

Obstetric Complications in Two Major Urban Maternal and Child Clinics in Mogadishu Somalia: A Cross Sectional Study on Prevalence and Associated Factors

Zainab Elmi Duhulo^{1*} Yeri Kombe² Simon Karanja¹

1.College of Health Sciences, Jomo Kenyatta University of Agriculture and Technology, off Thika Road, P.O. Box 103122 - 00101, Nairobi, Kenya

2.Centre for Public Health Research, Kenya Medical Research Institute (CPHR-KEMRI) Kenyatta National Hospital Complex off Ngong Road, P.O. Box 20752 - 00202, Nairobi, Kenya

Abstract

Somalia has the highest adult lifetime risk of maternal mortality of 1 in 18. Few pregnant women visit the antenatal care and have access emergency obstetric care services to detect and handle complications at childbirth. We assessed the cases of obstetric complications and associated factors in two major maternal and child clinic in urban areas of Mogadishu Somalia. This cross sectional study was conducted between 2015 and 2016 among women who had given birth at Banadir Maternity and Children Hospital and SOS Maternal and Child Clinic in Mogadishu Somalia. Participants' information was collected through interviews and health records. Data were analyzed using bivariate and multivariable logistic regression to determine factors associated with being prepared, with statistically significant level at $p < 0.05$. A total of 203 out of 385 (52.7%) women had obstetric complications. This included 30% severe bleeding, 29.6% obstructed labor, 23.6% hypertensive disorder and 14.3% cases of sepsis. Employment status (OR 0.6, 95% CI 0.4 to 0.9) monthly income (OR 1.7, 95% CI 1.1 to 3.2), antenatal care attendance (OR 0.7, 95% CI 0.5 to 0.9), ANC initiation in the first trimester (OR 0.7, 95% CI 0.5 to 0.9), home delivery assisted by Traditional Birth Attendance (OR 1.7, 95% CI 1.7 to 2.4), worsening of past medical condition preceding the current birth (OR 1.6, 95% CI 1.2 to 2.3), current pregnancy termination (OR 1.9, 95% CI 1.1 to 3.4), vaginal delivery (OR 0.5, 95% CI 0.3 to 0.6), delivery assisted by a nurse (OR 0.4, 95% CI 0.3 to 0.6) were associated with obstetric complication. The high proportion of obstetric complication especially hemorrhage among women in Mogadishu Somalia, requires that women be monitored closely during pregnancy to reduce complications and death, in the absence of medical interventions. Economic empowerment, improved awareness of ANC, training of TBA would be key in reducing the obstetric complication in this region

Keywords: Obstetric complications, prevalence and associated factors, two major urban maternal and child health clinic, Mogadishu Somalia.

Introduction

Although the 3rd Universal Sustainable Development Goals (USDG) advocates for the healthy lives and promotion of well-being for all at all ages by 2030 (ICSU, ISSC, 2015), global maternal mortality still remains a challenge with 62% of the global annual maternal deaths reported in Sub Saharan Africa (WHO, 2014). Women in Africa because of more number of child birth and the greater risk with each pregnancy, the lifetime risk of dying from pregnancy-related complications or during childbirth are higher than other continent estimated at one in 38 versus one in 3,700 in the developed world (WHO, 2014; United Nation, 2014). Chad and Somalia are among the countries with the highest adult lifetime risk of maternal mortality of 1 in 15 and 1 in 18, respectively (WHO, 2014). About 80 percent of maternal deaths are due to pregnancy and childbirth related causes such as: unsafe abortion and obstetric complications such as severe bleeding, infection, hypertensive disorders, and obstructed labor (Measure communication, 2000). Other than studies done among Somali immigrants in developed countries which have reported varied outcomes in the rates of anaemia, gestational diabetes, hypertension, (Johnson et al., 2005; Robertson et al., 2005; Small et al., 2008), no data are available on the cases of obstetric complication and associated factors in Somalia.

Many countries, particularly in sub-Saharan Africa, still have unsatisfactory levels of reproductive health visits (Wang et al., 2011). The Somali women both in Somalia and in other countries have low levels of access to quality reproductive health services (Malin & Gissler, 2009; Råssjö et al., 2013; Sorbye & Leigh, 2016). This is particularly worse in Somalia where investment in reproductive health is disproportionately low (Sorbye & Leigh, 2016). Poverty, underdevelopment, conflict, and internal displacements (Menkhous, 2006; World Bank, 2015), insufficient health hospitals and professionals (Capobianco, 2008; Dagne, 2009; Sorbye & Leigh, 2016), illiteracy and the low value placed on women's health, and social and cultural norms such as female genital mutilation (Thierfelder et al., 2005) has been associated with obstetric complication in Somalia. Following a fragile, but positive, transition mid-2012, Somalia has a full federal government in Mogadishu committed to inclusiveness, reconciliation and peace, based on a provisional constitution (World Bank, 2015). This study documents cases of obstetric complications and associated factors among the two largest reproductive health

clinics in Mogadishu Somalia.

