

## Assessment of knowledge on the danger signs of pregnancy among pregnant women at Sinza Palestina Hospital in Ubungo Municipality, Tanzania

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### Abstract

**Background:** The rate of maternal mortality has dropped globally however in some developing countries the rate of decline has been slow. Several efforts have been made to improve maternal health and reduce maternal mortality. Lack of information on danger signs during pregnancy is one of the factors that contribute to maternal mortality. The study aimed to assess knowledge of pregnancy danger signs among pregnant women at Sinza Palestina Hospital in Ubungo Municipality, Tanzania.

**Methods:** This was a cross-sectional study involving all pregnant women who attended RHC services at Sinza Palestina Hospital in Ubungo Municipality. Socio-demographic characteristics and obstetrics experiences in the last pregnancy, knowledge on danger signs of pregnancy were collected. Data were analysed using the SPSS statistical package. Categorical and continuous variables were summarized and presented in tables and bar charts. Any *p-value* of < 0.05, at a 95% confidence interval was regarded as statistically significant.

**Results:** A total of 410 pregnant women aged 18 – 46 years, mean age of 27 years were enrolled in this study. Amongst, 66 (16.1%) had low knowledge on obstetric danger signs and associated with age less than 20 years (aOR = 15.3, 95% CI: 4.8 – 48.3, *p-value*, < 0.001), education level (aOR = 27.7, 95% CI: 5.0 – 152, *p-value*, < 0.001), being single (aOR = 3.5, 95% CI: 1.1 – 12.9, *p-value*, < 0.04), parity (aOR = 1.9, 95% CI: 1.1 – 3.4, *p-value*, < 0.02 and less ANC visits (aOR = 2.6, 95% CI: 1.2 – 7.0, *p-value*, < 0.04). Moreover, occupation which was thought to have an association with knowledge of obstetrics danger signs, the association did not reach a statistically significant with *p* = 0.44.

**Conclusion and recommendations:** In general, the findings of this study, show that the vast majority (83.9%) of pregnant mothers have sufficient knowledge of obstetric danger signs. Vaginal bleeding was the most commonly mentioned obstetric danger while Convulsion and fever were mentioned less. Age and education level of pregnant women, parity and ANC visits were identified as the significant factors for knowledge of obstetric danger signs among pregnant women. We recommend that health education and behavioural change programs to continue be implemented in all health facilities to continue imparting knowledge to all pregnant mothers. Efforts should be directed towards empowering nurse midwives.

**Keywords:** Obstetrics Danger signs, Antenatal care, Knowledge, Pregnancy

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## Background

Although maternal mortality is preventable, specific complications during pregnancy develop in 15% of all pregnant mothers (Mendez and Sawan, 2011). Prolonged/obstructed labour, pregnancy-induced hypertension, maternal infections, maternal hemorrhage and complications of abortions are the main complications during pregnancy and delivery (Say *et al.*, 2014). Ninety nine percent of all maternal death globally occur in developing countries while in Sub-Saharan Africa maternal death is two third of all death (Mendez and Sawan, 2011)(Say *et al.*, 2014).

The rate of maternal mortality have dropped globally however in some of developing countries the rate of decline has been slow (Who, Unicef, Unfpa, 2007). Several efforts have been made to improve maternal health and reduce maternal mortality. These have mainly focused on improving referral systems for emergency obstetric care, improving access to skilled attendants at delivery, and monitoring progress through maternal mortality and morbidity audits (Who, Unicef, Unfpa, 2007). Studies conducted in developing countries in Africa shows that some pregnant mothers are unaware of obstetrics dangers signs. A study conducted at Goba in Ethiopia by *Bogale & Markos*, and Ethiopia by *Hailu & Berhe*, shows that pregnant mothers had low knowledge of obstetric danger signs during pregnancy, child birth and postpartum period. (Bogale and Markos, 2015) and (Hailu and Berhe, 2014) respectively. It signifies that the large proportions of pregnant women are more likely to delay in looking for care.

Another study conducted in Ghana by *Aborigo et al 2014* revealed that community members and health workers were at least knowledgeable on obstetric danger signs. They revealed wide range of obstetric danger signs. Health care providers confirmed that information on obstetric danger signs is offered to all pregnant mothers during ANC visits through pictures placed on the walls in the clinic and at the back of ANC cards; more over through verbal communication (Aborigo, RA Moyer, CA Gupta, M Adongo, PB Williams, J Hodgson, A Allote, P Engmann, 2014).

