

Level of Awareness on Danger Signs During Pregnancy and Associated Factors, among Pregnant Mothers, Dire Dawa Administrative Public Health Facilities, Eastern Ethiopia

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Abstract

Background: Raising awareness of women on danger signs during pregnancy is crucial for safe motherhood. In Ethiopia a country where maternal morbidity and mortality is high where little is known about awareness level of pregnant women on danger signs of pregnancy is used to enhance utilization of skilled care in low-income countries like Ethiopia.

Objective: To determine level of awareness on danger signs of pregnancy and associated factors among ANC attendant mother in urban and rural health centres, in Dire Dawa, eastern Ethiopia.

Methods and materials: Facility based cross-sectional study design was used to collect data. The study was conducted among a sample of 502 pregnant women in Dire Dawa administration town in selected health centres from Jan 1-Mar 30/2017. Sample size was determined by using double population proportion formulas. Simple random sampling technique was used to select six health centres, three from each urban and rural resident. Then systematic random sampling technique was used to select study subjects by considering both the inclusion and exclusion criteria. Pregnant mothers were interviewed face to face using pre-tested structured questionnaire. Data was checked for completeness, consistency and coded before data entry. Data entered, cleaned and analyzed using SPSS for windows version 20.0. Bivariate, multivariable logistic regression model were used to demonstrate the difference between study subjects' characteristics (independent variables) and level of awareness of danger sign of pregnancy.

Results: Of all 502 (100%) respondents interviewed 121 (24.1%) mothers had good awareness of danger signs of pregnancy. Maternal age, educational status, place of most recent delivery, residents and danger sign causes problem or death to the mother were independently associated with awareness of women about danger sign of pregnancy.

Conclusion: Three fourth of study subjects didn't have awareness about DSP. Maternal age, maternal education, place of most recent delivery, residents and danger sign causes problem or death to the mother were independently associated with awareness of women about danger sign of pregnancy. Thus, provision of information, education and communication targeting women, family and the general community on danger signs of pregnancy and associated factors was recommended.

Keywords: Level of awareness; Danger signs of pregnancy

Abbreviations DSP: Danger Sign of Pregnancy; EDHS: Ethiopian Demographic Health Survey; FMoH: Federal Ministry of Health; MMR: Maternal Mortality Rate; GA: Gestational Age; SSA; Sub Saharan Africa; WHO: World Health Organization

Introduction

Globally MMR stood at 216 which is 303000 estimated deaths and approximately 99% (302 000) of this deaths occurs in developing regions. The main burden of these deaths is shouldered by SSA and

South Asia. Both together bear 87% of which roughly 66% (201000) or 546 per 100,000 live births occurring in the SSA alone. In Ethiopia MMR estimated 412 per 100,000 live births which accounted for 21% of all deaths and the highest in the world [1-3].

Childbearing is experienced not as the joyful event as it should be [4]. Since every pregnant woman faces the risk of sudden unpredictable complications that could end in death or injury to herself or to her infant [5]. In developing world for every woman who dies as a result of pregnancy and child birth over 30 million women suffer each year from serious obstetric complications, injuries, infections because of inadequate or inappropriate care during

pregnancy, delivery and post natal [4]. Obstetrics related complications are among the greatest killers of women of reproductive age in developing countries. Especially in low-resource countries, like Ethiopia, childbirth is often associated with unpredictable life-threatening obstetric complications that lead to maternal and neonatal morbidity and mortality [6-12].

Despite various safe motherhood initiatives and interventions in East Africa, studies in Tanzania, Ethiopia, Burkina Faso and Uganda have shown that even within the last five years awareness of obstetric danger signs during pregnancy, delivery and postpartum were still low especially in rural populations [13-15]. Insufficient knowledge about danger signs of pregnancy among women, families, and birth attendants in developing world is one of the major contributing factors for maternal deaths [16] these death can be reduced by empowering women with knowledge on obstetrics danger signs, promote appropriate health seeking attitude and counselling on the obstetric danger signs of its unpredictable complications and its appropriate managements are crucial [17]. So that, women are expected to receive health education about pregnancy including outcomes, danger signs during pregnancy, nutrition and family planning and other services when they attend clinic for ANC [7].