METHODS

Study design and Settings

This cross sectional study conducted between 2015 to 2016, recruited consenting women of reproductive age (15-49 years), had a one-month delivery prior the study and had attended the Banadir Maternity and Children Hospital and SOS Maternal and Child Clinic during their pregnancy. Formula for estimating the population proportion with specified relative precision described by Lemeshow *et al.* (1990) was used to determine the number of participants in this study. Setting α at 0.05, and a childbirth complication rate of 50%, a total of 385 women were recruited to achieve 0.90 power. Of the 385 women 76 were from Eastern Mogadishu, 107 from Northern, 111 from Western and 91 from Southern Mogadishu.

Data collection

Structured face to face interviews

Face to face interviews were conducted among the 385 consenting women using structured questionnaires to gather information related to child birth and associated complication. The questionnaires were translated into the local Somali language and were done by trained women of Somali origin. Further, women's health records were accessed while a check-list was used to gather information related to the health facility.

Ethical consideration

The research protocol was approved by ethical review committees of both the Ministry of Health and Human Rights of the Federal Government of Somalia (MOH and HS/DMO/0424/July 2015) and the Kenyatta National Hospital and University of Nairobi, Kenya (KNH-ERC/A/492) prior to commencement of field activities. Permission were obtained from the two participating health facility while written informed consent was obtained from each participant. Confidentiality was maintained by assigning all participants unique identification number. All data were stored in a restricted-access room at the research station. This research adhered to the STROBE guidelines for observational studies as outlined at: <http://www.strobe-statement.org>.

Statistical analyses

Descriptive statistics frequency (%), mean, standard deviation and medium (interquartile ranges at 25% and 75%) were used to present the quantitative data. The overall cases of obstetric complications were determined for all participants. In bivariate analyses, odds ratios (OR) and 95% confidence intervals (CI) for the association between obstetric complications and socio-demographic, household demographic, awareness and reproductive health patterns characteristics were calculated using Poisson regression. In multivariate analyses, a manual backward elimination approach was used to reach the most parsimonious model including factors that were associated with obstetric complications among this population at the significance level of $P \leq 0.05$. All statistical analyses were performed using STATA version 13 (StataCorp LP, College Station, TX, USA).

RESULTS

Socio demographic characteristics

In this study, all the 385 recruited participants responded to the face to face interview using structured questionnaire (100% response rate). As shown in Table 1, the mean age was 25.46 (SD \pm 6.04) ranging from 16 to 45 years. About 31.2% participants were aged 25 to 29 years with the least 14.3% aged 30 to 34 years. Slightly over half (57.4%) participants had no formal (such as Madrassa) education type. Majority of women (94%), were currently married, 88% were unemployed and 62.3% had a family monthly income of \leq 200 USD. The mean household number of occupants was 3.4 (SD \pm 2.4) ranging from 1 to 12 persons, with about 47.3% participants from household with 6 to 10 persons and 16.9% participants from households with more than 11 persons.

Table 1: Socio demographic characteristics of participants (n = 385)

Variable	Unit	Number	Percentage
Admitting Hospital	Banadir	192	49.9
	SOS	193	50.1
Residency	Eastern	76	19.7
	Northern	107	27.8
	Western	111	28.8
	South Eastern	91	23.6
Age (Years)	Mean (\pm SD)	25.46(6.04)	
	Median (IQR)	25(20-29.5)	
	Range	26(16-45)	
	15- 20	104	27
	21-30	224	58.2
	31-40	53	13.8
Education level	≥ 41	4	1
	Primary	102	26.5
	Secondary	40	10.4
	Tertiary	22	12.2
Marrital status	Non-Formal	221	57.4
	Married	362	94
Occupation	Divorced/Widow	23	6
	Employed	21	5.5
	Self employed	25	6.5
Family Monthly Income (USD)	Unemployed	339	88
	None	47	12.2
	≤ 200	240	62.3
	201-400	65	16.9
Household population (Persons)	≥ 401	33	8.6
	Mean (\pm SD)	3.4(2.4)	
	Median (IQR)	3(1-5)	
	Range	11(1-12)	
	1 to 4	91	23.6
	≥ 5	294	76.4

USD - USA dollar

Obstetric and antenatal care

As presented in Table 2, the age at first delivery for majority of participants (64.9%) was below 20 years. The mean number of pregnancies for the participants was 4.14 (SD \pm 2.82) ranging from 1 to 17 different pregnancies. Up to 61.6% of the participants had been pregnant 2 to 6 times. Mean number of deliveries were 3.87 (SD \pm 2.6) ranging from 1 to 12 deliveries with most (89.9%) pregnancies carried to full term. The majority (81.8%) of the women attended antenatal care during their last pregnancy, with 60.3% attending a public ANC clinic. About 39.7% participants started their ANC during their first trimester of pregnancy where a majority 81.3% received tetanus toxoid vaccination.

About 42.1% participants had positive attitude toward the ANC care giver for which 43.6% approved of the quality of the ANC facility. For about 42.6% participants, the ANC facility was within 1 to 5 kilometers away from their residential areas, while 51% spent 1 to 2 hours to reach their ANC facility. The ANC services met the expectation of most (93.5%) participants.