Similar study on danger signs of pregnancy was conducted in rural Uganda by *Kabakyenga et al 2011*. Results revealed that pregnant women had relatively low knowledge levels on pregnant danger signs. Severe vaginal bleeding was the only danger sign mentioned by majority of the respondents (Kabakyenga *et al.*, 2011). Moreover, in their study *Kabakyenga et al 2011* knowledge level on obstetrics danger sings found to be associated with household assets owned education and age of respondent (Kabakyenga *et al.*, 2011).

Like in other developing countries in African, approximately 75 % of maternal deaths are results of direct causes namely hemorrhage infection, eclampsia, prolonged or obstructed labour and complications of abortion (DHS, 2010). Likewise, death among new-borns occurs due to difficult breathing, prematurity and infections. Tanzania loses 24 women and 144 new-born babies making a total of 168 lives lost to childbirth per day (DHS, 2010). If more women had access to emergency obstetric and newborn care, fewer would die unnecessarily because of complications during childbirth.

Lack of information on danger signs during pregnancy is one of the factors that contribute to maternal mortality. Maternal mortality and morbidity in Tanzania rated at 454 per 100,000 live births (Mwilike *et al.*, 2018) is associated with delay in search for care. About (26 %) of women are aware of the signs that indicate an upcoming pregnancy complications (Pembe *et al.*, 2009). The low knowledge is due to the limited access health facilities in rural areas; less skilled health personnel that are available in rural areas, but the problem also exists even in urban areas where it is acknowledged to have more health facilities, improved infrastructure and transport.

Irrespective of cost and easier access of health facilities, low level of knowledge is also highly likely caused by inadequate dissemination of information on danger signs at the health facilities

(Mwilike *et al.*, 2018). It contributes to significant delay in seeking health care and compromises the survival of the mothers and expected newborns. This may ultimately result into the persistent high maternal morbidity and mortality rate.

In general, these studies shows that significant proportion of the pregnant women are unaware of obstetric danger signs. This indicates the large proportions of pregnant women who do not have the knowledge are likely to delay in deciding to seek care. Study aimed to assess knowledge on the danger signs of pregnancy among pregnant women at Sinza Palestina hospital in Ubungo Municipality, Tanzania.

## **Methodology**

### **Study Design**

This was a cross sectional study involving pregnant women attending ANC at Sinza Palestina hospital in Ubungo Municipality, Tanzania. The fieldwork took place from July to December 2022 at Sinza Palestina hospital, located in Ubungo Municipal council, Dar es Salaam region in Tanzania. Ubungo Municipal council is an urban area with approximately 1,043,549 populations. The council has 14 wards and 91 streets it covers a total area of 210 km<sup>2</sup>. The council has a total of 135 functioning healthcare facilities where 21 of them are public owned health facilities. Out of 135 facilities 58 health facilities provide reproductive and child health services.

### **Sampling procedure and study participants**

All pregnant women who sought ante natal care were selected randomly for participating in the study. The identified women who were eligible to participate in the study were informed about the study and asked for their consent. Study participants were selected using systematic sampling approach which involves dividing the total number of women attending the clinic for ante natal services with estimated sample size to obtain a sampling interval. After obtaining the sampling interval, the first participant was randomly selected, while the subsequent participants were selected systematically .

### **Data collection methods**

Data were collected using self-administered structured questionnaires with closed ended questions. The questionnaires comprise of socio demographic characteristics, experiences in the last pregnancy, knowledge on danger signs of pregnancy. The socio-demographic characteristics section includes age, marital status, education level and occupation; pregnancy characteristics included the number of deliveries, number of pregnancies; experiences during their last pregnancy including whether they attended antenatal care and the number of visits made.

The knowledge section of danger signs comprised general knowledge about danger signs during pregnancy, the recognition of danger signs and where the source of information was. The participants were asked to put a tick to the best option on the questionnaires.

Knowledge about obstetrics danger sings was assessed through a list of danger signs stated in WHO guide for essential practice (Mattock, 2003). A point was given to each correct mentioned danger sign. The list comprises of common nine danger signs during pregnancy, which includes severe vaginal bleeding, reduced fetal movement, fast or difficulty in breathing, convulsions, severe headache with blurred vision, too weak to get out of bed severe abdominal pain, fever, swelling of fingers, face and legs (Mattock, 2003).