FMoH of Ethiopia in 2015, emphasis was given to set goal of reproductive health program strategy to reduce maternal mortality ratio from 412 to 199 per 100,000 live births by 2020 through ANC, birth plan package and its main components which includes key elements, recognition of danger signs [2,5] to ensure these 80% of all families should recognize at least three danger signs associated with pregnancy related complications [18] because only one in five was informed of signs of pregnancy complications [19]. Since 62% of women receive ANC from a skilled provider at least once for their last birth [2] besides the risk factors for pregnancy complications which are listed on ANC card not enough to tell to client and hence for those pregnant women who are able to read will still lack the information [20].

Lack of awareness on the significance of symptoms of danger signs of obstetric complications is one of the reasons of failure of women to identify and to reach health care facilities and to seek appropriate emergency care before severe forms of obstetric complications arise in which both mother and baby become at risk of dying from it [19] so that assessment of women's awareness of obstetric danger signs and associated factors contributes to their awareness [16]. Accordingly, raising awareness of pregnant women on the danger signs would improve early detection of problems and reduces the delay in deciding to seek obstetric care [18]. Because knowing this warning sign is important for both women and health care providers to rule out serious complications and initiate treatment immediately [16]. Thus, efforts should be done to increase awareness of obstetric danger signs [20]. Since little is known about the current level of knowledge and the influencing factors about danger signs of pregnancy in Ethiopia as well in study area. This study provides information and fills the knowledge gap on danger signs of pregnancy and identifies risk factors among ANC attendants.

Methods and Materials

The study was conducted in Diredawa administrative town, eastern Ethiopia located 515 km away from the capital city of Addis Ababa. According to 2009 census of Diredawa regional health bureau; the total population of Diredawa city administrative was 466,000. The city has

one referral and one primary hospital, 15 health centres which are 7 in rural and 8 in urban and 32 health posts, 3 private hospitals, 2 clinics and 32 mid-level clinics.

Study design and period

Facility based cross sectional study design was used from Jan 1 to March 30/2017

Source population

All women attended ANC in selected health centers of Diredawa city administration.

Study population

All randomly selected pregnant women who were attended ANC in selected health centers.

Sample size determination and sampling technique

Sample size determination: The sample size for the study was determined by using two-population proportion based on the following assumption.

$P_2=50\%$

$OR=2$

$CI=99\%$

$POWER=80\%$

$r=1:1$

Accordingly sample size for cross sectional study was calculated by stat calc program of Epi-info 3.5.3 the final result obtained was 456 (228 each for urban and rural). Therefore, the minimum sample size calculated was 456 (228 each for urban and rural). A contingency of 10% which is 46 used for non-response rate. The required total sample size became 502.

Sampling technique and procedure: From the total health centres, six were selected by simple random sampling technique, three from each resident. These facilities were given service for 3575 pregnant mothers in the past one year of which 1500 in rural (274 in Melkajebdu, 281 in Wahil and 945 in Biyoawale) and 2075 in urban (1389 in Legehare, 349 in Gendegerada and 337 Adisketema). The number of pregnant mothers in Biyoawale health centres was estimated higher in rural and Legehare health centres in urban. The total sample size of the study was allocated proportionally for the selected health centres both in urban and rural to avoid selection bias and to minimize disproportion between them. The proportion sample size of pregnant mothers were calculated by multiplying total sample size (502) and number of ANC attendants of each health centre and then divided by the total population size (3575). So that totally 211 pregnant mothers was allocated for rural health centres which was 39 from Melkajebdu, 39 from Wahil and 133 from Biyoawale as well, a of total of 291 study subjects were allocated for urban health centres which was 195 from Legehare, 49 from Gendegerada and 47 from Adis-keitema. A systematic random sampling technique was used to select study subjects in each health facilities. The first mother interviewed from each health centres was chosen by lottery methods and then next study subject was selected by calculating sampling interval of $(K^{th})=N/n$ for each health centres.

Data collection method

Pretested structured interviewer administered questionnaire, which was first prepared in English and translated to local language was employed to obtain information on socio-demographic, obstetric history, and knowledge of women about danger signs of pregnancy. Data collectors were diploma graduated midwives with at least 2 years of working experience trained for one day to conduct the interview. The subjects were first explained about the purpose of the study. It was also made clear that, the results of the tests will neither have bearing on their pregnancy nor on personal life. Rapport was established with the subjects before the administration of the tests. The questionnaires were administered in the above mentioned order.

