

# BMJ Open Knowledge and factors associated with obstetric danger signs among married men in Dessie town, South Wollo, North-East Ethiopia: a community-based cross-sectional study

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## ABSTRACT

**Objective** The aim of this study was to assess knowledge and factors associated with obstetrics danger signs among married men in Dessie town, North-East Ethiopia in 2020.

**Design** Community-based cross-sectional study.

**Setting** Dessie town, North-East Ethiopia.

**Participants** The study was conducted on selected 824 men. The data were collected through face-to-face interviews using pretested questionnaires and then the data were entered into Epi-Data V.3.1 software, and analysis was carried out using Statistical Package for the Social Sciences V.20. Bivariable and multivariable logistic regression analyses were used to determine the association between each independent variable with the dependent variable, and those variables with a value of  $p \leq 0.25$  in bivariable analysis were candidates for multivariable analysis. Finally those variables with a value of  $p < 0.05$  with 95% CI in multivariable analysis were reported as statistically significant.

**Result** This study revealed that the overall knowledge of obstetric danger signs was 53.8% (95% CI 50.2% to 57.2%). Respondents aged 35–40 years (AOR=4.92, 95% CI 2.6 to 9.0), exposure to media (AOR=10.4, 95% CI 4.19 to 25.9), wife's age  $\leq 35$  years (AOR=4.16, 95% CI 2.25 to 7.69), wife who attended secondary education (AOR=1.59, 95% CI 1.06 to 2.39), participation in the Health Development Army (AOR=4.74, 95% CI 1.8 to 12.5), previous obstetric complication (AOR=4.27, 95% CI 2.0 to 9.14) and number of pregnancy  $\leq 2$  (AOR=0.42, 95% CI 0.05 to 3.38) and 3–4 (AOR=0.22 95% CI 0.06 to 0.83) were significantly associated with knowledge of obstetric danger signs.

**Conclusion** Men's knowledge about obstetric danger signs was low. Age of respondents, wives' age, and respondents' media exposure, participation in the Health Development Army, wives' educational status, previous obstetrics complication and gravidity were significantly associated knowledge of obstetrics danger sign.

## BACKGROUND

Knowledge of danger signs in pregnancy is considered one of the ways to eliminate the primary level of delay as an element influencing maternal mortality and is the essential

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ To the best of our knowledge, this is the first study to be carried out in the study area.
- ⇒ This study was on men but most studies have been on women.
- ⇒ In addition this was a community-based survey designed to address those who cannot visit health institutions due to different reasons.
- ⇒ Inferring casual association is difficult due to the cross-sectional nature of study.
- ⇒ The study may be prone to social desirability bias.

opening in accepting appropriate and timely referral to obstetric care. The role of men as decision makers cannot be overlooked in this regard. Men play a central role in deciding and influencing positive actions to support their spouses during pregnancy, labour and delivery.<sup>1–4</sup> There is also a transparent association between men's awareness of danger signs of obstetric complications and involvement in birth preparedness practice.<sup>5</sup> Low levels of information about obstetric and newborn complications among men cause limited male involvement during pregnancy, childbirth and the postpartum period.<sup>6</sup> Study conducted on maternal referrals revealed that husbands and relatives are decision makers in maternal referrals, but women make limited decisions on referrals of pregnancy-related emergencies. Accordingly, men should participate and attain a reasonable level of awareness so that rational decisions at the household level are made to avoid risks of obstetric complications.<sup>7</sup>

On average, 830 maternal deaths occur each day. Most of the deaths occur due to obstetric complications during labour, delivery and the immediate postpartum period.<sup>8</sup> Pregnancy danger signs and delivery

complications can also result in newborn morbidity and even mortality. Ethiopia is a country with a high maternal mortality rate, which is estimated to be 412 per 100 000 live births.<sup>9</sup>

Most maternal deaths are caused by obstetric complications, such as obstructed labour, puerperal sepsis, hypertensive disorder and haemorrhage. From a world perspective, it is estimated that approximately 80% of maternal deaths and up to two-thirds of neonatal deaths may be avoided if effective health measures are provided during pregnancy, birth and the first week of the post-natal period.<sup>10</sup> Maternal deaths can even be reduced by increasing awareness of danger signs of obstetric complications because awareness of obstetric danger signs facilitates men in making a joint decision with their partners regarding accessing maternal healthcare services.<sup>5</sup> The majority of knowledgeable couples made joint decisions by avoiding cultural and gender influences. Their decisions may support to improve their knowledge about signs of obstetric complications and their implications for maternal and neonatal health. There has been some level of gender equality and feminine autonomy among knowledgeable couples in decision making.<sup>11</sup> In Ethiopia, over two-fifths of women do not have any role in making healthcare decisions about their own health. Husbands play a significant role in making healthcare decisions about their wives.<sup>12</sup> Therefore, they become major predictors of why, when, where and how frequently a pregnant woman will access antenatal, delivery and postdelivery care. Men are financially superior compared with women; thus, men are often responsible for meeting costs of transport in case of obstetric emergencies. Findings suggest that socio-economic status, educational status, number of children, occupation and place of delivery may affect men's knowledge of obstetrics danger signs.<sup>5</sup> male involvement is restricted by low knowledge and barriers associated with social norms.<sup>6</sup> Moreover, there are limited data on men's knowledge of danger signs of obstetric complications in Ethiopia. Most studies have focused on women's knowledge of danger signs of obstetric complications. Therefore, the identification of men's knowledge of danger signs of obstetric complications and the possible factors that determine knowledge will help to suggest interventions and reduce maternal deaths, which occur because of obstetric emergencies. This study has, therefore, attempted to explore men's awareness and their knowledge of matters associated with obstetric emergencies.