Knowledge was categorized into three categories, namely sufficient knowledge, low knowledge and no knowledge. Women who had mentioned 4 or more danger signs during pregnancy were categorized as having sufficient knowledge, those who mentioned 1-3 danger signs were

categorized as having low knowledge; and those who did not mention any danger sign were considered to have no knowledge (Okour, Alkhateeb and Amarin, 2012).

### Data analysis

Data coding, entry and analysis was done using Epi Info version 7.2.2.6. Frequency distributions, summary measures (means, median) and measures of variability were used to describe the general characteristics of the study population. The differences and significant of the study were assessed using Chi – square ( $\chi^2$ ) tests.

### Ethical Consideration

Ethical clearance was obtained from the HKMU Research and Ethical committee. Permission to access study sites was obtained from District Medical Officer of Ubungo and then from Sinza Palestina Medical Officer in charge. Informed consent was obtained from each participant by signing a consent form. Participants were informed on their rights to decline to answer any question or withdrawal from the study. Confidentiality was strictly observed as participants were identified by numbers and not by names. Participants' data were not disclosed to unauthorized people without prior permission from participants themselves and research team. Data reported in the aggregate form as a research report and individual results were reported to individuals or groups that are not concerned.

## Results

### Socio – demographic characteristics

Four hundred and ten pregnant women enrolled in this study. Majority of the respondents (68.3%) were at the age of 21 – 30 years (range 18 – 46 years) and the median age of the study group was 27. Out of 410 study participants 8.8% (36) and 22.9% (94) belongs to the age group less than 20 and more than 30 years old respectful. (Table 1)

Majority of study participants were married 72.2% (296) and living with their partners while 27.8 (114) were not living with their partners. This includes women who were either; single, separated, divorced or widowed. Almost half (47.3%) of the study participants completed secondary education. Regarding occupation of pregnant mothers participated in this study, majority (63.4%) were doing small business to earn family income while 19.0% (78) and 17.6% 72 were housewife and employed respectful (Table 1).

The obstetric characteristics that were looked at, include parity and ANC visits. More than half (57.6%) of study participants attended antenatal clinic four times or more during their last pregnancy where as 42.4% (174) attended less than four ANC visit. Additionally, majority of the women 58.0% (238) had two to four numbers of deliveries while 42.0% (172) had delivered once as shown in Table 1.

**Table 1: Socio – demographic and Reproductive characteristics (N=410)**

Variables	Categories	Frequency (N)	Percent (%)
<b>Age</b>			27 (18 – 46)
<b>Age group</b>			
	≤ 20 years	36	8.78
	21 – 30 years	280	68.29
	≥ 31 years	94	22.93
<b>Marita Status</b>			
	Single	102	24.88
	Married	296	72.20

	Separated	12	2.93
<b>Residence</b>			
	Kinondoni	90	21.95
	Ubungo	320	78.05
<b>Religion</b>			
	Christian	244	59.51
	Muslim	166	40.49
<b>Education Level</b>			
	Primary	138	33.66
	Secondary	194	47.32
	College/University	78	19.02
<b>Occupation</b>			
	Business	260	63.41
	Employed	72	17.56
	Housewife	78	19.02
<b>Parity</b>			
	Para one	145	35.40
	Multiparity	265	64.60
<b>ANC Attendances</b>			
	Less than four visit	137	33.41
	More than four	273	66.59
<b>Knowledge on danger Signs during pregnancy</b>			
	Low Knowledge	66	16.10
	Sufficient Knowledge	344	83.90
<b>Sources of Information on danger signs during pregnancy</b>			
	One Source	322	80.50
	Multiple Sources	78	19.50

**Knowledge on Danger signs during pregnancy among Pregnant women (N=410)**

All women (100%) participated in the study had ever heard about danger signs during pregnancy and the main source of information was from the nurse midwives (89.3%) at health care facilities followed by women who had delivered previously (13.2%) (table 2).