Data analysis

Prior to analysis, data cleaning, coding, checking for normality, completeness was done, then data was entered in to SPSS version 20.0. Descriptive statistics was computed to determine the level of awareness. Level of awareness of danger sign of pregnancy was assessed by 16 variables that measures the extent of pregnant women mentioned the types of danger sign with yes or no response. If they respond three or more of awareness measurements were considered as having good level of awareness and less than three was considered as having poor level of awareness. Bivariate analysis was carried out between the dependent and independent variables to determine their association. Binary logistic regression analysis was made to obtain odds ratio and the CI for statistical association variables. And multivariable logistic regression analysis was carried out to assess strength of statistical association (AOR) of level of awareness of danger sign of pregnancy with socio-demographic, ANC and obstetrics history related variables. Variables significant in Bivariate analysis at $p < 0.05$ and $p < 0.2$ were taken and entered into multivariate analysis. The strength of statistical association was measured by AOR at 95% CI. Statistical significance is declared at $P < 0.05$.

Outcome measure

The outcome measure of the study was client's awareness of the danger signs of pregnancy and it was assessed by recalling three or more of the sixteen danger signs of pregnancy spontaneously would be considered having good awareness and had poor awareness if mentioned less than three signs. The items included vaginal bleeding, reduced marked change in fetal movement, swollen face and leg, blurred vision, severe persistent abdominal pain, PROM, loss of consciousness, difficulty of breathing, high grade fever, weakness to get out of bed, chills, persistent vomiting, severe recurrent frontal head ache, awareness of high B/P, dysuria, oliguria/anuria.

Result

The data was compiled from 502 ANC attending mother at different health centres. For the ease of understanding the main results are presented under the sub headings as follows:

Socio-demographic characteristics

Table 1 shows the socio-demographic characteristics of the study subjects observed that, the mean age of the respondents was 25.13 (SD \pm 5.803, age range of 15–41). The majority of mothers 172 (34.3%) were in age group between 25–29 years, 491 (97.8%) were married, 330 (65.7%) were house wife, 443 (88.2%) were Muslim, 359 (71.5%) were Oromo in ethnicity, 315 (62.7%) born in rural, 311 (62%) were urban residents, 255 (50.3%) were illiterate, 255 (50.3%) had less than three family size, 415 (82.5%) were traveling less than 1 h to health facility, only 293 (58.4%) were disclosed about their monthly income and of them 248 (84.6%) had monthly income more than 1000 birr.

Demographic Variable		(n=502)	Percent
Maternal age	15-19	84	16.7
	20-24	152	30.3
	25-29	172	34.3
	≥ 30	94	18.8
Marital status	Separated	5	1.0
	Married	491	97.8
	Widowed	4	0.8
	Divorced	2	0.4
Occupation	Gov't	29	5.8
	Housewife	330	65.7
	Out of work	18	3.6
	Farmer	51	10.2
	Daily labourer	28	5.6
	NGOs	5	1.0

	Merchant	41	8.2
Ethnicity	Harari	8	1.6
	Oromo	359	71.5
	Amhara	43	8.6
	Gurage	21	4.2
	Somali	71	14.1
Religion	Muslim	443	88.2
	Orthodox	49	9.8
	Protestant	4	0.8
	Catholic	6	1.2
Educational level	Not read and write	222	44.2
	Read and write only	112	22.3
	Primary	113	22.5
	Secondary	35	7.0
	College/University	20	4.0
Place of birth	Urban	187	37.3
	Rural	315	62.7
Residence	Urban	291	58
	Rural	211	42
Travel time to health facility	<1 h	415	82.7
	≥ 1 h	87	17.3
Family size	<3	255	50.8
	4-5	159	31.7
	6-7	60	12.0
	≥ 8	28	5.6
Monthly income	100-300	7	2.4
	301-500	10	3.4
	501-1000	28	9.6
	>1000	248	84.6

Table 1: Socio-demographic characteristics of ANC Attendant in health centers, in Diredawa, Ethiopia, 2017.