Table 2: Obstetric and antenatal care

Variable	Unit	Number	Percentage
OBSTRETIC CARE			
Age at first delivery	≤20 years	250	64.9
	≥20 years	135	35.1
Parity	Mean (± SD)	4.14(2.82)	
	Median (IQR)	4(2-6)	
	Range	16(1-17)	
	1 to 3	189	49.1
	≥4	196	50.9
No of deliveries	Mean (± SD)	3.87(2.652)	
	Median (IQR)	3(2-5)	
	Range	11(1-12)	
	1 to 3	223	57.9
	≥4	162	42.1
Gestation period last pregnancy	Pre term	24	6.2
	Full term	346	89.9
	Post term	15	3.9
ANTENATAL CARE			
ANC Attendance	Yes	315	81.8
	No	70	18.2
ANC attendance decision maker	Self	196	50.9
	Husband	97	25.2
	Friend	44	11.4
	Others	48	12.5
ANC Type	Public	190	60.3
	Private	97	30.8
	TBA/Others	28	8.9
ANC start time	First trimester	125	39.7
	Second trimester	114	36.2
	Third trimester	76	24.1
TT vaccination	Yes	313	81.3
	No	72	18.7
Opinion towards ANC personnel	Strongly agree	162	42.1
	Agree	155	40.3
	Disagree	44	11.4
	Strongly disagree	24	6.2
Opinion towards of ANC facility	Strongly agree	168	43.6
	Agree	155	40.3
	Disagree	40	10.4
	Strongly disagree	22	5.7
Distance to ANC (KM)	<1	89	23.1
	1 to 5	164	42.6
	>5	132	34.3
Time to ANC	<30 min	86	28.1
	1-2 Hours	156	51
	> 2 hours	64	20.9
ANC meets expectation	Yes	286	93.5
	No	20	6.5

ANC - antenatal care; TT - Tetanus toxoid vaccination; KM - kilometers

Intrapartum care and previous medical history

As it is noted in Table 3, about 60.5% participants delivered their children at the hospital within their reach, where 86% had normal delivery. About 79.6% participants were assisted by trained health professionals (65.3% nurses and 14.3% doctors).

Only about 20.8% participants reported previous medical complications which included 26.3% hypertension, 21.3% cardiac related diseases and 6.3% diabetes. These previous medical conditions worsened during pregnancy for majority 85% of participants. About 20.6% of the participants terminated their pregnancy due to these conditions

Table 3: Intrapartum and past medical history

Variable	Unit	Number	Percentage
INTRAPARTUM CARE			
Place of deliver	Home/TBA	91	23.6
	Health center	61	15.8
	Hospital	233	60.5
Mode of delivery	Vaginal delivery	331	86
	Assisted vaginal delivery	13	3.4
	Caesarean section	41	10.6
Assisted Delivery	None	7	1.8
	TBA	72	18.7
	Nurse	251	65.2
	Doctor	55	14.3
PAST MEDICAL HISTORY			
Existence of past medical history	Yes	80	20.8
	No	305	79.2
Types of past medical condition (n = 80)	Diabetes mellitus	5	6.3
	Hypertension	21	26.3
	Cardiac disease	17	21.3
	Others	37	46.3
Worsening of medical condition (n = 80)	Yes	68	85
	No	12	15
Pregnancy termination during past medical history (n = 68)	Yes	14	20.6
	No	54	79.4

TBA - Traditional birth attendance

Obstetric (child birth related) complications

From the survey, a total of 203 out of 385 (52.7%) participants had complications associated with child birth. This included 61/203 (30%) bleeding, 60/203 (29.6%) obstructed labor, 48/203 (23.6%) hypertensive disorder, 29/203 (14.3%) sepsis and 5/203 (2.5%) other obstetric complications (Figure 1).

Compared to participants with no obstetric complication, those with complications resulted in adverse outcomes such 53/203 (26.1%) obstetric cases verses 4/182 (2.2%) non complicated cases and neonatal death 30/203 (14.8%) verse 4/182(2.2%) neonatal death. Live birth occurred more in non-complicated cases verse in obstetric complication cases 174/182 (95.6%) verses 120/203 (59.1%).

