



Original article

Determinants of repeated induced abortion among reproductive age group women visiting health facilities of Sidama regional state, Ethiopia, 2020: Facility based unmatched case-control study

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ABSTRACT

Background: Induced abortion is the intentional termination of pregnancy before the 28th weeks of gestation. Despite the urgency of the situation, little is known about the factors that lead to induced abortion. Therefore, the aim of this study was to identify determinants of repeated induced abortion among reproductive age group women at health facilities of Sidama region, Ethiopia.

Methods: Unmatched case-control study had been done. A total of 116 cases and 234 controls were included in the study. Cases were women with two or more induced abortions and controls with one induced abortion. Data was entered to Epi data version 3.1 and exported to SPSS 20 for analysis. Bivariate and multivariate logistic regression analysis with 95% confidence interval was done.

Result: A total of 116 cases and 234 controls completed the interview with response rate of 95% and 94.9% for cases and controls. Urban resident (AOR, 95% CI = 4.9 [2.1–11.3]), primary education (AOR, 95% CI = 0.21 [0.06–0.8]), multiple sexual partner (AOR, 95% CI = 2 [1.1–3.7]), fertility awareness (AOR, 95% CI = 6.8 [2.5–18.2]), age at first sex (AOR, 95% CI = 4 [1.9–8.7]) and not perceived abortion as painful procedure (AOR, 95% CI = 2.5 [1.2–5.3]) were significant factors of induced abortion.

Conclusion: Residence, education, number of sexual partner, age at first sex, fertility awareness and perception of abortion pain were determinant factors. Education, health information, family free discussion & reproductive health service utilization should be promoted.

1. Introduction

Induced abortion is defined as the intentional termination of pregnancy using drugs or surgical interventions before the 28th weeks of gestation or before the fetus become independently viable outside of the womb. Repeated induced abortion is having two or more induced abortions before 28th week of gestation. Repeated induced abortion

highlights the issues of unplanned pregnancies and poor post-termination contraceptive practices.^{1,2} Every year, worldwide, about 210 million women became pregnant and about 21 million of these ended in induced abortion. The burden of abortion related complications are still significant being one of the leading causes of maternal mortality and morbidity. During 2010–2014, an estimated 8.2 million induced abortions occurred each year in Africa. The annual rate of

Abbreviations: AOR, Adjusted Odds Ratio; COR, Crude Odds Ratio; CAGE, Cut down, Annoyed, Guilty and Eye opener; MCH, Maternal and Child Health; PCA, Principal Component Analysis; IRB, Institutional Review Board.

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abortion for the region was 34 per 1000 women of reproductive age and remained more or less constant.³⁻⁵ Repeated induced abortion accounts for a substantial proportion of all induced abortion in many countries, with reports ranging from 22% to 77%. Repeated induced abortions in Russia was among the highest in the world (68%) in 2014 and 38% of Scotland women in 2016 had repeated induced abortion. It was 16% in Kenya in 2016 and 33.6% in 2008 in Ethiopia.⁶⁻¹⁰

While safe termination of pregnancy is a relatively low risk procedure, repeated terminations have been associated with numerous sequelae in the latter pregnancies such as ectopic pregnancy, placenta Previa, fetal loss, consecutive preterm delivery, lower fertility and potentially breast cancer.¹¹ Ethiopia have been working a lot in reducing maternal mortality through adopting different international commitments and by expanding maternal health service delivery points. Currently family planning service is being provided at the health post level through health extension workers to the community. The country also revised its abortion law in 2005 to reduce maternal mortality from complication of unsafe abortion.¹² Despite of the availability of modern family planning methods, in Ethiopia the prevalence of repeated induced abortion remained 30% in 2013 and 23.5% of the pregnancies were unintended pregnancies in 2016 which is assumed to contribute for induced abortion.^{13,14} Worldwide, unsafe induced abortion is the leading cause of maternal death and morbidity,¹⁵ with Sub-Saharan African countries bearing the brunt of the burden.^{16,17} Furthermore, according to systematic review and meta-analysis abortion accounted for 8.6% of maternal deaths in Ethiopia.¹⁸ Despite the urgency of the situation, little is known about the factors that lead to induced abortion. Therefore, the aim of this study was to identify determinants of repeated induced abortion among reproductive age group women at health facilities of Sidama region, Ethiopia.