Obstetrics history

About 359 (71.5%) said that they wanted their pregnancy. 166 (33.1%) and 48 (9.4%) were pregnancy less than 3 months and greater or equal to 9 months respectively, 142 (28.3%) and 129 (25.7%) were prim-gravid and become pregnant for the more than three times respectively, 150 (29.9%) and 161 (32.1%) were not given birth before and gave birth once respectively. 296 (59%) had normal spontaneous vaginal delivery and 23 (4.6%) were instrumental delivery. The majority 403 (80.3%) had no history of abortion. 242 (48.2%) were given birth of their most recent child in health centres and 60 (12%)

were gave their first birth at age of 15 years. 352 (70.1%) and 24 (4.8%) were visited ANC clinic two time and more than four times respectively. 335 (66.7%) and 24 (4.8%) were booked at gestational age less or equal to four months and at nine month respectively. Regarding risk of pregnancy 67 (13.3%) study subjects had previous risks. About 449 (89.4%) and 23 (4.6%) were not had chronic medical illness and asthmatic respectively. 59 (11.8%) were developed danger sign in present pregnancy. Regarding laboratory blood examinations 206 (41%) were blood group "O" and 444 (89.4%) positive Rh-factor and 164 (32.7%) had haemoglobin of 12 to 16 gm/dl. The mean weight of

participants was 57.14 (SD+7.069, weight range of 44–89). Regarding their babies' health, it is found that only 28 (5.6%) of the study subjects having babies with health problems. These problems are congenital malformations 16 (3.2%), small for date babies 7 (1.4%) and macrosomic babies 5 (1%) (Table 2).

Obstetrics Variable		Frequency	Percent
Pregnancy intended	Not at all	62	12.4
	Mistimed	81	18.1
	Wanted	359	71.5
Months of pregnancy	≤ 3 months	166	33.1
	4-6 months	146	29.1
	7-8 months	143	28.5
	≥ 9 months	47	9.4
Place of most recent child delivery	Home	35	7
	Gov't hospital	30	6
	Health centre	242	48.2
	Private hospital	53	10.6
	Primigravid	142	28.3
Type of delivery	Normal/SVD	296	59
	Cesarian section	41	8.2
	Instrumental	23	4.6
	Primigravid	142	28.3
Age at first birth	≤ 15 years	60	12
	16-20 years	253	50.4
	≥ 21 years	47	9.4
	Primigravid	142	28.3
Gravida	Once	142	28.3
	Twice	121	24.1
	3 times	110	21.9
	>3	129	25.7
Number of abortion	None	403	80.3
	Once	88	17.5
	Twice	9	1.8
	Triple	2	0.4
Parity	None	150	29.9
	1	161	32.1
	2	85	16.9
	3	35	7
	4+	71	14.1

Previous risk of pregnancy	Yes	67	13.3
	No	293	58.4
	Primigravida	142	28.3
Having babies with problem	Yes	28	5.6
	No	332	66.1
	Primigravida	142	28.3
Chronic medical illness	Asthma	23	4.6
	Diabetics	22	4.4
	HTN	7	1.4
	Heart disease	1	0.2
	No	449	89.4
Months booked	≤ 4 th month	335	66.7
	5-6 months	78	15.5
	7-8 months	65	12.9
	9 months	24	4.8
Type of problems baby had	Congenital malformation	16	3.2
	Small for date	7	1.4
	Macrosomic baby	5	1
Number of ANC visit	≤ 2	352	70.1
	3	89	17.7
	4	37	7.4
	>4	24	4.8
Developed danger sign in present pregnancy	Yes	59	11.8
	No	443	88.2
Blood group	A	152	30.3
	B	104	20.7
	AB	40	8
	O	206	41
Rh factors	Negative	53	10.6
	Positive	449	89.4
Haemoglobin	<7 gm/dl	15	3
	7-9 gm/dl	54	10.8
	10-11gm/dl	269	53.6
	12-16 gm/dl	164	32.7

Table 2: Obstetrics history of ANC attendant in health centres, in Diredawa, eastern Ethiopia, 2017.

Knowledge and counselling assessment

About 489 (97.4%) of study subjects were given health talk during their ANC visit but 439 (87.5%) and 63 (12.5%) were considered adequate and inadequate respectively. 464 (92.4%) were informed about obstetrics danger sign. 241 (48%), 206 (41%), 195 (38.8%) and 99 (19.7%) respondents were obtained information about obstetrics

danger sign from health professionals, friends, relatives and media respectively. 407 (81.1%) and 343 (68.3%) of respondents were thought danger sign may cause problems or death for the mother and the foetus respectively. 66 (13.5%) and 101 (20.1%) of respondents were didn't know that danger sign causes problems or death for the mother and foetus respectively (Table 3).