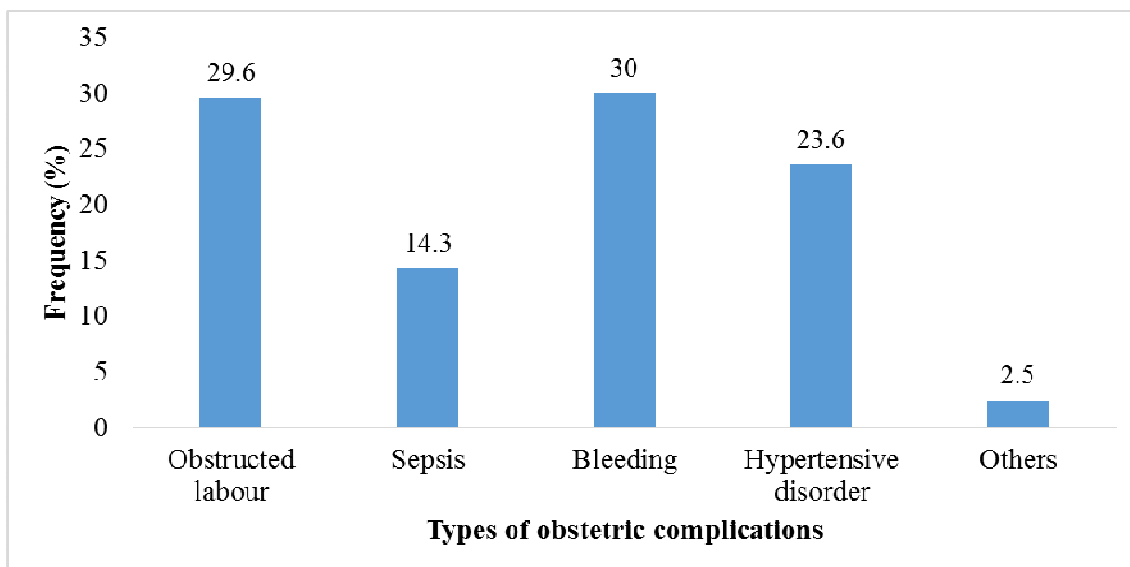


Figure 1: The frequency of obstetric complication by classification

Factors associated with child birth complication

Table 4 shows in bivariate analysis that participants who were employed were less likely to have obstetric complications (OR 0.6, 95% CI 0.4 to 0.9). On the other hand, participants who had no monthly income were more likely to have obstetric complication (OR 1.7, 95% CI 1.1 to 3.2). In multivariate analyses, after adjusting for participant's residency, age, education level, marital status, income and household population size only participants who were employed (OR 0.6, 95% CI 0.6 to 0.9) were associated with obstetric complication.

In Table 5 participants who attended antenatal care (OR 0.7, 95% CI 0.5 to 0.9), those who attended public hospital for ANC (OR 0.7, 95% CI 0.4 to 0.8) and those who started antenatal care in first trimester (OR 0.7, 95% CI 0.5 to 0.9) were less likely to have obstetric complications. These factors did not remain significant in multivariate analysis.

In Table 6 participants who gave birth at home assisted by TBA (OR 1.7, 95% CI 1.7 to 2.4), those who had worsening of past medical condition preceding the current birth (OR 1.6, 95% CI 1.2 to 2.3), and those whose current pregnancy were terminated (OR 1.9, 95% CI 1.1 to 3.4) were more likely to have obstetric complications. On the other hand, vaginal delivery (OR 0.5, 95% CI 0.3 to 0.6), delivery assisted by a nurse (OR 0.4, 95% CI 0.3 to 0.6) and those who gave birth to live children (OR 0.4, 95% CI 0.3 to 0.7) were less likely to have obstetric complications. In multivariate analyses, participants who gave birth at home assisted by TBA (OR 1.6, 95% CI 1.1 to 2.3), those with worsening of past medical condition preceding the current birth (OR 1.5, 95% CI 1.1 to 2.2), those who had vaginal delivery (OR 0.4, 95% CI 0.3 to 0.6) and those who gave birth to live children (OR 0.5, 95% CI 0.4 to 0.7) remained associated with obstetric complications.

Table 4: Socio-economic factors associated with obstetric complications

Variable	Sample size	Child Birth complications		Bivariate OR (95% CI)	Multivariate OR (95% CI)
		No	%		
Residency					
Eastern	76	44	57.9	1.12(0.7-1.7)	1(0.7-1.6)
Northern	107	47	43.9	0.9(0.6-1.3)	0.8(0.6-1.3)
Western	111	65	58.6	1.1(0.8-1.7)	1.1(0.7-1.6)
South Eastern	91	47	51.6	Referent	Referent
Age grouping					
15- 20	104	62	59.6	0.8(0.2-2.5)	1.1(0.6-1.9)
21-30	224	113	50.4	0.7(0.2-2.1)	1.1(0.6-1.8)
31-40	53	25	47.2	0.6(0.2-2)	0.9(0.6-1.7)
≥41	4	3	75	Referent	Referent
Education level					
Primary	102	54	52.9	1(0.7-1.4)	1.1(0.7-1.4)
Secondary	40	24	60	1.1(0.7-1.8)	1.1(0.7-1.8)
Tertiary	22	8	36.4	0.7(0.3-1.4)	0.7(0.3-1.6)
Non-Formal	221	117	52.9	Referent	Referent
Marrital status					
Married	362	189	52.2	0.9(0.5-1.5)	0.9(0.6-1.7)
Divorced/Widow	23	14	60.9	Referent	Referent
Occupation					
Employed	21	9	42.9	0.6(0.4-0.9)	0.6(0.4-0.9)
Self employed	25	20	80	0.5(0.4-1.2)	0.7(0.3-1.6)
Unemployed	339	174	51.3	Referent	Referent
Monthly Income (USD)					
None	47	32	68.1	1.7(1.1-3.2)	1.6(0.8-3.2)
≤200	240	130	54.2	1.4(0.8-2.4)	1.3(0.7-2.3)
201-400	65	28	43.1	1.1(0.6-2.1)	1.1(0.6-2.1)
≥401	33	13	39.4	Referent	Referent
Household size					
1 to 4	91	77	55.8	0.8(0.5-1.4)	0.9(0.5-1.8)
≥5	294	87	47.8	0.7(0.4-1.2)	0.8(0.4-1.4)
11 to 15	43	24	55.8	0.8(0.4-1.6)	0.9(0.5-1.9)
Above 15	22	15	68.2	Referent	Referent