### Objectives

- ▶ To assess knowledge towards obstetrics danger signs among married men in Dessie town, North-East Ethiopia in 2020.
- ▶ To identify factors associated with knowledge of danger signs among married men in Dessie town, North-East Ethiopia in 2020.

## METHODS

### Study area and study period

The study was conducted in Dessie town from October to December 2020. Dessie town is located 401 kilometres away from Addis Ababa. The main source of income is trading and employees' monthly salary. Based on the 2007 national census conducted by the Central Statistical Agency of Ethiopia, Dessie town has a total population of 382912. The town has 2 government hospitals, 8 public health centres, 3 private hospitals and 45 private clinics.

### Study design

A community-based cross-sectional study design was applied.

### Participants

The source population was all married men who live in Dessie town, and the study population comprised all married men living in the selected kebeles.

### Eligibility criteria

#### Inclusion criteria

All married men who were living in Dessie town during the data collection period and who had been residing there for 6 months and more were included in this study.

#### Exclusion criteria

Critically ill men who were unable to answer the questionnaire at the time of the interview were excluded from the study.

### Sample size determination

The sample size was calculated by using a single population proportion formula for the first objective, and the StatCalc function of Epi Info V.7 software was used for the second objective. Finally, the maximum calculated sample size was taken for this study.

For the first objective (dependent variables), the sample size was determined by using a single population proportion formula by considering the following assumptions:

1. Estimated proportion of knowledge of danger signs of obstetric complications (P)=42%, which is taken from a study done in southern Ethiopia.<sup>5</sup>
2. Margin of error d=5%
3. A CI of 95% is assumed ( $Z_{\alpha/2}=1.96$ )

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

n=sample size

z=the standard value corresponding to the desired level of confidence

d=margin of error

p=the estimated proportion of an attribute that is present in the population

$$n = \frac{(1.96)^2 * (0.42 * 0.58)}{(0.05)^2} = 374$$

The sample size of the first objective was higher, which was 374 after adding a non-response rate of 10% and design effect two due to the multistage sampling method; then, the final sample became 824.

### Sampling procedure

A multistage sampling method was employed to reach the study subjects. Dessie city has a total of five subcities. First, from these five subcities, three subcities were selected by the simple random sampling and then, from each subcity, the kebeles were selected by simple random sampling. Last, from each kebele, households were selected through systematic random sampling. The first house was selected randomly. The sampling interval of the households in each kebele was determined by dividing the total number of households in the specific kebele by the allocated sample size. When there was no eligible man in each selected house, a man living in next house who was eligible for the study was asked. In the case of a selected household where there was more than one eligible man, a lottery method was used to determine which man would be interviewed.

### Data collection tool, quality control and measurement

A structured and pretested questionnaire was used to collect the data. First, the tool was prepared in English, translated to the local language and then translated back to English by an expert to check for consistency. The data were collected by six well-trained diploma midwifery professionals and supervised by two Bachelors of Science nurse professionals along with the principal investigator. The reliability test was performed with a Cronbach's  $\alpha$  test and was 0.81. A pretest was carried out on 5% of the sample to assess the clarity of the questions, and the competency and the understanding of the data collectors. Double data entry was carried out to maintain data quality and uniformity.

### Variables

#### Dependent variable

Knowledge about danger signs of obstetric complications.

#### Independent variables

Age, religion, educational status, occupation, wife's age, wife's educational status, wife's occupational status, length of relationship, exposure to media, participation in the Health Development Army, previous obstetric complications, wife's gravidity and number of children were the independent variables.

**Signs of obstetric danger:** these are signs and symptoms of obstetric complications that occur during pregnancy, childbirth and immediately after delivery and are measured by the total number of correct spontaneous answers to 20 items on knowledge of danger signs during pregnancy, labour and childbirth.