**Table 2: Sources of Information on Danger signs during pregnancy (N=410)**

Information source	Yes		No	
	Number	Percent (%)	Number	Percent (%)
Nurse Midwives	366	89.27	44	10.73
Other Women	54	13.17	356	86.83
From Medias	42	10.24	368	89.76
Traditional Birth Attendants	2	0.49	408	99.51

Knowledge on obstetric danger signs was categorized into three namely sufficient knowledge, low knowledge and no knowledge. Woman who had mentioned 4 or more danger signs during pregnancy was categorized as having sufficient knowledge, mentioned 1-3 danger signs low knowledge; and not mentioned any danger sign was categorized into no knowledge (figure 1)

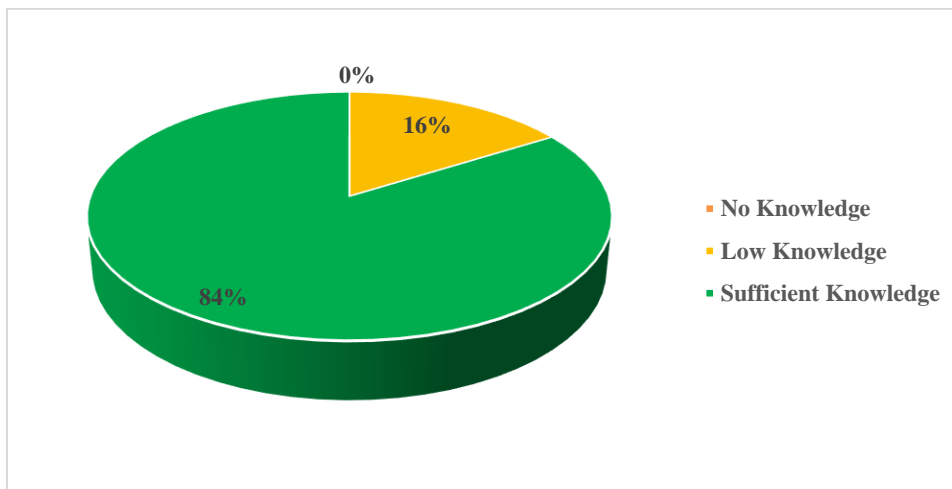


Figure 1: Knowledge on Danger signs during pregnancy (N=410)

When asked to spontaneously mention the danger signs, more than 80% had sufficient knowledge since they were able to mention four and more danger signs correctly. However, 16.1% had low knowledge on danger signs during pregnancy since they were able to mention one to three dangers signs correctly. Moreover, no respondent who was not able to mention even one danger sign correctly. The figure below shows that 66.6% of the respondents aged less than 20 years old exhibit low knowledge regarding obstetrics danger signs. Age has shown to have relationship with knowledge on danger signs during pregnancy ( $P = < 0.001$ ). Furthermore, sufficient knowledge is gained as age increases.