No - Number; % - Percentage; OR - Odds ratio; CI - confidence interval

Table 5: Obstetric and antenatal factors associated with obstetric complications

Variable	Sample size	Child Birth complications		Bivariate OR (95% CI)	Multivariate OR (95% CI)
		No	%		
Age at first delivery (Years)					
<20	250	142	56.8	1.3(0.9-1.7)	1.2(0.9-1.7)
>21	135	61	45.2	Referent	Referent
Parity					
1	76	49	64.5	1.3(0.8-1.9)	1.1(0.3-4.3)
2 to 6	237	117	49.4	0.9(0.7-1.4)	1.3(0.4-4.1)
≤ 7	72	37	51.4	Referent	Referent
Gestation period					
Pre term	24	17	70.8	1.2(0.5-2.6)	1.1(0.5-2.6)
Full term	346	177	51.2	0.9(0.4-1.7)	0.9(0.5-1.9)
Post term	15	9	60	Referent	Referent
Type of circumcision					
Sunna	149	80	53.7	1.1(0.4-2.7)	1.1(0.4-2.8)
Finori	226	118	52.2	1.0(0.4-2.6)	1.1(0.4-2.7)
None	10	5	50	Referent	Referent
Attended ANC					
Yes	315	156	49.5	0.7(0.5-0.9)	1.2(0.6-2.3)
No	70	47	67.1	Referent	Referent
ANC Type					
Public	190	91	47.9	0.7(0.4-0.8)	0.7(0.4-1.2)
Private	97	47	48.5	0.7(0.5-1)	0.7(0.4-1.3)
TBA/Others	28	18	64.3	Referent	Referent
ANC start time					
First trimester	125	56	44.8	0.7(0.5-0.9)	0.9(0.6-1.2)
Second trimester	114	57	50	0.7(0.5-1.1)	0.9(0.6-1.3)
Third trimester	76	43	56.6	Referent	Referent
TT vaccination					
Yes	313	157	50.2	0.8(0.6-1.1)	0.94(0.6-1.3)
No	72	46	63.9	Referent	Referent
Distance to ANC (KM)					
<1	89	38	42.7	0.8(0.5-1.2)	0.9(0.6-1.4)
1 to 5	164	93	56.7	1.1(0.7-1.4)	1.1(0.8-1.6)
>5	132	72	54.5	Referent	Referent
Time to ANC					
<30 min	86	47	54.7	0.9(0.6-1.4)	1.1(0.7-1.8)
1-2 Hours	156	70	44.9	0.7(0.5-1.1)	0.8(0.6-1.3)
> 2 hours	64	33	57.9	Referent	Referent

No - Number; % - Percentage; OR - Odds ratio; CI - confidence interval

Table 6: Intrapartum care and past medical history factors associated with obstetric complications

Variable	Sample size	Child Birth complications		Bivariate OR (95% CI)	Multivariate OR (95% CI)
		No	%		
Place of delivery					
Home/TBA	91	69	75.8	1.7(1.7-2.4)	1.6(1.1-2.3)
Health center	61	32	52.5	1.2(0.8-1.8)	1.1(0.7-1.7)
Hospital	233	102	43.8	Referent	Referent
Mode of delivery					
Vaginal delivery	331	149	45	0.5(0.3-0.6)	0.4(0.3-0.6)
Assisted vaginal delivery	13	13	100	1(0.5-1.8)	0.8(0.4-1.5)
Caesarean section	41	41	100	Referent	Referent
Delivery Assistance					
None	7	6	85.7	1(0.4-2.3)	0.9(0.3-2.8)
TBA	72	55	76.4	0.9(0.6-1.3)	0.6(0.2-1.7)
Nurse	251	95	37.8	0.4(0.3-0.6)	0.8(0.4-1.6)
Doctor	55	47	85.5	Referent	Referent
Current Pregnancy birth outcomes					
Live birth	294	120	40.8	0.4(0.3-0.7)	0.5(0.4-0.7)
Neonatal death	34	30	88.2	0.9(0.6-1.4)	0.8(0.4-1.5)
Still birth	57	53	93	Referent	Referent
Baby birth weight					
Below 2500g	37	21	56.8	0.9(0.5-1.5)	1.1(0.7-1.7)
2500-3500g	163	84	51.5	0.8(0.6-1.2)	1(0.6-1.7)
Above 3500g	109	51	46.8	0.8(0.5-1.2)	1(0.7-1.5)
Don't Know	76	47	61.8	Referent	0.9(0.6-1.5)
Past medical history					
Yes	80	51	63.8	1.3(0.9-1.8)	1.1(0.7-1.5)
No	305	152	49.8	Referent	Referent
Past medical condition					
Diabetes mellitus	5	4	80	1.6(0.6-4.3)	1.5(0.5-4.4)
Hypertension	21	11	52.4	1.1(0.6-1.9)	0.7(0.3-1.4)
Cardiac disease	17	13	76.5	1.5(0.9-2.7)	1.3(0.6-2.5)
Others	37	23	62.2	Referent	Referent
Worsening of past medical condition					
Yes	68	53	77.9	1.6(1.2-2.3)	1.5(1.1-2.2)
No	317	150	47.3	Referent	Referent
Pregnancy termination due to past medical condition					
Yes	14	14	100	1.9(1.1-3.4)	1.5(0.8-2.8)
No	371	189	50.9	Referent	Referent

