

Risk Factors of Abortion Among Women Who Gave Birth at Edna Adan University Hospital in Hargeisa, Somaliland: A Case Control Study

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Received: May 26, 2025; Accepted: June 10, 2025; Published: June 16, 2025

ABSTRACT

Introduction: The World Health Organization (WHO) defines abortion as the termination of pregnancy before 20 weeks or the birth of a fetus weighing less than 500 g. It is a common complication of pregnancy and is influenced by multiple factors: reproductive, economic, social and cultural. We examined risk factors for abortion among pregnant women delivering at Edna Adan University Hospital in Hargeisa, Somaliland.

Methods: We conducted an unmatched case-control study at Edna Adan Hospital, Hargeisa, Somaliland from 1st of January 2023 to 1st of August 2023. The sample size was determined by using an Epi-info version 7 sample size calculator. The minimum estimated sample for this study was 80 cases and 160 controls. Cases were all aborted women who gave birth at Edna Adan Hospital and controls were all selected women who have no history of abortion and gave birth at the hospital from 1st of January 2023 to 1st of August 2023. To select the controls, we used a simple random sampling technique, but for the cases, we enrolled all women (consecutively) until the required sample size was filled. Data were collected using an interviewer-administered questionnaire. Moreover, bivariate and multivariable regression analysis was done using SPSS Version 23 to determine the association between the independent and dependent variables. Findings were interpreted using the Odds Ratio (OR) with its corresponding 95% C.I. and variables with a P-value of <0.05 were considered statistically significant.

Results: Half of the mothers among the cases and one-fourth of the controls 27.5% were the between age 30-34. The educational level of the mothers among cases and controls were almost similar, while 56.25% of the cases and 48.75% of the controls were married living together. The majority of the cases and controls, 70% and 75% did not utilize family planning, respectively. In accordance to the multivariable analysis, those with a maternal age of 30-34 have reduced risk of abortion by 77% (AOR: 0.23, 95% CI: 0.11, 0.66). Mothers whose educational level is college/university showed an increased risk of abortion by 4.32 times (AOR: 4.32, 95% CI: 1.02, 19.9). Having more than 5 children increased the risk of abortion by 1.23 times (AOR: 1.23, 95% CI: 0.68, 2.21). Working long hours in the house has also a significant association with abortion. Working hours in the house between 4-8 reduces the risk of abortion by 77% (AOR: 0.23, 95% CI 0.06, 0.84). Moreover, working <4 hours a day has a protective effect against abortion by 89% (AOR: 0.11, 95% CI 0.03, 0.37).

Conclusion: We conclude that the key risk factors for abortion among women in Somaliland, are maternal age, education level, abortion history and the role of domestic work. These findings highlight the need for policies that improve access to reproductive health services, promote family planning and address the socio-economic challenges women face in this context.

Keywords: Abortion, Case-Control, Woman, Somaliland

Introduction

The removal of a fetus from the uterus before it reaches the viable stage is known as an abortion (in humans, this usually occurs around the 20th week of gestation). Abortions can happen naturally, in which case they are sometimes referred to as miscarriages, or they can be intentionally caused, in which case they are commonly referred to as induced abortions. Abortion

falls into two primary categories, each of which has subtypes. Abortion comes in two primary forms: induced abortion and spontaneous abortion. The following are subtypes of spontaneous abortion: full, incomplete, recurrent, and habitual; missing, inevitable, and complete. Criminal and therapeutic abortions are subgroups of induced abortion [1].

One of the main issues preventing population growth worldwide is abortion. It is an issue not just for population increase but

Citation: Mohamed Abdiqadir Ahmed, Farhia Ibrahim Yusuf and Alemayehu Bayray Kahsay. Risk Factors of Abortion Among Women Who Gave Birth at Edna Adan University Hospital in Hargeisa, Somaliland: A Case Control Study. J Gyneco Obstet Res. 2025. 3(2): 1-7. DOI: doi.org/10.61440/JGOR.2025.v3.36

also for thousands of women's health worldwide. Most societies across the world struggle with infertility and recurrent spontaneous abortion, and infertility perception has drawn a lot of attention as a psychological issue [2].