**Knowledgeable/good knowledge of obstetric danger signs:** refers to those men who responded to the 20 questions on danger signs of obstetric complications during any of the three phases (pregnancy, childbirth or postpartum period) and scored above or equal to the median score.

**Knowledgeable/had good knowledge on danger signs of pregnancy:** refers to those men who responded and

scored more than the median value of the 11 questions on danger signs of pregnancy.

**Knowledgeable/had good knowledge of danger during delivery:** refers to those men who responded and scored more than the median value of the four questions on danger signs during delivery.

**Knowledgeable/had good knowledge of danger signs in the postpartum period:** refers to those men who responded and scored more than the median value of the five questions on danger signs during the postpartum period

### Data processing and analysis

The collected data were checked for completeness and entered into the computer using the EpiData V.3.1 statistical package. The data were then exported to the Statistical Package for the Social Sciences V.20 for analysis. Logistic regression was performed, and variables with a 95% CI and value of  $p < 0.25$  during the bivariable analysis were entered into multivariable logistic regression analysis to determine the effect of confounding variables and the interaction of variables. The multicollinearity test was verified with the SE. The goodness of fit was tested by the Hosmer-Lemeshow statistic (0.95). Finally, variables with a value of  $p \leq 0.05$  in the multivariate analysis were considered significant.

### Patient and public involvement

No patients were involved

## RESULTS

### Sociodemographic characteristics

Out of the 824 study participants, 785 were included in the final analysis, giving a response rate of 95.2%. The median age of respondents was 41 (SD $\pm$ 11.06) years. The majority (401 (51.1%)) of the respondents were more than 40 years old, followed by the age group between 35 years and 40 years (262 (33.4%)). Four hundred and thirteen (52.6%) were merchants and 150 (19.1%) were employees. The largest portion of the participants was Muslim (488 (62.2%)). When we see their educational status, the majority of the respondents had attended secondary school and above (508 (64.7%)) (table 1).

### Social and wife-related characteristics

The findings highlight that approximately 722 (91.2%) respondents had access to mass media. One hundred and thirty (16.8%) of the wives of the respondents had previous obstetric complications, and 69 (8.8%) of the wives were participating in the Health Development Army. In terms of the length of the relationship, the majority 550 (70.1%) had a relationship of 10 years or less (table 2).

### Distribution of respondents' awareness of obstetric danger signs

During pregnancy, vaginal bleeding is the most recognised danger sign, which was recognised by 93.6% of the

**Table 1** Distribution of the study participants by their sociodemographic characteristics in Dessie town, North-East Ethiopia (n=785)

Variable	Frequency	Percentage
<b>Respondent's religion</b>		
Orthodox	286	36.4
Muslim	488	62.2
Protestant	11	1.4
<b>Respondent's age, years</b>		
≤35	122	15.5
35–40	262	33.4
>40	401	51.1
<b>Respondent's educational status</b>		
Primary and below	277	35.3
Secondary and above	508	64.7
<b>Respondent's occupation</b>		
Merchant	413	52.6
Employer	150	19.1
Other, specify	222	28.3
<b>Wife's age, years</b>		
≤35	416	53.0
>35	369	47.0
<b>Wife's educational status</b>		
Primary and below	405	51.6
Secondary and above	380	48.4
<b>Wife's occupation</b>		
Housewife	470	59.9
Merchant	150	19.1
Farmer	29	3.7
Employed	136	17.3

respondents, followed by the danger sign of absence or decrease of fetal movement, which was recognised by 79.1% of the respondents. During delivery, the most recognised danger sign was prolonged labour (92.1%), followed by premature onset of contraction (91.6%), and during the postnatal period, convulsion (70.6%) was the most recognised danger sign. Foul smelling vaginal discharge was the least recognised obstetrics danger sign among the respondents (table 3).

#### Knowledge of obstetric danger signs

In this study, the overall knowledge of obstetric danger signs was 53.8% (95% CI 50.2% to 57.2%) (figure 1).

#### Knowledge of the danger signs of pregnancy, delivery, postpartum period

Approximately 49.3% (95% CI 45.9% to 53.0%) had good knowledge of pregnancy danger signs, 71.6% (95% CI 68.5% to 74.6%) of men had good knowledge about danger signs during delivery and half of the men,

**Table 2** Reproductive and wife-related characteristics of respondents who lived in Dessie town, North-East Ethiopia<sup>15</sup> (n=785)

Variable	Frequency	Percentage
<b>Wife's participation in the Health Development Army</b>		
Yes	69	8.8
No	716	91.2
<b>Respondent's exposure to media</b>		
Yes	722	92.0
No	63	8.0
<b>Length of relationship, years</b>		
≤10	550	70.1
>10	235	29.9
<b>Previous obstetric complication</b>		
Yes	132	16.8
No	653	83.2
<b>Number of pregnancy</b>		
≤2	389	49.6
3–4	266	33.9
≥5	130	16.6
<b>Number of children</b>		
≤2	379	48.3
3–4	301	38.3
≥5	105	13.4

or 50.1% (95% CI 46.7% to 53.6%), were aware of the warning signs during the postpartum period.