No - Number; % - Percentage; TBA - Traditional birth attendance; OR - Odds ratio; CI - confidence interval

DISCUSSION

This study determined the prevalence of obstetric complication among expectant women attending two urban maternal and child clinic in Mogadishu Somalia in order to identify independent predictors of obstetric complications. Our findings largely support reports in the literature that women of Somali origin both within Somalia and the immigrants in developed countries are at a greater risk of developing child birth complications probably because of poor ANC attendance, poverty, illiteracy, socio-cultural issues (Thierfelder et al., 2005; Malin & Gissler, 2009; Gele et al., 2012; Råssjö et al., 2013; Sorbye & Leigh, 2016).

The current study established a prevalence of 52.7% obstetric complications, which is higher than that of studies done in India, China, Tanzania, Ethiopia (Sikder et al. 2014; Debelew et al., 2014; August et al., 2015; Zhu et al., 2016) but low compared with study done in South Africa (Allanson et al. 2015). The difference in these findings may be that our study participants were recently delivered women while in India were pregnant women and in Uganda were both delivered and pregnant women. Pregnant women may not able to report complications they have not experienced.

Bleeding (30%), obstructed labor (29.6%), hypertensive disorder (23.6%) and sepsis (14.3%) were reported in our study. In India 12% hemorrhage, 8% sepsis, 11% obstructed labor and 1% eclampsia were reported (Sikder et al. 2014). In Ethiopia bleeding (58.4%) and prolonged labor (23.7%) were the most common reported complications (Worku et al., 2013). In Tanzanian hemorrhage (12%) and obstructed labor (6%) were reported (Sorensen et al., 2010). The existence of more cases of bleeding/hemorrhage complication in this and other studies is a major concern because the majority of the complications are unpredictable and the short time interval for postpartum and antepartum hemorrhage complications and death, in the absence of medical interventions (WHO, 2006).

Economic empowerment through employment and income were important factors in the development of obstetric complications. Reports have shown importance of financial barriers in accessing obstetric care and delays in seeking treating the patient when the complication arises (Borghi et al., 2008; Kabali et al., 2011). In the Ivory Coast the need for advance payment of delivery due to lack led to delay in providing hospital care (Gohou et al. 2004). Other studies in Bangladesh, Benin, and Morocco also showed that the lack of cash as a determinant of delay in obtaining emergency care and birth complication (Saizonou et al., 2006; Pitchforth et al., 2006).

Attendance of antenatal care especially in public hospital and during first trimester of pregnancy was associated with low obstetric complication. The importance of ANC in the maternal service utilizations, like delivery care, and timely care-seeking during obstetric complications has been reported (Rööst et al., 2010; Worku et al., 2013).

More obstetric complications occurred among the women who were attended to by traditional birth attendance which is contrary to a study done in Kenya (Liambila & Kuria, 2014) which showed higher complications among women attended to by skilled providers in health facilities during childbirth. Unlike in Kenya our results probably imply that the TBA lacked the ability to handle complications and are not able to sense the thin line when to refer women they suspect are at a higher risk of developing obstetric complications to health facilities. The association of vaginal delivery, delivery assisted by a nurse and those who gave birth to live children with less likelihood of obstetric complication confirms further the importance of delivery attended to by skilled personnel. Vaginal delivery and live births probably indicates the lack of complications.

Some other studies among pregnant women have identified other independent factors associated with obstetric complications that we did not either measure or find to be significant in this study, including young age, lack of awareness regarding provision of antenatal care, lack of health education, negligence, financial constraints, environmental & cultural prejudices, male involvement in maternal health care, poor nutritional status of young women (anemia), lack of transport facility, absence of patient counseling prior to planning of mode of delivery particularly in primiparous are the important reasons behind high prevalence rate of these complications (Khan et al., 2006; Liambila & Kuria, 2014).