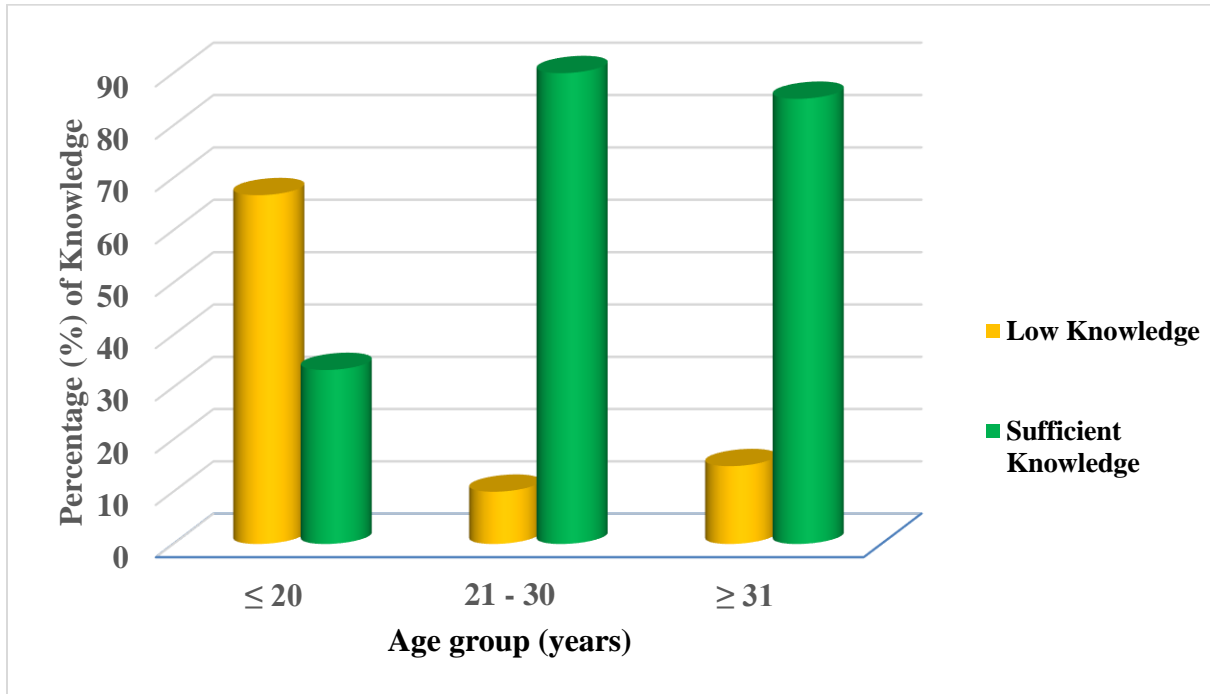


Figure 2: Knowledge on Danger signs during pregnancy by age group

When asked about danger signs of pregnancy; frequently stated danger signs that may occur during pregnancy as signs for obstetrics complications are severe vaginal bleeding and reduced fetal movement by more than 90%. The least danger signs known by participants are Convulsions and fever (table 3).

Table 3: Knowledge on Danger signs during pregnancy (N=410)

Danger signs during pregnancy	Yes		No	
	Number	Percent (%)	Number	Percent (%)
Severe Vaginal Bleeding	392	95.61	18	4.39
Reduced fetal Movement	370	90.24	40	9.76
Fast or Difficult breathing	358	87.32	52	12.68
Severe headache with blurred vision	358	87.32	52	12.68
DS/Severe abdominal Pain	344	83.90	66	16.10
Swelling of fingers, face or legs	332	80.98	78	19.02
Too weak to get out of bed	328	80.00	82	20.00
Convulsion	298	72.68	112	27.32
Fever	298	72.68	112	27.32

#### Factors associated with Knowledge on Danger signs during pregnancy (N= 410)

A number of demographics and obstetrics characteristics were significantly associated with odds for low knowledge on obstetrics danger signs in univariate analysis (Table 4). These included age, education level, marital status, parity, Ante natal care attendances and residence. There was no association between Occupation and knowledge on obstetrics danger signs.

In multivariate analysis after adjusting for all significant variables ( $p - value < 0.05$ ) from the univariate analyses and the potential confounders; age, education level, marital status, parity, ante natal care

attendances and residence were found to be associated with knowledge on obstetrics danger signs (Table 4).

The independent variable age was statistically significant for the knowledge of danger signs during pregnancy. Women aged 20 years and less had 15.3 higher odds for low knowledge on obstetrics danger signs (aOR = 15.3, 95% CI: 4.8 – 48.3, *p* – value, < 0.001) as compared to a women aged 30 years and above. Similarly, women aged 20 to 30 years were less likely to have low knowledge on obstetrics danger signs as compared to women aged 30 years and above. However, the association is not statistically significant.

Participants who had primary and secondary education had higher odds (aOR = 27.7, 95% CI: 5.0 – 152, *p* – value, < 0.001) and (aOR = 13.1, 95% CI: 2.6 – 67, *p* – value, < 0.001) respectful for low knowledge on obstetrics danger signs as compared to women who had college or university level of education. Compared to married women, separated women had 3.5 times the odds for low knowledge on obstetrics danger signs (aOR = 3.5, 95% CI: 1.1 – 12.9, *p* – value, < 0.04).

Regarding occupation, housewives were more likely to have low knowledge for danger signs compared to employed women although this association did not reach a statistically significant with *p* = 0.44. Additionally, parity and antenatal clinic attendances were associated with knowledge on obstetrics danger signs. Women who attended antenatal clinic less than four times during their last pregnancy and women who had one delivery were almost two to three times higher the odds for low knowledge for obstetrics danger sings compared to their counterparts (aOR = 1.9, 95% CI: 1.1 – 3.4, *p* – value, < 0.02) and (aOR = 2.6, 95% CI: 1.2 – 7.0, *p* – value, < 0.04) respectful. Participants residing in Kinondoni Municipality were 2.3 times the odds for low knowledge on danger signs as compared to participants residing in Ubungo municipality (aOR = 2.3, 95% CI: 1.1 – 4.6, *p* – value, < 0.02).

