daily laborer	42	14	0.66 (0.337-1.29)	0.58 (0.29-1.18)	0.134
Government employee	22	65	5.86 (3.32-10.35)	5.94 (3.17-11.12)*	≤0.001
NGO employee	23	27	2.33 (1.24-4.38)	2.29 (1.19-4.42)*	0.014
Merchant	14	15	2.13 (0.97-4.67)	2.08 (0.91-4.75)	0.081
Child birth order					
1	51	32	1	1	
2-3	67	68	1.62 (0.93-2.82)	1.83 (0.97-3.46)	0.063
>3	112	86	1.22 (0.725-2.066)	1.85 (1.00-3.40)*	0.005
Source of information					
Healthcare providers	114	118	2.22 (1.322-3.72)	2.19 (1.23-3.87)	
Mass media	29	23	1.70 (0.84-3.45)	1.67 (0.76-3.64)	0.007
Experience from other mothers	27	17	1.35 (0.63-2.87)	1.53 (0.64-3.69)	0.200
Experience from the previous child	60	28	1	1	0.343

aOR – adjusted odds ratio; cOR – crude odds ratio; PNC – postnatal care.

Mothers having an under-five child in the birth order of more than three children were 1.85 times more likely to know about general danger signs of common childhood illnesses than those mothers who had only one child (AOR=1.85, 95%CI=1.00-3.40, $p=0.005$). Mothers who get information about general

danger signs of under-five children common childhood illnesses from healthcare providers were 2.19 times more likely to have knowledge than the mothers who get experience from their previous child (AOR=2.19, 95%CI=1.23-3.87, $p=0.007$) – Table 5.

Discussion

A sick child with general danger signs of common childhood illnesses needs management since a delay in seeking care results in disability and child mortality.² This community-based study aimed to assess knowledge of mothers and its associated factors on general danger signs of common childhood illnesses of children under the age of five years old in Adwa town.

In this study, 55.3% of the mothers had poor knowledge of WHO standard general danger signs of common childhood illnesses. This knowledge level is higher when compared with previous studies conducted in North West of Ethiopia (18.2%), Gedeo zone (32.4%) and Southwestern Rural Uganda (14.8%).^{10,17,18} This discrepancy may be due to variation in sample size, time gap, residence, socio-economic and cultural variation.

This study demonstrated that educational status and occupation of mothers, childbirth order and source of information were significantly associated with the level of knowledge on general danger signs of common childhood illnesses among mothers.

Mothers with primary education were about 2 times more likely to be knowledgeable about general danger signs of common childhood illnesses than mothers who were illiterate (AOR=1.93, 95%CI=1.09-3.44, $p=0.025$). This is consistent with a study conducted in Woldia and North West of Ethiopia.^{10,19} This may be due to: educated mothers acquire knowledge about the danger signs of childhood illnesses and human health through their academic life. Furthermore, educated mothers were more likely to make a decision on looking quality of health service and have a better perception of danger signs of common childhood illnesses.

Mothers with occupational status of government employee were 5.94 times more likely to know about general danger signs of common childhood illnesses than housewives (AOR=5.94, 95%CI=3.17-11.12, $p\leq 0.001$) and nongovernmental organization (NGO) employed mothers were 2.29 times more likely to know about general danger signs of common childhood illnesses than housewives (AOR=2.29, 95%CI=1.19-4.42, $p=0.014$). The possible

justification might be due to: governmental and NGO employee mothers may share different experiences in their workplace concerning the knowledge of life-threatening conditions of childhood illnesses with other mothers.

Mothers having an under-five child in the birth order of more than three children were 1.85 times more likely to know about general danger signs of common childhood illnesses than mothers who had only one child (AOR=1.85, 95%CI=1.00-3.40, $p=0.005$). This might be through acquiring knowledge of the danger signs of the children's illnesses through their experience of their previous children.

Mothers who get information about general danger signs of under-five children common childhood illnesses from healthcare providers were 2.19 times more likely to have knowledge than the mothers who get experience from previous child (AOR=2.19, 95%CI=1.23-3.87, $p=0.007$). This may be due to: healthcare providers have a better knowledge concerning health issues better than anybody else because of their profession, taking updated information through different trainings and their life experiences.

The global and national integrated management of common newborn and childhood illnesses are established to improve the vertical and horizontal integration, addressing the main gaps in process of the quality of the healthcare system, providing consistent delivery of high impact clinical interventions and optimizing care as well as reducing unnecessary treatment to danger signs of childhood diseases.²⁰ Many of the concerns are related to the lack of knowledge of mothers on the danger signs of childhood illnesses.

This study also had some limitations. Morbidity data of the children was collected without the validation of medical personnel only by the mothers' perception. This study used a recall period of six months. This may be susceptible to recall bias and social desirability bias. Since the study was cross-sectional, it may not be strong to show direct cause and effect relationship but may only indicate a temporal relationship.

Conclusions

Based on the findings of this study, 55.3% of the mothers had poor knowledge of WHO standard general danger signs of common childhood illnesses. Educational status of mothers, childbirth order, source of information and occupation of mothers were significantly associated with knowledge of mothers on general danger signs of under-five common childhood illnesses.

Therefore, health education, support and counselling should be given to community, particularly to women in health visits, religious and meetings about early recognition of general danger signs of common childhood illnesses, efforts expected to be done by government and non-governmental organization to improve the mothers' knowledge by providing information, education and behavioral change communication in order to improve their ability to recognize danger signs of common childhood illnesses and improved literacy, women empowerment and health education are strategies that may improve.

Authors' contributions statement: SG carried out the conception and designing of the study, performed statistical analysis and wrote the manuscript. GW, BB and BG supervised the data collection and assisted the analysis. BF assisted with interpretation of the data and reviewed the manuscript critically. TT and HN critically reviewed the manuscript and made progressive suggestions throughout the study. All authors read and approved the final version of the manuscript.

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