Several limitations of the current study are worth mentioning. First, the main focus of this study was to evaluate the existence of birth complications, valuable clinical information such as possible existence of abortion and medication during pregnancy were not evaluated. Some health records for some patient such as date of admission and onset of symptoms and accompanying treatment strategies were missing. The cross-sectional nature of this study, inadequate assessment of all pregnancy related history, could partly explain the observed lack of association between obstetric complications with factors identified in other reports stated above

Conclusions

Obstetric complication is high among women in Mogadishu Somali, especially hemorrhage complications which of the short time interval for complications and death, in the absence of medical interventions (WHO, 2006). This calls for the improvement in the awareness and utilization of ANC in which complications are easily identifiable.

Economic empowerment, improved awareness on the importance of ANC, training of TBA would be important in reducing the obstetric complication in this region

Competing interests

The authors declare no competing interests.

Authors' contributions

This work was part of Master of Science degree for ZED in public health at the Jomo Kenyatta University of Agriculture and Technology. ZED, SK and YK conceived and designed the study. ZED conducted field work, collected data, conducted data analysis and wrote the draft manuscript. SK and YK advised and supervised data analysis and reviewed the manuscript. All authors read and approved the final manuscript.

Acknowledgements

We acknowledge all participants, the research assistants and translators for their valuable contribution to the study. We thank the Ministry of Health of the Federal Government of Somalia in Mogadishu, Somalia and the medical superintendents of the two maternal and child clinic for granting permission to conduct this study.

References

- Allanson, E.R., Muller, M., & Pattinson, RC. (2015). "Causes of perinatal mortality and associated maternal complications in a South African province: challenges in predicting poor outcomes". *BMC Pregnancy and Childbirth*. 15:37
- August, F., Pembe, A.B., Mpembeni, R., Axemo, P & Darj E. (2015). "Men's Knowledge of Obstetric Danger Signs, Birth Preparedness and Complication Readiness in Rural Tanzania". *PLoS ONE*. 10(5): e0125978.
- Borgi, J, Storeng, K, & Filippi, V. (2008). "Overview of the Costs of Obstetric Care and the Economic and Social Consequences for Households". *Studies in Health Service Organisation & Policy*. 24:27–52
- Capobianco, E., & Naidu, V. (2008). "A review of health sector aid financing to Somalia (2000–2006)". The World Bank (WB Working Paper No. 142), Washington, DC.
- Dagne T. (2009). "Somalia: prospects for a lasting peace. *Mediterr Q* 2009; 20:95-112. World Bank. Somalia country brief. Working for a World Free of Poverty." available from <http://www.worldbank.org/en/country/somalia/overview>. Accessed January 2016.
- Debelew, G.T., Afework, M.F., Yalaw, & A.W. (2014). "Factors affecting birth preparedness and complication readiness in Jimma Zone, Southwest Ethiopia: a multilevel analysis". *Pan Afr Med J*. 12; 19:272.
- Gele, A.A., Kumar, B., Hjelde, K.H., & Sundby, J. (2012). "Attitudes toward female circumcision among Somali immigrants in Oslo: a qualitative study". *Int J Womens Health*. 4: 7–17.
- Gohou, V., Ronsmans, C., Kacou, L., Yao, K., Bohoussou, K.M., Houphouet, B., Bosso, P., Arra-Nama, A.J., Bacci, A., & Filippi, V. (2004). "Responsiveness to life-threatening obstetric emergencies in two hospitals in Abidjan, Cote d'Ivoire". *Trop Med Int Health*. 9:406–415.
- ICSU, ISSC. (2015). "Review of the Sustainable Development Goals: The Science Perspective. Paris: International Council for Science (ICSU)". <http://www.icsu.org/publications/reports-and-reviews/review-of-targets-for-the-sustainable-development-goals-the-science-perspective-2015/SDG-Report.pdf> accessed Feb, 2016.
- Johnson, E.B., Reed, S.D., Hitti, J., & Batra, M. (2005). "Increased risk of adverse pregnancy outcome among Somali immigrants in Washington State". *Am J Obstet Gynecol*. 193:475–82.
- Kabali, E., Gourbin, C., & De Brouwere, V. (2011). "Complications of childbirth and maternal deaths in Kinshasa hospitals: testimonies from women and their families". *BMC Pregnancy Childbirth*. 11: 29.
- Khan, K.S., Wojdyla, D., Say, L., Gülmezoglu, A.M., Van Look, P.F., & Khan, K.S. (2006). "WHO analysis of causes of maternal death: a systematic review". *Lancet* 367(9516):1066–1074.
- Lemeshow, S., Hosmer, D.W., & Klar, J (1990). "Sample size requirements for studies estimating odds ratios or relative risks". *Statistics in medicine*. (7):759-764.
- Liambila, W.N., & Kuria, S.N. (2014). "Birth attendance and magnitude of obstetric complications in Western Kenya: a retrospective case-control study". *BMC Pregnancy and Childbirth*. 14:311
- Malin, M., & Gissler, M. (2009). "Maternal care and birth outcomes among ethnic minority women in Finland". *BMC Public Health*. 20; 9:84.
- Measure communication. (2000). "Making pregnancy and Childbirth Safer Policy Brief, Population Reference Bureau". Available from: http://www.prb.org/pdf/makingpregnancysafer_eng.pdf. accessed on 4 March 2016.
- Menkhaus K. (2006). "Governance without government in Somalia: spoilers, state building and the politics of coping". *Int Secur*. 31:74-106.
- Pitchforth, E., van, T.E., Graham, W., xon-Woods, M., & Chowdhury, M. (2006). "Getting women to hospital is not enough: a qualitative study of access to emergency obstetric care in Bangladesh". *Qual Saf Health Care*.