**Table 4: Factors associated with Knowledge on obstetrics danger signs (N= 410)**

Variables	Knowledge on danger Signs									
	Low		Sufficient		Crude OR			Adjusted OR		
	No	(%)	No	(%)	OR (95% CI)	<i>P</i> – Value	OR (95% CI)	<i>P</i> – Value		
<b>Age (Years)</b>										
≤ 20	24	66.7	12	33.3	11.4	4.6 – 27.9	< 0.001	15.3	4.8 – 48.3	< 0.001
21 – 30	28	10.0	252	90.0	0.6	0.3 – 1.3	0.19	0.8	0.4 – 1.6	0.50
≥ 31	14	14.9	80	85.1	1.0					
<b>Education Level</b>										
Primary	34	24.6	104	75.4	12.4	2.9 – 53.2	< 0.001	27.7	5.0 – 152	< 0.001
Secondary	30	15.5	164	84.5	6.9	1.6 – 27.8	< 0.001	13.1	2.6 – 67.5	< 0.001
Tertiary*	2	2.6	76	97.4	1.0					
<b>Marital Status</b>										
Single	24	23.5	78	76.5	2.1	1.2 – 3.7	0.01	1.5	0.7 – 3.3	0.09
Separated	4	33.3	8	66.7	3.4	1.2 – 11.8	0.04	3.5	1.1 – 12.9	0.04
Married	38	12.8	258	87.2	1.0					
<b>Occupation</b>										
Housewife	18	23.1	60	76.9	1.9	0.8 – 4.4	0.15	0.7	0.2 – 1.9	0.44
Business	38	14.6	222	85.4	1.1	0.5 – 2.2	0.87	0.6	0.2 – 1.5	0.29
Employed	10	13.9	62	86.1	1.0					
<b>Parity</b>										



<i>Para One</i>	32	22.1	113	77.9	1.9	1.1 – 3.3	<b>0.01</b>	2.6	1.2 – 7.0	<b>0.04</b>
<i>Multiparity</i>	34	12.8	231	87.2	1.0					
<b>ANC attendances</b>										
< 4 Visits	32	23.4	105	76.6	2.1	1.3 – 3.7	<b>0.004</b>	1.9	1.1 – 3.4	<b>0.02</b>
≥ 4 visits	34	12.5	239	87.5	1.0					
<b>Residence</b>										
<i>Kinondoni</i>	20	25.6	58	74.4	2.1	1.2 – 3.9	<b>0.01</b>	2.3	1.1 – 4.6	<b>0.02</b>
<i>Ubungo</i>	46	13.9	286	86.1	1.0					

Key: \* - College/University; CI – Confidence Interval; No – Number; OR – Odds Ratio; % - Percentage; YRS – Years, ANC – Ante Natal Care

## Discussion

Results shows that, among all women at Ubungo municipality, 84% of women had sufficient knowledge on danger signs during pregnancy. This is contrary with results of studies from other parts of Africa which show an overall low awareness of maternal danger signs (Mwilike *et al.*, 2018), (Maseresha, Woldemichael and Dube, 2016a), (Akililu Solomon, 2015). This is thought to be due to majority of women (%) attended antenatal clinics for more than four visit where they obtained information about obstetrics danger sings from nurse midwives. Antenatal attendance influences knowledge of obstetrics danger signs (Hibstu and Siyoum, 2017).

On the other hand in this study about 95% of the study participants identified vaginal bleeding as a leading danger sign during pregnancy which was higher than the findings in other studies Tanzania (81%) (Mwilike *et al.*, 2018), Ethiopia (75.4%) (Hibstu and Siyoum, 2017), and Guatemala (31.0%) (Fonseca-becker and Schenck-yglesias, 2004). This variation might be due to socio-cultural difference, difference in implementation of relevant health intervention programs such as provision of antenatal care and delivery services, study design and location differences as they were all community surveys (Mwilike *et al.*, 2018), (Hibstu and Siyoum, 2017).

Significant association was observed concerning advanced age. It was found that knowledge of obstetric danger signs was more likely to increase among women above 30 years old. This finding is similar to studies conducted in Tanzania, Ethiopia and Enugu State Nigeria, (Mwilike *et al.*, 2018), (Hibstu and Siyoum, 2017), (C. Agunwa, 2015) respectively. It might be explained that as elder women not only own better knowledge of obstetric danger signs in this age group but also, they are psychologically and physically ready to accept information on danger signs (Hibstu and Siyoum, 2017).