2. Methods and materials

2.1. Study design and area

Facility based unmatched case-control study was conducted at health facilities of Sidama regional state, Ethiopia from February 16/2020–April 28/2020. Sidama is the 10th regional states found in Ethiopia. Hawasa is the capital city of the region which is located 273 km far from Addis Abeba, the capital city of Ethiopia. The Region has a total population of 3,893,816 in which 1,927,439 and 1,966,377 are male and female respectively. In 2020 the estimated number of pregnant women in the region was 31,795. It has 17 public hospitals, 123 health centers, 532 health posts and two Ethiopian family health guidance associations. According to health management information system report of 2020, the health coverage of the Region was 89% [HMIS 2020].

2.2. Source population

Women of reproductive age attending public health facilities in the Sidama region who received maternity health care services.

2.3. Study population

Women of reproductive age who got comprehensive abortion treatment and those who visited maternity and child health (MCH) departments for prenatal or postnatal care services in selected public hospitals in the Sidama region.

2.4. Selection of cases and controls

Cases: Women who obtained induced abortion care services in selected public hospitals throughout the data collection period or who received post-abortion care services after being presented with an induced abortion attempt at the select public hospital.

Control: Women with at least one pregnancy history in the previous 12 months who sought maternal health care (antenatal or postnatal care) in selected public hospitals and had no history of induced abortion.

2.5. Inclusion criteria

Women of reproductive age group with one and two or more induced abortion at health facilities of Sidama region were included in the study.

2.6. Exclusion criteria

Women of reproductive age group with one and two or more induced abortion who were critically ill and induced abortion due to medical indication were excluded from the study.

2.7. Sample size determination

Sample size was determined by double population proportion formula using the assumptions P_1 (proportion of exposure among cases), p_2 (proportion of exposure among controls) 95% CI, 80% power of the test and 1:2 case to control ratio under open epi from previous studies¹⁹⁻²¹ and the largest sample size was found from study done in Mekelle town.²¹ A 10% nonresponse rate was added to the initial sample size. $n = (1+r)/r^* (P) (1-P) (Z\beta + Z \alpha/2)^2 / (p_1-p_2)^2 = 112$ where n is the sample in the case population. After adding 10%, the total sample became 369 (123 cases and 246 controls).

2.8. Sampling procedure

All public health facilities and family health guidance associations which provide induced abortion, were identified and included in the study by the merit of providing comprehensive abortion care. After the health facilities were identified three months registered cases and controls from each health facility was enumerated to estimate the average flow of cases and controls per month. Then proportional allocation to size were calculated to each health facility for cases and controls separately. The cases were chosen using a consecutive sampling procedure until the requisite sample size was obtained. A systematic random selection procedure was used to choose the controls. The first control was chosen by random, and each subsequent control was interviewed until the needed sample size was attained.

2.9. Data collection procedure

Data was collected by using pretested structured interviewer administered questionnaire which was designed by reviewing previous literatures on the issue under investigation. Eleven female data collectors (clinical nurse & Midwives) and 3 supervisors were assigned. Face to face interviewing method was used and interviewers have obtained written informed consent from each respondent. Moreover the interview was made in a separate room after client received abortion care and got stable condition.

2.10. Data quality control

Data collection tool was pretested on 5%¹⁹ of the sample size out of the study area before the actual data collection. A two day training was given for data collectors and supervisors. The collected data was checked for completeness, accuracy, clarity, and consistency by a supervisor and the principal investigator on daily basis. History of abortion either single or repeated was asked from the participant. Besides, so as to minimize bias, the participant response was cross-checked with the medical record. Same gender data collectors were recruited to increase participation rate of respondents.

2.11. Definition of terms

Alcohol, Cigarette and Khat abuser: Women who reported two positive answers from four CAGE (cut down, annoyed, guilty and eye opener) questions.²²

Induced abortion: intentional termination of pregnancy, by any means or person other than spontaneous.²⁰

2.12. Data processing and analysis

The collected data was checked for completeness, coded, and entered to Epi-data version 3.1 then it was exported to SPSS version 20 for further analysis. Frequencies, mean, standard deviations and percentages were used to describe the study population in relation to socio-demographic and other independent variables. Principal component analysis (PCA) was done for variables which used to assess wealth status of households. Wealth index quintiles were created.