#### Factors associated with knowledge of danger signs during pregnancy

Respondents' age group, wife's educational status, participation in the Health Development Army, respondent's exposure to media, number of children and previous obstetric complications were independent predictors of knowledge of danger signs during pregnancy (table 4).

#### Factors associated with knowledge of danger signs during delivery

Respondent's age group, wife's age, respondent's educational status, respondent's occupation, wife's education, length of relationship and previous obstetric complications were significantly associated with knowledge of danger signs during delivery (table 5).

#### Factors associated with knowledge of danger signs during the postpartum period

Wife's educational status, participation in the Health Development Army, length of relationship, exposure to media, previous obstetric complications and number of children were significantly associated with knowledge of danger signs during the postpartum period (table 6).

**Table 3** Per cent distribution of respondents' awareness of obstetrics danger signs among married men in Dessie town, North-East Ethiopia 2020

Danger sign	Frequency	Percentage
<b>Danger sign during pregnancy</b>		
Severe abdominal pain during pregnancy		
Yes	123	15.7
No	662	84.3
Fowl smelling vaginal discharge		
Yes	54	6.9
No	731	93.1
Severe vaginal bleeding		
Yes	735	93.6
No	50	6.4
High fever		
Yes	360	45.9
No	425	54.1
Loss of consciousness		
Yes	255	32.5
No	530	67.5
Swelling of the face and hands		
Yes	528	67.3
No	257	32.7
Sustained vomiting		
Yes	457	58.2
No	328	41.8
Blurred vision		
Yes	217	27.6
No	568	72.4
Severe headache		
Yes	305	38.9
No	480	61.1
Convulsions		
Yes	607	77.3
No	178	22.7
Absence of fetal movement or decrease in fetal movement		
Yes	621	79.1
No	164	20.9
<b>Danger sign during delivery</b>		
Premature onset of contraction (before 37 weeks)		
Yes	719	91.6
No	66	8.4
Prolonged labour		
Yes	723	92.1
No	62	7.9
Water breaking/leaking before labour		
Yes	179	22.8

Continued

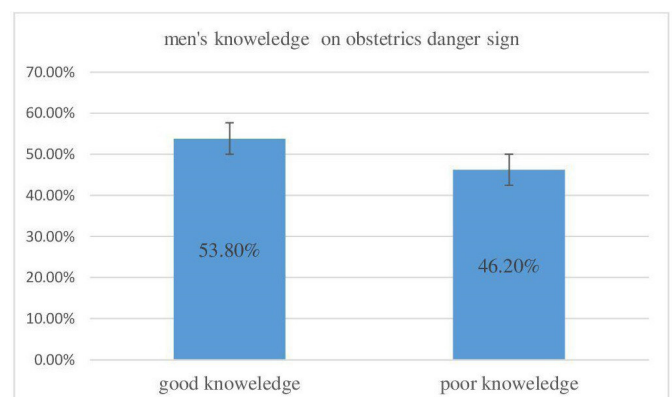
**Table 3** Continued

Danger sign	Frequency	Percentage
No	606	77.2
Retained placenta (>1 hour)		
Yes	458	58.3
No	327	41.7
Fits		
Yes	471	60.0
No	314	40.0
<b>Danger sign during the immediate postpartum period</b>		
Excessive vaginal bleeding		
Yes	455	58.0
No	330	42.0
Severe headache		
Yes	182	23.2
No	603	76.8
Convulsions		
Yes	554	70.6
No	231	29.4
High fever		
Yes	147	18.7
No	638	81.3

#### Factors associated with knowledge of obstetric danger signs

In the multivariable analysis, respondent's age group, respondent's exposure to media, wife's age, wife's educational status, participation in the Health Development Army, previous obstetric complications and number of pregnancies were significantly associated with knowledge of obstetric complications.

Men whose age was between 35 years and 40 years were 4.9 times more knowledgeable (AOR=4.92, 95% CI 2.6 to 9.0) than men whose age was more than 40 years. Men who had exposure to media were approximately 10 times more knowledgeable (AOR=10.4, 95% CI 4.19 to 25.9) than men who had no exposure to media. Respondents



**Figure 1** Knowledge on obstetrics danger sign among married men in Dessie town, North-East Ethiopia, 2020.

**Table 4** Factors associated with knowledge on danger signs of pregnancy among married men in Dessie town, North-East Ethiopia, 2020 (n=785)