Advanced maternal age, heavy alcohol or caffeine usage, chronic maternal diseases, medication use, and prior spontaneous abortions are major variables that lead to spontaneous abortions. Miscarriages, also known as spontaneous abortions, can happen for a variety of causes, such as illness, trauma, genetic flaws, or incompatibility between the mother's and the fetus's biochemistry. Sometimes a fetus passes away inside the uterus without being evacuated; this is known as a missed abortion. One prevalent medical intervention is abortion. When performed by a skilled individual and according to the WHO's approved protocol, it is safe for the length of the pregnancy. Maternal mortality and morbidity can be prevented, and one of the main causes is unsafe abortion [3].

Worldwide, abortion is one of the safest medical operations and is performed on demand in underdeveloped nations in compliance with local laws. On the other hand, 5 million hospital admissions and 70,000 maternal deaths worldwide are attributed to spontaneous abortion. Slightly less than half of the 44 million abortions carried out worldwide annually are thought to be dangerous. Africa, on the other side, has the greatest rate of abortion-related deaths worldwide. At least 9,000 maternal fatalities (or 16,000 deaths) occurred in Africa in 2014 as a result of both induced and spontaneous abortions. Incomplete abortions, significant blood loss, and infections are the most frequent side effects of unsafe abortions. In Sub-Saharan Africa, the estimated yearly number of spontaneous abortions performed on reproductive-age women is 5.5. In Sub-Saharan Africa, women of reproductive age are predicted to have 5.5 million spontaneous abortions annually; this translates to an overall abortion rate of 34 per 1,000 women. An estimated 500,000 of Ethiopia's 3.27 million pregnancies are thought to result in abortions each year. Two hundred fifty-six women (19%) in Ethiopia underwent abortions; the prevalence rates of induced and spontaneous abortions were calculated to be 4.8% and 14.3%, respectively [4].

According to the World Health Organization (WHO), in 2018, every ten women who live in Somalia may encounter spontaneous abortion and its related factors. This is due to the lack of basic health services and maternal welfare brought on by the chaos resulting from the civil wars. Abortion is unacceptable in the Somali context, according to several sources [5].

Spontaneous miscarriage has been observed in 15–20% of pregnancies recorded through hospital statistics, and this may be up to 30% using community-based assessments. What enhances or contributes to spontaneous abortion occurring recurrently are maternal age and the history of previously spontaneous abortion. Moreover, environmental factors and smoking are also major drivers of abortion, which in turn causes severe psychological and physical problems. Most spontaneous miscarriages occur before 12 weeks of gestation, while pregnancy loss between 12 and 24 weeks of gestation occurs in <4% of pregnancies [6].

Miscarriage is associated with both medical and psychological consequences. The medical complications include hemorrhage,

infection, embolism, and complications of anesthesia, and the psychological consequences include depression and anxiety for the woman and her family. Abortion has causes and complications. This results in hormonal issues, immune system responses, and cervical insufficiency, where the cervix is weak and cannot hold a pregnancy, which causes miscarriage in the second trimester. Some medical conditions, such as diabetes, high blood pressure, and certain uterine or cervix problems, can be associated with a higher risk of miscarriage. Smoking and alcohol consumption while underweight or overweight can increase the risk [7].

The burden of abortion in Somaliland contributes to maternal mortality and morbidity, with a 2014 analysis of the causes of maternal mortality report finding that 2.3% of maternal deaths were attributable to abortion [8]. Accurate and early identification of signs, symptoms, and risk factors for abortion can have a positive impact on reducing maternal mortality and morbidity. Despite the limited and fragmented nature of research, the magnitude of abortion and its associated factors in Somaliland are not well documented. Therefore, we investigated the magnitude and risk factors of abortion among women who delivered at Edna Adan University Hospital in Hargeisa, Somaliland, with the premise that understanding this issue will be an important contribution in informing policies and programs aimed at improving women's health outcomes and they experience unintended pregnancies in such settings.

Methods and materials

Study site

We conducted this study at Edna Adan Hospital, Hargeisa which is one of the largest charity maternity hospitals in Somaliland. It provides comprehensive medical and surgical services including; ANC, delivery service, post abortion and family planning for clients coming from all parts of Somaliland and other neighborhood regions such as Puntland and southern Somalia. Edna Adan Hospital was founded by a famous lady, Edna Adan in the context of Somalia and the world as a whole.