Binary logistic regression analysis was done and Variables with P value of less than 0.25 were taken into multivariate analysis. Multicollinearity diagnostic test was done for all independent variables before entered to multivariate analysis. Multivariate analysis was done for candidate variables. The model fitness was checked by Hosmer and Lemeshow model fitness test ($p = 0.41$) and omnibus tests of model Coefficients all significant ($p < 0.05$). Variables in the multivariate analysis with p-value of <0.05 and 95% confidence interval not including one in between were taken as determinants of repeated induced abortion among reproductive age group women.

2.13. Ethical clearance

Ethical clearance was obtained from institutional review board (IRB) of Dilla University, College of medical and health science. Support letter was received from Woreda health offices in Sidama region. Ethical clearance and support letter were presented to the selected health facilities during the data collection time and approved by hospital medical directors and health center directors. Informed written consent was obtained from each respondent. Respondents were informed about the purpose and procedure of the study, the importance of their participation, and the right to withdraw at any time if they want. Emphasize was given to privacy and confidentiality by conducting the interview in a separate place, in a non-judgmental manner and the recorded data was kept in a secured place with strict confidentiality. Advice was given to each participant about the effect of repeated abortion and use of contraceptive methods to prevent unintended pregnancy.

3. Results

3.1. Sociodemographic characteristics of participants

Out of 369(123 cases and 246 controls) participants, 234 women completed the face to-face interview with a response rate of 94% for cases and 95% for controls. And the main reason for non-response was a refusal to participate in to study. Among these, 116(33.15%) were cases and 234(66.85%) controls.

The mean age of cases was 29 years (Min = 20, Max = 37, SD = 3.7) and 26 years (Min = 18, Max = 38, SD = 4.5) for controls. More than half of cases 77(66.38%) were from urban area as compared to 85 (38.4%) of controls. Nearly half of the cases 51 (43.96%) and more than half of controls 184 (76.63%) were married participants.²⁶ (22.41%) of cases and 8 (3.41%) of controls were illiterate respondents. Regarding occupational status 41 (35.34%) of cases and 101(43.16%) of controls were housewives. 75(64.65%) cases and 111(47.43%) of controls reported they had their own income. Nearly one-third 32 (27.58%) of cases and 38 (16.23%) of controls were in the poorest wealth index category (Table 1).

Table 1

Socio demographic characteristics of the study participants at public health facilities and family health guidance association of Sidama regional state, Ethiopia 2020.

Variables	Cases(n = 116) N(%)	Controls(n = 234) N(%)	P - value for χ^2 test
Age			
15–24	15(12.93%)	87(37.17%)	<0.001
25–34	87 (75%)	132 (56.41%)	
35–44	14 (12.07%)	15 (6.41%)	
Residence			
Urban	77 (66.38%)	85 (36.32%)	<0.001
Rural	39 (33.62%)	149 (63.62%)	
Religion			
Orthodox	38 (32.75%)	61(26.06%)	0.22
Muslim	13 (11.20%)	13 (5.55%)	
Protestant	36 (31.03%)	91 (38.88%)	
Catholic	27 (23.27%)	54 (23.07%)	
Others	2 (1.74%)	7 (2.99%)	
Marital status			
Single	47(30.51%)	23 (9.82%)	<0.001
Married	51 (43.96%)	184 (76.63%)	
Divorced	10 (8.62%)	21 (8.97%)	
Widowed	8 (6.89%)	6 (2.56%)	
Educational status			
Illiterate	26 (22.41%)	8 (3.41%)	<0.001
Primary	45 (38.79%)	108(46.51%)	
Secondary	30 (25.86%)	96 (41.02%)	
College and above	7 (6.03%)	30 (12.82%)	
Occupation			
House wife	41 (35.34%)	101(43.16%)	0.001
Student	5 (4.31%)	13 (5.55%)	
House maid	2 (1.72%)	-	
Daily laborer	8 (6.89%)	5 (2.13%)	
Farmer	15 (12.93%)	13 (5.55%)	
Government employee	11 (9.48%)	34 (14.52%)	
Merchant	22 (18.96%)	33 (14.10%)	
Others	12 (10.34%)	35 (14.95%)	
Had own income			
Yes	75(64.65%)	111(47.43%)	0.03
No	41 (35.34%)	123 (52.56%)	
Wealth status			
Poorer	32 (27.58%)	38 (16.23%)	0.73
Poor	20 (17.24%)	51 (21.79%)	
Medium	18 (15.51%)	53 (22.64%)	
Rich	23 (19.82%)	45 (19.23%)	
Richest	23 (19.82%)	47 (20.08%)	