Variable		Frequency	Percent
Health talks given during ANC	Yes	489	97.4
	No	13	2.6
Health talks received considered adequate	Adequate	439	87.5
Informed about obstetrics danger signs	Inadequate	63	12.5
	Yes	464	92.4
	No	38	7.6
What is other source of information about DSP?	From media		
	Yes	99	19.7
	No	403	80.3
	From friends		
	Yes	206	41
	No	296	59
	From relatives		
	Yes	195	38.8
	No	307	61.2
	From health professional		
	Yes	241	48
	No	261	52
Do you think that danger sign may cause problems/death for the mother?	Yes	407	81.1
	No	29	5.8
	I don't know	66	13.1
Do you think that danger sign may cause problems/death for the fetus	Yes	343	68.3
	No	58	11.6
	I don't know	101	20.1

Table 3: Knowledge and counseling assessment of ANC attendant in health centers, in Diredawa, Ethiopia.

Knowledge on danger signs during pregnancy

Respondents when asked about danger signs that occur during pregnancy, most commonly mentioned were vaginal bleeding by 373 (74.3%), edema of face and hand/leg by 135 (26.9%), blurred vision 134 (26.7%), reducing fetal movement by 116 (23.1%) early rupture of membrane 77 (15.3%), foul vaginal discharge 73 (14.5), severe abdominal pain 65 (12.9%) and other signs mentioned were less than 10 % (difficulty of breathing, high fever, weakness, chills, severe frontal

head ache, high B/P) as well dysuria, and anuria were not mentioned at all (Table 4).

Variable	Yes n (%)	No n (%)
Vaginal bleeding	373 (74.3%)	129 (25.7%)
Marked reduction in foetal movement	16 (23.1%)	386 (76.9%)
Swollen face and leg	135 (26.9%)	367 (73.1%)

Blurred vision	134 (26.7%)	368 (73.3%)
Persistent abdominal pain	65 (12.9%)	437 (87.1%)
PROM	77 (15.3%)	425 (84.7%)
Loss of consciousness	25 (5.0%)	477 (95.0%)
Difficulty of breathing	9 (1.8%)	493 (98.2%)
High grade fever	39 (7.8%)	463 (92.2%)
Weakness to get out of bed	31 (6.2%)	471 (93.8%)
Chills	12 (2.4%)	490 (97.6%)
Persistent vomiting	73 (14.5%)	429 (85.5%)
Recurrent frontal head ache	21 (4.2%)	481 (95.8%)
Awareness of high B/P	32 (6.4%)	470 (93.6%)
Dysuria	0 (0%)	502 (100%)
Oliguria/anuria	0 (0%)	502 (100%)

Table 4: Danger sign that occurs during pregnancy.

Level of awareness of danger sign of pregnancy

From the total 16 questions of danger signs of pregnancy 75 (14.9%) didn't mention any of the signs that occur during pregnancy while 1 respondent was answered 10 (0.2%) out of total questions. Ranges 0-10, over all mean score is 2.27 (SD \pm 1.71) and about 121 (24.1%) of pregnant mothers had good awareness and 381 (75.9%) had low awareness of danger sign of pregnancy (Table 5).

Variable	Frequency	Percent
Poor awareness	381	75.9%
Good awareness	121	24.1%

Table 5: Level of awareness of danger sign of pregnancy.

Association between dependent and independent variables

Dependant and independent variables were cross tabulated with each maternal characteristics related factors and level of awareness of danger sign of pregnancy. The relation between level of awareness of the study subjects and their general characteristics (Tables 5 and 6).

There were no significant associations observed between DSP and marital status, occupation, ethnicity, place of birth, travel time to

health centre, family size and monthly income with good awareness of DSP.

However, bivariate logistic regression analysis showed that maternal age between 20-24 years were 0.31% times more likely and age \geq 30 years were 0.54% times more likely to have good awareness of danger sign of pregnancy than age between 15 to 19 years. Besides; multivariate logistic regression showed that statistical significant association at ($p < 0.05$) observed between age 20-24 years were 3.11 times more likely [AOR (95% CI)=3.114 (1.431, 6.778) and age \geq 30 years 3.91 times more likely [AOR (95% CI)=3.914 (3.405, 10.904)] to have good awareness of danger sign of pregnancy than age between 15-19 years.