Study design, period, and study population

We conducted an unmatched case-control study at Edna Adan Hospital, Hargeisa, Somaliland from 1st of January 2023 to 1st of August 2023. The sample size for this study was determined by using an Epi-info version 7 sample size calculator. The following assumptions were considered: 95% level of confidence, 80% of power, the ratio of case to control 1:2, proportion of cases with exposure 14.8% and proportion of controls with exposure 31.6%. Based on the above assumptions, the minimum estimated sample for this study was 80 cases and 160 controls.

Cases: All aborted women who gave birth at Edna Adan Hospital from 1st of January 2023 to 1st of August 2023.

Controls: All selected women who are not aborted and give birth at the hospital from 1st of January 2023 to 1st of August 2023.

To select controls, we used simple random sampling techniques, but for the cases, we enrolled all women (consecutively) until the required sample size was filled.

Data collection

Data were collected using an interviewer-administered questionnaire. Two permanent staff midwives who were trained for 2 days on how to interview and handle the collected data. The questionnaire included socio-demographic and economic variables, obstetric-related factors, and the history of abortion, smoking, or other substance use. The questionnaire was adapted from different pieces of literature and took into account the local context. A pretest was conducted on 5% of the participants at Gargar Hospital, and any ambiguity as well as missed points were used to modify the final version of the questionnaire. The data collection process was well supervised by the researchers, and to maintain the quality of the data, all questionnaires were cross-checked on a daily basis.

Data analysis

Data were entered, edited, and coded using SPSS Version 23. Moreover, bivariate and multivariable regression analysis was done to determine the association between the independent and dependent variables. All variables with significant associations in the bivariate analysis were entered into the multivariable logistic regression model to control the confounding effect. Findings were interpreted using the Odds Ratio (OR), with its corresponding 95% C.I. and variables with a P-value of <0.05 were considered statistically significant. Results were presented using texts and tables. Model fitness was checked using the Hosmer-Lemeshow Goodness of Fit Test, and the multi-collinearity test was checked to minimize bias. The result of the Hosmer-Lemeshow Goodness of Fit Test was a p-value of 0.845. Hence, we considered the model fit to run the binary logistic regression. Moreover, tolerance and variance inflation factors (VIF) showed that there was no multi-collinearity among the independent variables.

Variables

The dependent variable is status of abortion, and the independent variables include sociodemographic characteristics such as age, residence, educational status, occupation, monthly income, and obstetric factors such as, Parity, Gravidity, Maternal number of working hours within the house, history and number of previous abortions, and behavioral factors such as a history of smoking or any other substances use.

Ethical approval

Ethical clearance was solicited from the office of research and the ethical committee of the Edna Adan University Hospital (IRB No. XXXXXX). We obtained permission from all relevant authorities at the hospital. We also obtained written consent from participants prior to enrollment in the study. Participation in the study was voluntary, and participants were informed of their right to withdraw from the study. Data collection was conducted confidentially, and the data was kept and stored in a secure location.

Results

Distribution of Socio-demographic, Obstetric and lifestyle characteristics of the mothers

Out of the total study participants 17.1% were in the age group of 19-24, 22.5% between 25-29, and 22.5% between 35-39. The mean age of the respondents was 30.6 (SD= 5.3) years. The majority (51.2%) of the mothers were married and lived together

with their husband; about 38.3% had no formal education; 25% went to Islamic/Quran schools; 19.6% had primary education; 9.2% had secondary education; and 7.9% had a University and college education. In terms of income, about 43% of the respondents had a monthly income less than \$100. Moreover, about 35% of the mothers were housewives, 30.8% were government employees, 47.1% were private employees, and 6.4% were self-employed while 20.4% were unemployed. Furthermore, 62.1% of the participants were urban dwellers, whereas 37.9% were from rural areas. The mean (SD) of gravidity and parity was 6 (2.81) and 4 (2.14) respectively. The majority of the respondents gestational age was >20 weeks of gestation (59.6%). Regarding the history of abortion of mother, nearly two-third of the respondents have not history of abortion (72%). Furthermore, 71.7% of the mothers did not utilize family planning. Finally, more than half of the respondents work more than 8 hours in the house (55%) (Table 1).