Variables	Knowledge		COR	AOR
	Good	Poor		
<b>Respondent's age, years</b>				
≤35	37 (30.3%)	85 (69.7%)	0.77 (0.5 to 1.2)	0.59 (0.31 to 1.12)
35–40	206 (78.6%)	56 (21.4%)	6.56 (4.58 to 9.4)	<b>4.04 (2.29 to 7.15)*</b>
>40	144 (35.9)	257 (64.1%)	1	1
<b>Wife's educational status</b>				
No formal education	83 (25.3%)	245 (74.7%)	1	1
Primary education	22 (28.2%)	56 (71.8%)	1.16 (0.66 to 2.0)	0.84 (0.46 to 1.54)
Secondary and above	282 (74.4%)	97 (25.6%)	8.58 (6.11 to 12.0)	<b>4.01 (2.63 to 6.10)*</b>
<b>Wife's participation in the Health Development Army</b>				
Yes	63 (91.3%)	6 (8.7%)	12.7 (5.429 to 29.7)	<b>4.60 (1.58 to 13.3)*</b>
No	324 (45.3%)	392 (54.7%)	1	1
<b>Respondent's exposure to media</b>				
Yes	380 (52.6%)	342 (47.4%)	8.89 (3.99 to 19.76)	<b>4.75 (1.88 to 11.9)*</b>
No	7 (11.1%)	56 (88.9%)	1	1
<b>Previous obstetric complication</b>				
Yes	114 (86.4%)	18 (13.6%)	8.81 (5.23 to 14.8)	<b>5.96 (2.93 to 12.1)*</b>
No	273 (41.8%)	380 (58.2%)	1	1
<b>Number of children</b>				
≤2	217 (57.3%)	162 (42.7%)	5.69 (3.35 to 9.65)	1.65 (0.78 to 3.49)
3–4	150 (49.8%)	151 (50.2%)	4.22 (2.46 to 7.22)	<b>2.49 (1.32 to 4.70)*</b>
≥5	20 (19.0%)	85 (81%)	1	1

\*, Statically Significant variables with p value <=0.0 5; AOR, Adjusted Odd Ratio; COR, Crude Odd Ratio .

whose wives' age was less than 35 years were more knowledgeable (AOR=4.16, 95% CI 2.25 to 7.69) than those respondents whose wives' age was greater than 35 years, and respondents whose wives attended secondary school and above were approximately 1.6 times more knowledgeable (AOR=1.59, 95% CI 1.06 to 2.39) than those respondents whose wives' educational status was primary and less.

Respondents whose wives participated in the Health Development Army were 4.7 times more knowledgeable (AOR=4.74, 95% CI 1.8 to 12.5) compared with those respondents whose wives did not participate in the Health Development Army. Men whose wives had experienced previous obstetric complications were 4.2 times more knowledgeable (AOR=4.27, 95% CI 2.0 to 9.14) than men whose wives did not have any previous obstetric complications.

Regarding the number of pregnancies, respondents with low gravidity were less knowledgeable than those with high gravidity. Respondents whose wives' gravidity was ≤2 were 58% less knowledgeable (AOR=0.42, 95% CI 0.05 to 3.38) compared with those respondents whose wives' gravidity was ≥5, and respondents whose wives' gravidity was 3–4 were 78% less knowledgeable (AOR=0.22, 95% CI

0.06 to 0.83) compared with those respondents whose wives had 5 or more pregnancies (table 7).

## DISCUSSION

In this study, the prevalence of knowledge on obstetric danger signs was 53.8% (95% CI 50.2% to 57.2%), which is consistent with the findings of a study performed in Nigeria<sup>3</sup> but higher than findings in studies performed in southern Ethiopia<sup>5</sup> and Musoma district, Mara region, Tanzania<sup>13</sup> and lower than findings in a study performed in Kozhikode district, Kerala.<sup>14</sup> This discrepancy might be due to differences in sociodemographic characteristics, study period and measurement.

In this study, approximately 49.3% (95% CI 45.9% to 53.0%) of men had good knowledge of pregnancy danger signs, and 71.6% (95% CI 68.5% to 74.6%) of men had good knowledge about danger signs during delivery, which is higher than the results of the study performed in Aneded woreda, North-West Ethiopia, which were 44% and 53%, respectively.<sup>15</sup> This discrepancy might be due to differences in sociodemographic characteristics such as residence. Accordingly, this study was performed in towns, whereas the study performed in Aneded woreda

**Table 5** Factors associated with knowledge of the danger sign of delivery among married men in Dessie town, North-East Ethiopia, 2020 (n=785)