There was no significance association were observed in educational level and danger sign of pregnancy. But statistical significant association ($p < 0.05$) were observed in primary educated 2.05 times more likely [AOR (95% CI)=2.054 (1.054, 4.003)] secondary educated were 3.12 time more likely [AOR (95% CI)=3.107 (1.201, 8.036)] and college/university graduates were 3.15 times more likely [AOR (95% CI)=3.146 (1.053, 9.402)] to have good awareness of danger signs of pregnancy than those who can't read and write.

There were statistical associations observed between DSP and residents of study subjects. Bivariate logistic regression analysis showed that rural residents were 1.72 time more likely and in multivariate logistic regression rural habitants were 2.79 times more likely [AOR (95% CI)=2.793 (1.686, 4.626)] to have good awareness than those from urban residents.

There were no significant associations observed between DSP and pregnancy intendedness, monthly booked, age at first birth, number of ANC, gravida, abortion, previous risk of pregnancy, having baby with problem, chronic medical illness, place of previous delivery, type of delivery, health talk given during pregnancy, adequacy of health talk, but there was significant association were observed that place of most recent delivery, parity, informed about DSP, knowing that DSP causes problem or death to the mother and/or baby with good awareness of DSP. But statistical significant association ($p < 0.05$) were observed in place of most recent delivery and knowing that DSP causes problem or death to the mother. Those mothers who gave birth in health centre 3.41 time more likely [AOR (95% CI)=3.414 (1.078, 10.814)] and those in private hospital were 5.52 times more likely [AOR (95% CI)=5.514 (1.551, 19.601)] to have good awareness of danger sign of pregnancy than home birth. Mothers who were unaware of DSP causes problem or death to themselves were 0.41% more likely [AOR (95% CI)=0.409 (0.182, 0.922)] to have poor awareness than those who knows (Table 6).

Characteristics	n=502	P	COR at 95% CI	P	AOR at 95% CI
Age of mother					
15-19	84 (16.7%)		1		1
20-24	152 (30.3%)	0.002	0.306 (0.142, 0.659)*	0.004	3.114 (1.431, 6.778)**
25-29	172 (34.3%)	0.436	0.802 (0.460, 1.398)	0.120	1.993 (0.835, 4.756)
\geq 30	94 (18.8%)	0.032	0.538 (0.306, 0.947)*	0.009	3.914 (3.405, 0.904)**

Education level					
Not read and write	222 (44.2%)		1		1
Read and write only	112 (22.3%)	0.675	1.121 (0.656, 1.918)	0.116	1.630 (0.886, 3.001)
Primary	113 (22.5%)	0.578	1.163 (0.683, 1.980)	0.035	2.054 (1.054, 4.003)**
Secondary	35 (7 %)	0.397	1.412 (0.635, 3.140)	0.019	3.107 (1.201, 8.036)**
College/University	20 (4 %)	0.195	1.901 (0.719, 5.025)	0.040	3.146 (1.053, 9.402)**
Residents					
Urban	311 (62%)		1		1
Rural	191 (38%)	0.011	1.717 (1.134, 2.598)*	0.000	2.793 (1.686, 4.626)**
Place of most recent delivery					
Home	29 (5.8%)		1		1
Gov't hospital	330 (65.7%)	0.124	2.818 (0.754, 10.536)	0.064	3.786 (0.927, 15.460)
Health centre	18 (3.6%)	0.082	2.612 (0.886, 7.699)	0.037	3.414 (1.078, 10.814)**
Private hospital	51 (10.2%)	0.022	3.986 (1.217, 13.054)*	0.008	5.514 (1.551, 19.601)**
Primigravid	28 (5.6%)	0.200	2.076 (0.680, 6.340)	0.456	2.096 (0.300, 14.650)
Do you think that danger sign causes problem or death to the mother					
Yes	407 (81.1)		1		1
No	29 (5.8%)	0.133	0.437 (0.149, 1.286)	0.231	0.502 (0.162, 1.550)
I don't know	66 (13.1%)	0.013	0.377 (0.174, 0.815)*	0.031	0.409 (0.182, 0.922)**
NB: These variables are from the total variables statistical significant while cross tabulation done (p<0.05) (Age of mother, educational status, residents, place of most recent delivery and danger sign causes problem or death to the mother).					