Table 1: The socio-demographic characteristics of the mothers who gave birth at Edna Adan University hospital in Hargeisa, Somaliland (n, 240)

Variable	Frequency	percentage
Age		
19-24	41	17.1
25-29	54	22.5
30-34	84	35
35-39	54	22.5
≥40	7	2.9
Education		
Illiterate	92	38.3
Islamic/Quran school	60	25
Primary	47	19.6
Secondary	22	9.2
University or college	19	7.9
Marital Status		
Married and living together	123	51.2
Divorced	76	31.7
Separated	41	17.1
Occupation		
Housewife	84	35
Government employees	74	30.8
Unemployed	49	20.4
Self-employed	16	6.7
Private organization	17	7.1
Income		
<100\$	104	43.3
100-300\$	94	39.2
301-500\$	28	11.7
>500	14	5.8
Residence		
Urban	149	62.1
Rural	91	37.9

Gravida		
<5	102	42.5
>5	138	57.5
Parity		
<5	164	68.3
>5	76	31.7
Gestational age of current pregnancy		
6-10 weeks	25	10.4
11-15 weeks	47	19.6
16-20 weeks	25	10.4
>20 weeks	143	59.6
History of abortion		
Yes	72	30
No	168	70
Family Planning utilization		
Yes	68	28.3
No	172	71.7
Working hours in the house		
>8 hours per day	38	15.8
4-8 hours per day	70	29.2
<4 hours per day	132	55

Socio-demographic, Obstetric and lifestyle characteristics of the mothers related to abortion for cases and controls

Half of the mothers among the cases and one-fourth of the controls 27.5% were the between age 30-34. The educational level of the mothers among cases and controls were almost similar, while 56.25% of the cases and 48.75% of the controls were married living together. The majority of the mother were housewives 31.25% among cases and 36.9% among controls. About 48.75% of the cases and 41.25 of the controls had a monthly income of <\$100. Sixty percent of the cases and 63.1% of the controls were urban dwellers. In terms of parity and gravidity, 56.25% of cases and 58.1% controls had Gravidity of >5 while 71.25% of cases and 66.9% of controls had a parity of <5. Moreover, 52.5% and 59.6% of the cases and controls had a gestational age of >20 weeks, respectively. Regarding history of abortion, 57.5% of the cases and 21.2% of the controls had history of abortion. The majority of the cases and controls, 70% and 75% did not utilize family planning, respectively. Finally, 72.5% of the cases and 46.2% of controls work less than 4 hours a day at home (Table 2).

Table 2: The socio-demographic, Obstetric and lifestyle characteristics of the mothers related to abortion for cases and controls at Edna Adan University Hospital, Hargeisa, Somaliland (n, 240)

Variables	Cases n (%)	Controls n (%)	Total n (%)	P-value
Age				
19-24	8 (10)	33 (20.6)	41 (17.1)	0.006
25-29	12 (15)	42 (26.25)	54 (22.5)	
30-34	40 (50)	44 (27.5)	84 (35)	

35-39	17 (21.25)	37 (23.13)	54 (22.5)	0.006
≥40	3 (3.75)	4 (2.5)	7(2.9)	
Education				
Illiterate	31 (38.75)	61 (38.13)	92 (38.3)	0.26
Islamic/ Quran school	23 (28.75)	37 (23.13)	60 (25)	
Primary	16 (20)	31 (38.75)	47 (29.4)	
Secondary	8 (10)	14 (8.75)	22 (13.75)	
University or college	2 (2.5)	17 (10.6)	19 (7.9)	
Marital status				
Married and living together	45 (56.25)	78 (48.75)	123 (51.25)	0.22
Divorced	20 (25)	56 (35)	76 (31.7)	
Separated	15 (18.75)	26 (16.25)	41 (17.1)	
Occupation				
House wife	25 (31.25)	59 (36.9)	84 (35)	0.43
Government employees	22 (27.5)	52 (32.5)	74 (30.8)	
Unemployed	21 (26.25)	28 (17.5)	49 (30.6)	
Self- employed	7 (8.75)	9 (5.6)	16 (6.7)	
Private organization	5 (6.25)	12 (7.5)	17 (7.1)	
Income				
<100\$	38 (48.75)	66 (41.25)	104 (43.3)	0.63
100-300\$	29 (36.25)	65 (40.6)	94 (39.2)	
301-500\$	10 (12.5)	18 (11.25)	28 (11.7)	
>500	3 (3.75)	11 (6.9)	14 (8.75)	
Residence				
Urban	48 (60)	101 (63.1)	149 (62.1)	0.67
Rural	32 (40)	59 (36.9)	91 (37.9)	
Gravida				
<5	35 (43.75)	67 (41.9)	102 (42.5)	0.842
>5	45 (56.25)	93 (58.1)	123 (51.25)	
Parity				
<5	57 (71.25)	107 (66.9)	164 (68.3)	0.51
>5	23 (28.75)	53 (33.13)	76 (31.7)	