15:214–219.

- Råssjö, E.B., Byrskog, U., Samir, R., & Klingberg-Allvin, M. (2013). “Somali women's use of maternity health services and the outcome of their pregnancies: a descriptive study comparing Somali immigrants with native-born Swedish women”. *Sex Reprod Healthc.* 4(3):99-106.
- Robertson, E., Malmström, M., & Johansson, S.E. (2005). “Do foreign-born women in Sweden have an increased risk of non-normal childbirth?” *Acta Obstet Gynecol Scand.* 84:825–32
- Rööst, M., Altamirano, V.C., Liljestrang, J., & Essén, B. (2010). “Does antenatal care facilitate utilization of emergency obstetric care? A case-referent study of near-miss morbidity in Bolivia”. *Acta obstetricia et gynecologica Scandinavica.* 89: 335–342
- Saizonou, J., Godin, I., Ouendo, E.M., Zerbo, R., & Dujardin, B. (2006). “La qualité de prise en charge des urgences obstétricales dans les maternités de référence au Bénin: Le point de vue des «Echappées Belles» et leurs attentes”. [Emergency obstetrical care in Benin referral hospitals: 'near miss' patients' views] *Trop Med Int Health.* 11:672–680
- Sikder, S.S., Labrique, A.B., Shamim, A.A., Ali, H., Mehra, S., Wu, L., Shaikh, S., West, K.P., & Christian, P (2014). “Risk factors for reported obstetric complications and near misses in rural northwest Bangladesh: analysis from a prospective cohort study”. *BMC Pregnancy and Childbirth.* 14:347
- Small, R., Gagnon, A., Gissler, M., Zeitlin, J., Bennis, M., Glazier, R.H., Haelterman, E., Martens, G., McDermott, S., Urquia, M., & Vangenn, S (2008). “Somali women and their pregnancy outcomes postmigration: data from six receiving countries”. *BJOG.* 115(13): 1630–1640.
- Sorbye, I., & Leigh, B. (2016). “Somalia reproductive health: national strategy and action plan 2010–2015”. Available from www.unicef.org/somalia/SOM_ReproductiveHealthReport-WEB.pdf. Accessed January, 2016.
- Sorensen, B.L., Elsass, P., Nielsen, B.B., Massawe, S., Nyakina, J., Rasch, V. (2010). “Substandard emergency obstetric care - a confidential enquiry into maternal deaths at a regional hospital in Tanzania”. *Trop Med Int Health.* 2010; 15(8):894-900.
- Thierfelder, C., Taner, M., & Kessler, C.M. (2005). “Female genital mutilation in the context of migration: experience of African women with the Swiss health care system”. *Eur J Public Health.* 15:86–90
- United Nations. (2014). “The Millennium Development Goals Report 2014. New York: United Nations, 2014”. Available at <http://mdgs.un.org/unsd/mdg/Resources/Static/Products/Progress2014/English2014.pdf>, accessed on 4 March 2016.
- Wang, W., Alva, S., Wang, S., & Fort, A. Levels and Trends in the Use of Maternal Health Services in Developing Countries DHS Comparative Reports 26. ICF Macro Calverton, Maryland, USA June 2011.
- Worku, A.G., Yalew, A.W., & Afework, M.F. (2013). “Maternal Complications and Women's Behavior in Seeking Care from Skilled Providers in North Gondar, Ethiopia”. *PLoS One.* 2013; 8(3): e60171.
- World Bank. (2006). “Somalia: from resilience towards recovery and development: a country economic memorandum for Somalia”. World Bank Report, 2006
- World Health Organization. (2012). UNICEF, UNFPA, World Bank. Trends in maternal mortality: 1990 to 2010 World Health Organization. Available from: <http://www.who.int/reproductivehealth/publications/monitoring/9789241503631/en/>. Accessed January 2016.
- World Health Organization. (2014). Trends in maternal mortality: 1990 to 2013 Estimates developed by WHO, UNICEF, UNFPA and The World Bank. Geneva: WHO, 2014. Available at http://apps.who.int/iris/bitstream/10665/112682/2/9789241507226_eng.pdf, accessed on 4 March 2016.
- Zhu, J., Liang, J., Mu, Y., Li, X., Guo, S., Scherpbier, R., Wang, Y., Dai, L., Liu, Z., Li, M., He, M., Deng, C., Yi, L., Deng, K., Li, Q., Ma, X., Wen, C., Mu, D., & Ronsmans, C. (2016). “Socio-demographic and obstetric characteristics of stillbirths in China: a census of nearly 4 million health facility births between 2012 and 2014”. *Lancet Glob Health.* 4: e109–18