Table 6: Bivariate and multivariate logistic regression model showing predictors of danger sign of pregnancy among ANC attendants in public health facilities in Diredawa administration from Jan 1 to March 30/2017.

Discussion

In this study 92.4% study subjects were informed about the danger signs related to pregnancy. This is in agreement with study done in Nigeria Southeast [21] Ibadan [22], and higher than study done in northern part of Ethiopia, Mekelle city [23] Tsegedi district Tigray [4] but lower than Mbarara district Uganda [15].

This difference might be due to the city administration, regional health bureau, stake holders, health professionals working together and implemented relevant strategies to improve the access and utilization of the health care information in order to minimize maternal mortality rate.

In our study, 74.3% study subjects mentioned vaginal bleeding which is higher than study done in different part of Ethiopia Tsegedi district 49.1% [4] Debar town north west 66.8% [10] Adigrat 10.9% [14], Debra Birhan town 45.4% [16] Aleta Wondo, Southern 45.9% [18] Mekelle city Tigray 68.5% [24] Debaytilatgin district 53.7% [25] and other part of African countries like in Tanzania 50% [13] Mbarara district Uganda 49.2% [15] Burkina Faso 39.4% [26], Guatemala 31.0% [27], Rewa district of Madhya Pradesh [28], Southeast Nigeria 67% [21] Lagos, Nigeria 48.4% [29], Malawi 39% [30] Uganda 67.4% [31] Burkina Faso 24.8%, Ghana 29.3%, Tanzania 57.6% [32] Tanzania 19%

[33] but lower than study done in Dar-es-salaam, Tanzania 81.2% [20] BRD Medical College, Gorakhpur, India 90.5% [34].

This difference might be due to socio-cultural difference and difference in the implementation of relevant health intervention programs. This could also be attributable to the time gap that there could be improved in access and utilization of the health care information being provided.

In this study, 24.1% of study subjects had good awareness of danger signs of pregnancy. This is consistent with study done in Arba Minch, Ethiopia 24.1% [35] Alexandria, Egypt 26% [11], but higher than Mbarara district Uganda 19% [15] Jordan 15.2% [36] Uganda 20% [31] South Africa 16% [37] Tanzania 14.8% [33] but lower than study done in other part of Ethiopia, Tsegedi district 58.8% [4] Debar town north west 47% [10], Debra Birhan town 38.6% [16] Aleta Wondo 30.4% [18] East Gojjam Zone 55.1% [38] Mekelle city Tigray 82.5% [24] Debaytilatgin District 56.8% [39] in South Africa, Kwazulu-Natal, province [40]. North West Province 72.6% [37] Dar-es-salaam, Tanzania 31% [20] Southeast Nigeria 53.7% [30] in India Narayana Medical college hospital 49.9% [41] Salem, Tamil Nadu 34% [9], India 79.2% [25].

Generally, the awareness level is much lower than most research done in other part of the world. This difference might be due to the method used to inform the mothers about danger signs of pregnancy is inadequate or one way communication which may not consider clients background.

In our study 14.9% of the respondents were unable to mention any danger sign of pregnancy, which is lower than the findings from Tsegedi district 35.1% [4] Aleta Wondo, Ethiopia 39.0% [18]. Southeast Nigeria 17% [21] Burkina Faso 58.2%, Ghana, 21.7% and in Tanzania 30.0% [32] South Africa 39% [37].

This difference may be due to better methods were used to inform ANC attendants mothers about DSP.

In this study maternal age was one factor that has been indicated as predictors of awareness of danger signs of pregnancy. When maternal age increases level of awareness of danger sign of pregnancy became good.

This finding is consistent with study done in Tsegedi district [4] Debark town north west Ethiopia 66.8% [10] Egypt [11] and Tanzania [13] Dar-es-salaam, Tanzania [20] Arba Minch Ethiopia [35] Mekelle city Tigray but significant at 24-30 years age group [24] inconsistent with study done in Southeast Nigeria [21] younger age groups were aware than those elderly.

This can be explained by the fact that increased awareness among older women may be related to their own experiences of pregnancy and delivery which is an important source of their information, especially those who had complications associated with their pregnancy.