3.2. Reproductive characteristics of respondents

Almost all cases 114 (98.27%) and controls 234(100%) have heard of about at least one or more types of modern family planning methods. Regarding past experience of modern family planning methods, more than half of cases 70 (60.34%) and controls 159 (67.95%) reported they had ever used modern family planning methods in their life. Nearly all cases 112(96.55%) and controls 232(99.15%) reported they have been counselled for post abortion family planning methods after the termination of the index pregnancies.

Respondents were asked whether they started post abortion modern family planning method utilization or not. Accordingly 104(89.65%) of cases and 217 (89.7%) of controls have started post abortion modern family planning methods after the index abortion. Among those who used post abortion modern family planning methods 55(47.41%) of cases and 119 (50.85%) of controls started pills respectively (Table 2).

3.3. Reproductive and abortion related characteristics of respondents

Forty seven (40.51%) of cases did not understand their fertility cycle and when they will most likely to conceive after menstruation as compared to only 72 (30.76%) of controls. More controls 124(52.99%)

Table 2

Family planning information and utilization related characteristics of respondents at public health facility and family health guidance association of sidama regional state, Ethiopia 2020.

Variables	Cases (n = 116) N (%)	Controls (n = 234) N (%)	P - value for χ^2 test
Ever heard of modern FP			
Yes	114 (98.27%)	234(100%)	0.034
No	2 (1.73%)	-	
Ever used modern FP			
Yes	70 (60.34%)	159 (67.95%)	0.057
No	46 (39.66%)	75 (32.05%)	
Counselled on post abortion FP			
Yes	112(96.55%)	232(99.15%)	0.055
No	4(3.45%)	2 (0.85%)	
Started post abortion FP			
Yes	104 (89.65%)	209(89.32%)	0.989
No	12 (10.35%)	25(10.68%)	
Type of post abortion FP			
Pills	55(47.41%)	119 (50.85%)	0.011
Injectable	26 (22.41%)	67 (28.63%)	
Implants	23 (19.82.0%)	24 (10.25%)	

had regular monthly menstrual cycle than cases 51(43.96%).With regard to age at first sexual initiation 93(80.17%) of cases and 130 (57.0%) of controls reported starting sexual intercourse before the age of 18 years old. Concerning number of sexual partners more than half of cases 86(74.13%) and 103 (55.55%) of controls claimed having more than one sexual partner in the past twelve months.

Cases had more gravidity than controls and 46 (39.65%) of cases had three and more live birth children when compared with only 63 (26.92%) of controls. About 14(12.07%) and 27 (11.53%) of respondents claimed that their last pregnancy was unwanted for cases and controls respectively. More controls 67(28.63%) than cases 35(30.17%) had intention to have children in the coming future.

Concerning disclosing about termination of pregnancy more than half 72 (62.06) of cases and 114 (48.71%) of controls reported disclosing about termination of pregnancy to third parties and 30 (25.86%) of cases and 71(69.3%) of controls have disclosed about termination of pregnancy to a friend.

Participants were asked their opinions about the effect of repeated induced abortion in the long term, accordingly only 13 (12%) cases and 46 (18.9%) of controls agreed that repeated induced abortion causes permanent infertility (Table 3).

3.4. Substance use characteristics of respondents

With regard to respondents exposure to substances like alcohol, Khat and cigarette use, from one hundred eight cases 17(15.7%) and 21 (8.7%) out of 242 controls reported that they had a habit of drinking alcohol. Regarding the use of Khat 5 (4.6%) of cases and 9 (3.7%) controls claimed chewing Khat. None of the cases and controls reported the habit of smoking cigarette.