Gestational age of current pregnancy				
≤10 weeks	10 (12.5)	15 (9.4)	25 (10.4)	0.44
11-15 weeks	19 (23.75)	28 (17.5)	47 (19.5)	
16-20 weeks	9 (11.5)	16 (10)	25 (10.4)	
>20 weeks	42 (52.5)	101 (63.1)	143 (59.6)	
History of abortion				
Yes	46(57.5)	28 (21.2)	74 (30.8)	0.007
No	34 (42.5)	132 (78.8)	166 (69.2)	
Family Planning utilization				
Yes	20 (25)	48 (30)	68 (28.3)	0.41
No	60 (75)	112 (70)	172 (71.7)	
Working hours in the house				
>8 hours per day	3 (3.75)	35 (21.9)	38 (15.8)	<0.001
4-8 hours per day	19 (23.75)	51 (31.9)	70 (29.2)	

<4 hours per day	58 (72.5)	74 (46.2)	132 (55)	<0.001
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Factors associated with abortion

A bivariate and multivariable logistic regression analysis was conducted to identify factors associated with Abortion. In accordance to the multivariable analysis, those with a maternal age of 30-34 have reduced risk of abortion by 77% (AOR: 0.23, 95% CI: 0.11, 0.66). Mothers whose educational level is college/university showed an increased risk of abortion by 4.32 times (AOR: 4.32, 95% CI: 1.02, 19.9). Having more than 5 children increased the risk of abortion by 1.23 times (AOR: 1.23, 95% CI: 0.68, 2.21). Working long hours in the house has also a significant association with abortion. Working hours in the house between 4-8 reduces the risk of abortion by 77% (AOR: 0.23, 95% CI 0.06, 0.84). Moreover, working <4 hours a day has a protective effect against abortion by 89% (AOR: 0.11, 95% CI 0.03, 0.37) (Table 3).

Table 3: Bivariate and multivariable regression analysis for factors associated with Abortion among mothers who gave birth at Edna Adan University Hospital in Hargeisa, Somaliland (n,240)

Characteristics		Abortion status		COR	95% CI		AOR	95% CI	
Variable	Categories	Case	Control		Lower	Upper		Lower	Upper
Age of the Mother	19-24	8	33	1	1	1	1	1	1
	25-29	12	42	1.2	0.39	3.64	0.85	0.31	2.32
	30-34	40	44	0.33	0.12	0.85	0.27	0.11	0.66
	35-39	17	37	0.7	0.24	2.04	0.53	0.20	1.38
	≥40	3	4	0.31	0.05	2.04	0.32	0.06	1.74
Marital Status	Married live together	45	78	1	1	1	1	1	1
	Divorced	20	56	1.63	0.79	3.36	1.62	0.86	3.03
	Separated	15	26	1.27	0.55	2.9	1.01	0.48	2.08
Educational Level	Illiterate	31	61	1	1	1	1	1	1
	Islamic/Quran schools	23	37	0.82	0.38	1.79	0.82	0.42	1.61
	Primary	16	31	0.67	0.28	1.63	0.99	0.47	2.07
	Secondary	8	14	0.94	0.31	2.85	0.89	0.34	2.35
	University/ college	2	17	3.92	0.65	23.82	4.32	1.02	19.90
Occupation	Housewife	25	59	1	1	1	1	1	1
	Government employee	22	52	0.73	0.32	1.59	1.01	0.51	1.98
	Unemployed	21	28	0.42	0.18	0.99	0.57	0.27	1.18
	Self-employed	7	9	0.32	0.08	1.27	0.55	0.18	1.63
	Private organization	5	12	1.1	0.32	3.96	1.02	0.32	3.19
Income	<100\$	38	66	1	1	1	1	1	1
	100-300\$	29	65	1.04	0.53	2.02	1.29	0.71	2.33
	30-500\$	10	18	1.06	0.37	3.01	1.04	0.43	2.47
	>500\$	3	11	2.19	0.46	10.5	2.11	0.55	8.04
Residence	Urban	48	101	1	1	1	1	1	1
	Rural	32	59	1.36	0.7	2.6	0.88	0.50	1.52