Level of maternal educational was one of the factors that statistically associated with awareness of danger sign of pregnancy. This finding is consistent with study done in parts of Ethiopia, Tsegedi district [4] Debark town north west [10], Debra Birhan town [16] Arba Minch [35] East Gojjam Zone [38] and Alexandria, Egypt [11], Tanzania [13], KwaZulu-Natal [24] Jordan [36] Narayana Medical college hospital, India [41] BRD Medical College, Gorakhpur, India [34] Debaytilatgin District [39].

This might be due to the fact that educated women have better access to reproductive health related information than those non educated women.

Current residence of the study subjects was statistical associated with DSP. Those mothers who were living in rural residents were 2.79 times more likely [AOR=2.793, 95% CI (1.686, 4.626)] to have good awareness than those urban residents.

This finding is inconsistent with study done in other part of Ethiopia, Debra Birhan town [16], Aleta Wondo [18] and in India, Narayana Medical college hospital [41].

This difference is may be rural residents were informed about danger sign of pregnancy at home by health extension workers as well by health professionals in health facilities. Furthermore, the rural community may have history of common maternal loss due to pregnancy related problems and complications.

This study further revealed the association between DSP and place of most recent delivery of babies. Mothers who gave birth in health centres were 3.414 times more likely [AOR=3.414, 95% CI (1.078, 10.814)] and those gave birth in private hospitals were 5.514 times more likely [AOR=5.514, 95% CI (1.551, 19.601)] to have good

awareness than those gave birth their most recent delivery at home. This finding is consistent with study done in Tsegedi district [4] Tanzania [13] East Gojjam Zone Ethiopia [38].

This is may be due to the fact that mothers who were given birth in health facilities were informed about DSP and its impact in pregnancy, labour and delivery as well after child birth than those mothers who gave birth at home by traditional birth attendants. Besides, mothers may see other labouring mother facing trouble by DSP.

Furthermore, mother who did not know that DSP causes problem or death to the mother had statistical association with awareness of DSP. This finding consistently associated with study done in other part of Ethiopia, Debra Birhan town [6] Aleta Wondo, Southern, [18] East Wollega, Ethiopia [19] Arba Minch [35].

This is may be due to the fact that mothers who were given birth in health facilities were informed about DSP and may see mothers who were admitted with DSP and may understand its impact on pregnancy, labour and delivery as well after child birth than those mothers who gave birth at home by traditional birth attendants.

Conclusion

Awareness on danger signs of pregnancy among women in Diredawa administration was poor even if they are informed about DSP. Maternal age, educational level, residents, place of most recent delivery and danger sign causes problem or death to the mother were independently associated with awareness of women about DSP. Thus, provision of information, education and communication targeting women, family and the general community on DSP and associated factors is recommended.

Recommendations

Proper emphasis should be given for awareness of danger sign of pregnancy. Therefore we would like to recommend that Diredawa University College of Medicine and Health Science College in collaboration with regional health bureau, health facilities, minister of education and other concerned stakeholders' to empower women through education. Similarly, minister of health, the regional health office, zonal administrative health facilities and other responsible bodies should make efforts to provide more information about DSP by:

Scaling up of health care providers (midwives, nurses, health extension professionals) knowledge and skill by providing training on how to counsel and inform the mothers about DSP.

Preparing and providing pamphlets, brochures that are supported by pictures in order to make easy transfer of information.

A comparative study can be done between rural and urban set up.

Further study needs to be conducted at community level for better generalization.

Limitation of the Study

The findings may not be generalizable to the women who did not visit health institution.

By virtue, this study is expected to be prone for the limitation of cross sectional survey or establishing causal relationship is impossible and the wider confidence interval observed with some variables may also indicate inadequate sample size.

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Availability of Data and Materials

Data will not be share in order to protect the participants' anonymity.

Authors' Contributions

NA designed the study, performed the statistical analysis and drafted the manuscript. NI, KA and NA participated in the study design, implemented the study, and contributed to the draft manuscript. All the authors contributed to the data analysis, read and approved the final manuscript.

Competing Interests

We declare that we have no conflicts of interest to disclose.

Ethics Approval and Consent to Participate

Ethical clearance was obtained from the Institutional Research Ethics Review of Dire Dawa University, College of Medicine and Health Sciences. Voluntary verbal consent was obtained from each study participant.

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