Higher education level, was found to have a significant association with being knowledgeable about obstetric danger signs during pregnancy, This agrees with a study conducted by Pembe *et al* from Tanzania and (Hibstu and Siyoum, 2017), (Maseresha, Woldemichael and Dube, 2016b) from Ethiopia where they found that women who attended secondary and above were more likely to be knowledgeable on obstetric danger signs compared to women without formal education (Pembe *et al.*, 2009), (Hibstu and Siyoum, 2017), (Maseresha, Woldemichael and Dube, 2016b) respectively. This could be explained by fact that educated women might be more empowered and have more autonomous decisions making in accessing own health service information needed to act on ANC advice about obstetric danger signs (Bintabara, Mpembeni and Mohamed, 2017).

Mothers who had four and above ANC follow-ups had sufficient knowledge on obstetric danger signs compared to women who had less than four ANC visit. This finding agrees with studies conducted elsewhere (Pembe *et al.*, 2009, (Billign and Mulatu, 2017). This could be expected in that, having more visits before delivery thereby increasing chances of being educated on obstetric danger signs (Emeh *et al.*, 2021).

Similarly, having more than one deliver is the most important predictive factors for knowledge on obstetric danger signs. Women who had more than one delivery had higher the odds for sufficient knowledge for obstetrics danger sings compared to their counterparts. Similar findings were reported by (Bolanko *et al.*, 2021) where they found that, women with a greater number of deliveries were more knowledgeable of obstetric danger signs than primigravida (Bolanko *et al.*, 2021). This could be explained by the fact that some of them might have experienced obstetric complications during their previous pregnancy and childbirth which are an important source of their information (Bolanko *et al.*, 2021).

### **Conclusion**

In general, the findings of this study, shows that vast majority (83.9%) of pregnant mothers have sufficient knowledge on obstetric danger signs. Vaginal bleeding is the commonly mentioned obstetric danger while Convulsion and fever mentioned less. However, age and education level of pregnant women parity and ANC visits were identified as the significant factors for knowledge of obstetric danger signs among pregnant women. Furthermore, knowledge about danger signs during pregnancy has been found not to have a significant relationship with occupation or marital status. The findings provided insight information on women's knowledge about danger signs in the study area, which could help in designing appropriate interventions and as a base for further exploratory studies in other parts of the country.

### **Recommendations**

The study has shown there is higher antenatal clinic attendance and Nurse Midwives being the main source of information on obstetric danger signs. It is therefore recommended that health education and behavioral change programs be continued implemented in all health facilities to continue imparting knowledge to all pregnant mothers. Efforts should be directed towards empowering nurse midwives thorough continuous professional development.

Factors such as shortages of staff and inadequate medical supplies can be reduced by producing an adequate number of health professionals. Moreover, provisions of posters and banners that have messages about danger signs during pregnancy which is prepared in simple terms for easy understanding even among illiterate people.

### **Funding**

This study had no sources of funding. All operational costs were met by authors.

### **Competing interests**

The authors declare that they have no competing interests.

### **Acknowledgements**

The authors are grateful to all who participated in the preparation of this manuscript. The authors acknowledge the help of the student who collected the data through administering questionnaires.

### **Reference**

Aborigo, RA Moyer, CA Gupta, M Adongo, PB Williams, J Hodgson, A Allote, P Engmann, C. (2014) 'Obstetric danger signs and factors affecting health seeking behavior among the Kassena-Nankani of Northern Ghana: A qualitative study', *African Journal of reproductive health*, 18(3), pp. 78–86.