Variables	Knowledge		COR	AOR
	Good	Poor		
<b>Respondent's age, years</b>				
≤35	109 (89.3%)	13 (10.7%)	4.69 (2.55 to 8.64)	2.62 (0.76 to 8.98)
35–40	196 (74.8%)	66 (25.2%)	1.66 (1.17 to 2.35)	<b>0.23 (0.09 to 0.56)*</b>
>40	257 (64.1%)	144 (35.9%)	1	1
<b>Wife's age</b>				
<30	219 (80.2%)	54 (19.8%)	3.41 (2.28 to 5.11)	<b>0.22 (0.07 to 0.65)*</b>
30–40	229 (75.8%)	73 (24.2%)	2.64 (1.81 to 3.85)	0.46 (0.21 to 1.01)
>40	114 (54.3%)	96 (45.7%)	1	1
<b>Respondent's education</b>				
Have no formal education	38 (32.8%)	78 (67.2%)	1	1
Primary education	68 (42.2%)	93 (57.8%)	1.5 (0.91 to 2.47)	0.78 (0.28 to 2.17)
Secondary and above	456 (89.8%)	52 (10.2%)	18 (11.1 to 29.1)	<b>8.02 (2.73 to 23.5)*</b>
<b>Respondent's occupation</b>				
Merchant	293 (70.9%)	120 (29.1%)	1	1
Employer	53 (35.3%)	97 (64.7%)	0.22 (0.15 to 0.33)	0.72 (0.32 to 1.60)
Other, specify	216 (97.3%)	6 (2.7%)	14.7 (6.37 to 34.1)	<b>5.97 (2.43 to 14.6)*</b>
<b>Wife's educational status</b>				
No formal education	190 (57.9%)	138 (42.1%)	1	1
Primary education	49 (62.8%)	29 (37.2%)	1.22 (0.73 to 2.04)	1.11 (0.56 to 2.18)
Secondary and above	323 (85.2%)	56 (14.8%)	4.18 (2.92 to 5.99)	<b>2.06 (1.16 to 3.64)*</b>
<b>Length of relationship</b>				
≤10	448 (81.5%)	102 (18.5%)	4.66 (3.33 to 6.51)	<b>5.37 (2.38 to 12.0)*</b>
>10	114 (48.5%)	121 (51.5%)	1	1
<b>Respondent's exposure to media</b>				
Yes	543 (75.2%)	179 (24.8%)	7.02 (3.99 to 12.3)	2.03 (0.73 to 5.63)
No	19 (30.2%)	44 (69.8%)	1	1
<b>Previous obstetric complication</b>				
Yes	123 (93.2%)	9 (6.8%)	6.66 (3.32 to 13.36)	<b>8.18 (3.37 to 19.8)*</b>
No	439 (67.2%)	214 (32.8%)	1	1

\*, Statically Significant variables with p value <=0.0 5; AOR, Adjusted Odd Ratio ; COR, Crude Odd Ratio .

was carried out in both rural and urban areas/settings. The other possible justification might be the difference in sample size and study period.

In this study, both respondents' age and their wives' age were significantly associated with knowledge of obstetric danger signs. Younger respondents are more knowledgeable than older respondents. This study is in agreement with the study done in the Mara region, Tanzania,<sup>13</sup> but contrary to the findings of the study done in Aneded woreda, north-western Ethiopia, which showed that older men are more knowledgeable than younger ones<sup>15</sup> and respondents whose wives were younger were more knowledgeable compared with those whose wives' age was more. This might be because young people might have more exposure to media and might get information from

media than older people. The other reason might be that younger individuals might fear any complication and might visit health professionals and obtain information from them.

Respondents whose wives attended secondary school and above are more knowledgeable than those respondents whose wives attended primary education and less. The possible reason might be that an educated woman may have better health knowledge about obstetric danger signs and might share her knowledge with her husband.

Participation in the Health Development Army was significantly associated with men's knowledge of obstetric danger signs. In this regard, this study is similar to a study performed in southern Ethiopia.<sup>5</sup> The possible justification might be that those who

**Table 6** Factors associated with knowledge of obstetrics danger signs during the postnatal period among married men in Dessie town, North-East Ethiopia, 2020 (n=785)