Gravida	<5	35	67	1	1	1	1	1	1
	>5	45	93	0.90	0.43	1.87	1.08	0.63	1.86
Parity	<5	57	107	1	1	1	1	1	1
	>5	23	53	1.19	0.53	2.65	1.23	0.68	2.21
Gestational age	≤10 weeks	10	15	1	1	1	1	1	1
	11-15 weeks	19	28	0.82	0.27	2.47	0.98	0.37	2.64
	16-20 weeks	9	16	0.97	0.26	3.60	1.19	0.38	3.72
	>20 weeks	42	101	0.96	0.23	3.93	1.60	0.67	3.86
History of abortion	Yes	46	28	1	1	1	1	1	1
	No	34	132	28	6.14	136.5	6.38	3.49	11.65
Family planning	Yes	20	48	1	1	1	1	1	1
	No	60	112	0.21	0.45	0.99	0.78	0.42	1.43
Working hours in the house	>8 hours per day	3	35	1	1	1	1	1	1
	4-8 hours per day	19	51	0.198	0.052	0.76	0.23	0.06	0.84
	<8 hours per day	58	74	0.10	0.029	0.378	0.11	0.03	0.37

Discussion

Our goal was to determine the risk factors for abortion among women who gave birth in Hargeisa, Somaliland, at Edna Adan University Hospital. We discovered that the likelihood of having an abortion is greatly influenced by factors such as working hours within the home, maternal age, educational status, and history of abortion.

Our findings about the relationship between maternal age and the risk of abortion are in line with a number of other research projects carried out in low- and middle-income countries (LMICs). Abortion risk was observed to be reduced in women aged 30-34 (AOR: 0.23, 95% CI: 0.11–0.66), which is consistent with earlier Ethiopian study that showed similar patterns [9]. Nonetheless, this runs counter to research from Kenya and Nigeria, which found that abortion rates were higher in younger mother age groups [10]. This difference could be due to the distinct socio-economic and healthcare access dynamics in Somaliland.

Abortion risk was significantly influenced by educational status. Compared to their less educated peers, women with a university or college degree had an abortion over four times more frequently (AOR: 4.32, 95% CI: 1.02–19.9). This is consistent with research conducted in Ethiopia and Nigeria, which found that having more education was associated with a higher risk of abortion [11, 12]. This may be explained by the fact that educated women are more likely to put off having children and seek an abortion when their pregnancies interfere with their plans for their careers or are unanticipated.

Regarding occupational considerations, our research revealed that working hours inside the home significantly reduced the risk of abortion. Less than 4-hour workers had an 89% lower chance of having an abortion (AOR: 0.11, 95% CI: 0.03–0.37). This result is in contrast to earlier research conducted in Ethiopia and Kenya, where the association between occupation and abortion rates was stronger [13]. This element emphasizes the necessity of customized treatments that lessen the burden on expectant mothers, especially those who originate from low-income families.

Moreover, it was found that a woman's past abortion history was a powerful predictor of future abortions; those who had

previously had an abortion were six times more likely to have another one than those who had not (AOR: 6.38, 95% CI: 3.49–11.65). This result is in line with research from Ethiopia and other sub-Saharan African countries, where a history of either an induced or spontaneous abortion frequently results in recurrent miscarriages because of underlying medical issues or insufficient post-abortion treatment [14, 15].

Strengths and Limitations

The main strength of this study lies in its focus on Somaliland, a region where there is a lack of information regarding family planning and maternal health in general. The use of a case-control design allowed for the identification of specific risk factors associated with abortion, and the relatively large sample size enhances the generalizability of our findings. However, the limitation of the study is that it relied on self-reported data, which may be affected by recall bias, especially when it comes to sensitive topics like abortion.

Conclusion

We conclude that the key risk factors for abortion among women in Somaliland, are maternal age, education level, abortion history and the role of domestic work. These findings highlight the need for policies that improve access to reproductive health services, promote family planning and address the socio-economic challenges women face in this context.

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