- Akililu Solomon, A. (2015) 'Knowledge About Danger Signs of Pregnancy and Associated Factors Among Pregnant Women in Debra Birhan Town, Central Ethiopia', *Science Journal of Public Health*, 3(2), p. 269. doi: 10.11648/j.sjph.20150302.27.
- Billign, N. and Mulatu, T. (2017) 'Knowledge of obstetric danger signs and associated factors among reproductive age women in Raya Kobo district of Ethiopia: A community based cross-sectional study', *BMC Pregnancy and Childbirth*, 17(1), pp. 1–7. doi: 10.1186/s12884-017-1253-4.
- Bintabara, D., Mpembeni, R. N. M. and Mohamed, A. A. (2017) 'Knowledge of obstetric danger signs among recently-delivered women in Chamwino district, Tanzania: A cross-sectional study', *BMC Pregnancy and Childbirth*, 17(1), pp. 1–10. doi: 10.1186/s12884-017-1469-3.
- Bogale, D. and Markos, D. (2015) 'Knowledge of obstetric danger signs among child bearing age women in Goba district, Ethiopia: A cross-sectional study', *BMC Pregnancy and Childbirth*, 15(1), pp. 1–8. doi: 10.1186/s12884-015-0508-1.
- Bolanko, A. et al. (2021) 'Knowledge of obstetric danger signs and associated factors among pregnant women in Wolaita Sodo town, South Ethiopia: A community-based cross-sectional study'. doi: 10.1177/20503121211001161.
- C. Agunwa, C. (2015) 'Knowledge of Obstetric Danger Signs Among Women of Reproductive Age in Rural Communities in Enugu State, Nigeria', *American Journal of Health Research*, 3(6), p. 376. doi: 10.11648/j.ajhr.20150306.20.
- DHS (2010) 'Tanzania Demographic and Health Survey 2010', *Institutional Adjustment for Economic Growth: Small Scale Industries and Economic Transition in Asia and Africa*, pp. 163–199. doi: 10.4324/9780429441561-7.
- Emeh, A. N. et al. (2021) 'Antenatal care and determinants of obstetric danger signs awareness of immediate postpartum women at'.
- Fonseca-becker, F. and Schenck-yglesias, C. (2004) 'Measuring the effects of behavior change and service delivery interventions in Guatemala with population-based survey result', pp. 41, 43–45.
- Hailu, D. and Berhe, H. (2014) 'Knowledge about obstetric danger signs and associated factors among mothers in Tsegedie district, Tigray region, Ethiopia 2013: Community based cross-sectional study', *PLoS ONE*, 9(2), pp. 0–7. doi: 10.1371/journal.pone.0083459.
- Hibstu, D. T. and Siyoum, Y. D. (2017) 'Knowledge of obstetric danger signs and associated factors among pregnant women attending antenatal care at health facilities of yirgacheffe town, gedee zone, southern ethiopia', *Archives of Public Health*, 75(1), pp. 1–9. doi: 10.1186/s13690-017-0203-y.
- Kabakyenga, J. K. et al. (2011) 'Knowledge of obstetric danger signs and birth preparedness practices among women in rural Uganda', *Reproductive Health*, 8(1), pp. 1–10. doi: 10.1186/1742-4755-8-33.
- Maseresha, N., Woldemichael, K. and Dube, L. (2016a) 'Knowledge of obstetric danger signs and associated factors among pregnant women in Erer district, Somali region, Ethiopia', *BMC Women's Health*, 16(1), pp. 1–8. doi: 10.1186/s12905-016-0309-3.
- Maseresha, N., Woldemichael, K. and Dube, L. (2016b) 'Knowledge of obstetric danger signs and associated factors among pregnant women in Erer district, Somali region, Ethiopia', *BMC Women's Health*, 16(1), pp. 1–8. doi: 10.1186/s12905-016-0309-3.
- Mattock, N. (2003) 'Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential practice', *World Health*, pp. 1–179.
- Mendez, A. and Sawan, M. (2011) 'Chronic monitoring of bladder volume: A critical review and assessment of measurement methods', *Canadian Journal of Urology*, 18(1), pp. 5504–5516.
- Mwilike, B. et al. (2018) 'Knowledge of danger signs during pregnancy and subsequent healthcare

- seeking actions among women in Urban Tanzania: A cross-sectional study', *BMC Pregnancy and Childbirth*, 18(1), pp. 1–8. doi: 10.1186/s12884-017-1628-6.
- Okour, A., Alkhateeb, M. and Amarin, Z. (2012) 'Awareness of danger signs and symptoms of pregnancy complication among women in Jordan', *International Journal of Gynecology and Obstetrics*, 118(1), pp. 11–14. doi: 10.1016/j.ijgo.2012.01.020.
- Pembe, A. B. et al. (2009) 'Rural Tanzanian women's awareness of danger signs of obstetric complications', *BMC Pregnancy and Childbirth*, 9, pp. 1–8. doi: 10.1186/1471-2393-9-12.
- Say, L. et al. (2014) 'Global causes of maternal death: A WHO systematic analysis', *The Lancet Global Health*, 2(6), pp. 323–333. doi: 10.1016/S2214-109X(14)70227-X.
- Who, Unicef, Unfpa, T. W. B. (2007) 'Maternal Mortality in 2005: estimates developed by WHO, UNICEF, UNFPA and The World Bank', *Bull World Health Organ*, 79, pp. 657–664.