Variables	Knowledge		COR	AOR
	Good	Poor		
<b>Respondent's age, years</b>				
≤35	50 (41.0%)	72 (59.0%)	1.01 (0.67 to 1.53)	0.48 (0.22 to 1.06)
35–40	180 (68.7%)	82 (31.3%)	3.20 (2.30 to 4.45)	1.32 (0.71 to 2.46)
>40	163 (40.6%)	238 (59.4%)	1	1
<b>Wife's age</b>				
<30	154 (56.4%)	119 (43.6%)	3.23 (2.20 to 4.74)	1.71 (0.70 to 4.17)
30–40	179 (59.3%)	123 (40.7%)	3.63 (2.49 to 5.30)	0.84 (0.41 to 1.71)
>40	60 (28.6%)	150 (71.4%)	1	1
<b>Length of relationship, years</b>				
≤10	330 (60.0%)	220 (40%)	4.09 (2.92 to 5.72)	<b>5.1 (2.51 to 10.5)*</b>
>10	63 (26.8%)	172 (73.2%)	1	1
<b>Wife's educational status</b>				
No formal education	103 (31.4%)	225 (68.6%)	1	1
Primary education	25 (32.1%)	53 (67.9%)	1.03 (0.6 to 1.75)	0.88 (0.49 to 1.56)
Secondary and above	265 (69.9%)	114 (30.1%)	5.07 (3.68 to 6.99)	<b>1.97 (1.3 to 2.98)*</b>
<b>Wife's participation in the Health Development Army</b>				
Yes	59 (85.5%)	10 (14.5%)	6.74 (3.39 to 13.4)	<b>2.77 (1.25 to 6.1)*</b>
No	334 (46.6%)	382 (53.4%)	1	1
<b>Respondent's exposure to media</b>				
Yes	382 (52.9%)	340 (47.1%)	5.31 (2.72 to 10.3)	<b>5.76 (2.54 to 13)*</b>
No	11 (17.5%)	52 (82.5%)	1	1
<b>Previous obstetric complication</b>				
Yes	109 (82.6%)	23 (17.4%)	6.15 (3.82 to 9.9)	<b>3.84 (2.08 to 7.0)*</b>
No	284 (43.5%)	369 (56.5%)	1	1
<b>Number of children</b>				
≤2	203 (53.6%)	176 (46.4%)	2.40 (1.52 to 3.8)	0.21 (0.09 to 0.48)
3–4	156 (51.8%)	145 (48.2%)	2.24 (1.40 to 3.58)	0.67 (0.36 to 1.25)
≥5	34 (32.4%)	71 (67.6%)	1	1

\*, Statically Significant variables with p value ≤0.05; AOR, Adjusted Odd Ratio; COR, Crude Odd Ratio.

participate in the Health Development Army may obtain adequate information about obstetric danger signs because the role of the Health Development Army in Ethiopia is to decrease maternal and infant mortality since obstetric-related mortality is a major cause of maternal mortality.

Exposure to media was significantly associated with men's knowledge of obstetric danger signs. This study is supported by a study performed in Tanzania.<sup>13</sup> This might be because media is one of the means of access to resources for awareness and knowledge, so men who had exposure to media might have obtained information about obstetric danger signs, and they might have received different educational messages regarding maternal health, including obstetric danger signs.

Previous obstetric complications were also independent predictors of men's knowledge of obstetric danger signs. This is supported by a study performed in Aneded woreda, Ethiopia.<sup>15</sup> The possible justification might be that men whose wives had previous obstetric complications might have visited health institutions and might have obtained information from health professionals, and their wives might have experienced those obstetric danger signs in their previous obstetric complications.

The number of pregnancies (gravidity) is also significantly associated with knowledge of obstetric danger signs. In this study, men whose wives had a lower number of pregnancies were less knowledgeable than those whose wives had a higher number of pregnancies. The possible reason could be that men with wives



**Table 7** Factors associated with knowledge of obstetric danger signs among married men in Dessie town, North-East Ethiopia, 2020 (n=785)

Variables	Knowledge		COR	AOR
	Good	Poor		
<b>Respondent's age, years</b>				
≤35	62 (50.8%)	60 (49.2%)	1.8 (1.2 to 2.7)	1.08 (0.56 to 2.06)
35–40	215 (82.1%)	47 (17.9%)	8.0 (5.54 to 11.7)	<b>4.92 (2.6 to 9.0)*</b>
>40	145 (36.2%)	256 (63.8%)	1	1
<b>Wife's age, years</b>				
<35	290 (69.7%)	126 (30.3%)	4.1 (3.06 to 5.56)	<b>4.16 (2.25 to 7.69)*</b>
>35	132 (35.8%)	237 (64.2%)	1	1
<b>Wife's educational status</b>				
Primary and below	137 (33.8%)	268 (66.2%)	1	1
Secondary and above	285 (75.0%)	95 (25.0%)	5.86 (4.30 to 8.0)	<b>1.59 (1.06 to 2.39)*</b>
<b>Wife's participation in the Health Development Army</b>				
Yes	63 (91.3%)	6 (8.7%)	10.4 (4.46 to 24.4)	<b>4.74 (1.8 to 12.5)*</b>
No	359 (50.1%)	357 (49.9%)	1	1
<b>Respondent's exposure to media</b>				
Yes	414 (57.3%)	308 (42.7%)	9.2 (4.3 to 19.6)	<b>10.4 (4.19 to 25.9)*</b>
No	8 (12.7%)	55 (87.3%)	1	1
<b>Previous obstetric complication</b>				
Yes	111 (84.1%)	21 (15.9%)	5.8 (3.5 to 9.4)	<b>4.27 (2.0 to 9.14)*</b>
No	311 (47.6%)	342 (52.4%)	1	1
<b>Number of pregnancy</b>				
≤2	257 (66.1%)	132 (33.9%)	2.82 (1.88 to 4.253)	<b>0.42 (0.05 to 3.38)*</b>
3–4	112 (42.1%)	154 (57.9%)	1.0 (0.69 to 1.61)	<b>0.22 (0.06 to 0.83)*</b>
≥5	53 (40.8%)	77 (59.2%)	1	1
<b>Number of children</b>				
≤2	247 (65.2%)	132 (34.8%)	4.9 (3.04 to 7.9)	0.78 (0.09 to 6.52)
3–4	146 (48.5%)	155 (51.5%)	2.46 (1.52 to 4.0)	3.06 (0.79 to 11.7)
≥5	29 (27.6%)	76 (72.4%)	1	1

\*, Statically Significant variables with p value ≤0.05; AOR, Adjusted Odd Ratio ; COR, Crude Odd Ratio .

of the highest gravidity could experience these signs of danger during their previous pregnancy.

### Limitation of the study

Inferring casual association is difficult due to the cross-sectional nature of the design .In addition information in the survey is based on self-reports, so there may be social desirability bias.

### Conclusion

Husbands' knowledge about obstetric danger signs was low. The age of the respondent, the wife's age, the respondent's media exposure, participation in the Health Development Army, the wife's educational status, previous obstetric complications and the number of pregnancies (gravidity) were the most significant predictive factors for knowledge of obstetric danger signs.

### Recommendation

The city administration and Dessie town health office better work on enhancing the capacity of women in their participation in the Health Development Army and need to further work on women's education.

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## REFERENCES

- O.O. S. E.T. O. Male Knowledge Of Danger Signs Of Obstetric Complications Inan Urban City. In: Nigeria SW, ed. 2,(2). , 2014: 1, 89–95.
- Dunn A, Haque S, Innes M. Rural Kenyan men's awareness of danger signs of obstetric complications. *Pan African Medical Journal* 2011;1937–8688.
- Odimegwu C, Adewuyi A, Odebiyi T, et al. Men's role in emergency obstetric care in Osun state of Nigeria. *Afr J Reprod Health* 2005;9:59–71.
- Aborigo RA, Reidpath DD, Oduro AR, et al. Male involvement in maternal health: perspectives of opinion leaders. *BMC Pregnancy Childbirth* 2018;18:3.
- T.D A, M. G B. T.M M. Factors Associated withMen's Awareness of Danger Signs of Obstetric Complications and Its Effect on Men's Involvement in Birth Preparedness Practice in Southern Ethiopia, 2015.
- Sharma V, Leight J, Giroux N, et al. "That's a woman's problem": a qualitative analysis to understand male involvement in maternal and newborn health in Jigawa state, northern Nigeria. *Reprod Health* 2019;16:143.
- Pembe AB, Urassa DP, Darj E, et al. Qualitative study on maternal referrals in rural Tanzania: decision making and acceptance of referral advice. *Afr J Reprod Health* 2008;12:120–31.
- Central Statistical Agency (CSA) [Ethiopia] and ICF. *Ethiopia demographic and health survey 2016: key indicators report*. Addis Ababa, Ethiopia, and Rockville, Maryland, USA: CSA and ICF, 2016. <https://www.usaid.gov/.Ethiopia%20DHS%202016%20KIR%20-%20Final%2010-1>
- Weyesa JB, Henok Tadesse A, Yadessa Eba T, Tadesse AH, Eba TY, et al. Prevalence and risk factors associated with maternal mortality in Mizan-Aman Hospital, bench Maji, Southwest Ethiopia. *J Women's Health Care* 2015;04.
- Landers C, Maternal MS. And newborn health: a global challenge U.S. Fund for UNICEF Youth Report The State of the World's Children 2009;2009.
- Bassoumah B, A.M S. Awareness of signs of obstetric complications amongst married couples: implications for decision-making towards Care-Seeking. A qualitative study of selected districts in Ghana. *Global Journal of Medical Research* 2017;17.
- Alemayehu M, Meskele M. Health care decision making autonomy of women from rural districts of southern Ethiopia: a community based cross-sectional study. *Int J Womens Health* 2017;9:213–21.
- Swai MP. *Men's knowledge on danger signs of obstetric complications: The case of musoma district, mara region - Tanzania*, 2013.
- Nayana E. *Knowledge and health care participation of husbands during period of pregnancy, delivery, postnatal and child immunization in KOZHIKODE district, Kerala*, 2015.
- G F, Abate S, Solomon D. Men's knowledge towards obstetric danger signs and their involvement on birth preparedness in Aneded woreda, Amhara Regional State, Northwest Ethiopia. *Ethiop J Public Health Nutr* 2020;3.