3.5. Experience of intimate partner violence

Respondents were asked about whether they have ever faced intimate partner violence or not in their whole life. Accordingly from a total of 116 cases and 234 controls,41 (35.34%) and 39(16.66%) have experienced sexual violence by their intimate partners respectively. About 27 (25.0%) of cases and 90 (37.2%) of controls reported ever experience of being physically abused.

3.6. Determinants of repeated induced abortion

Sociodemographic, Reproductive characteristics, Substance abuse and Intimate partner violence related variables were entered to bivariate logistic regression analysis to test their association with the dependent

Table 3

Reproductive and abortion related characteristics of respondents at public health facilities and family health guidance association of Sidama regional state Ethiopia 2020.

Variables	Cases (n = 116) N (%)	Controls (n = 234) N (%)	P - value for χ^2 test
Aware of fertility cycle			
Yes	69(59.48%)	162 (69.23%)	0.012
No	47 (40.51%)	72 (30.76%)	
Fertility resumption after menses			
Within 7 days	18(16.4%)	6 (3.5%)	0.001
After 7 days	51 (83.6%)	164 (96.5%)	
Menstrual cycle			
Regular	51 (43.96%)	124 (52.99%)	0.001
Irregular	36 (31.03%)	82 (35.04%)	
Did not know	29 (25%)	28 (11.96%)	
Age at first sex			
<18 years	93(80.17%)	130 (57.0%)	<0.001
>= 18 years	23 (19.82%)	104 (43.0%)	
Had multiple sexual partner			
Yes	86(74.13%)	103 (55.55%)	<0.001
No	30 (25.86%)	131 (55.98%)	
Number of pregnancy			
One - two	27(23.27%)	148 (63.24%)	<0.001
Three & above	89 (76.72%)	86 (36.75%)	
Number of live birth			
None	27(23.27%)	96 (41.02%)	<0.001
One - two	43 (37.06%)	75 (32.05%)	
Three & above	46 (39.65%)	63 (26.92%)	
Last pregnancy unwanted			
Yes	14 (12.07%)	27 (11.53%)	0.098
No	102 (87.93)	207 (88.46%)	
Future intention of children			
Yes	35 (30.17%)	67 (28.63%)	0.764
No	64 (55.17%)	135 (57.69%)	
Not decided yet	17 (14.65%)	32 (13.67%)	
Abortion disclosed			
Yes	72 (62.06)	114 (48.71%)	0.036
No	44 (37.93%)	120 (51.28%)	
To whom it was disclosed			
Sexual partner	35 (30.17%)	20 (17.5%)	0.002
Family member	7 (6.03%)	15 (13.2%)	
Friend	30 (25.86%)	71 (69.3%)	
Type of abortion			
Medical	69 (59.48%)	79 (33.76%)	<0.001
Surgical	47 (40.51%)	155 (66.23%)	
Perceived abortion as painful			
Yes	74 (63.79%)	180 (76.92%)	0.001
No	42 (36.20%)	54 (23.07%)	

variable. From those variables which were interred to bivariate analysis, place of residence, women's educational status, having multiple sexual partner in the preceding twelve months, fertility awareness, age at first sexual initiation, ever used modern family planning methods, disclosing about termination of pregnancy to third party, type of abortion procedure,client perception on painfulness of abortion procedure,ever drunk alcohol,ever experienced sexual and emotional violence by intimate sexual partner have showed association with the dependent variable. After controlling for confounders (effect of extraneous variables) during multivariate analysis, only six variables remained showing statistical significant association with the outcome variable.Variables which remained statistically significant during multivariate analysis were place of residence, mother's educational status, multiple sexual partner in the preceding twelve months, fertility awareness, age of women at first sexual initiation and client perception on painfulness of abortion procedures.

Women who are living in urban area were 5 times most likely to engage in repeated induced abortion as compared to rural residents. Participants who have attended primary, secondary and college plus education had 79.4%, 89.1% and 99% reduced odds of practicing repeated induced abortion than illiterate respondents. Those who reported having multiple sexual partner in the preceding twelve months

were at 2 folds of terminating pregnancies repeatedly as compared to their counter parts. The study also found participants who had no fertility awareness when they will most likely to conceive after menstruation were 7 times at increased odds of repeatedly terminating pregnancies than those who had fertility awareness. Those who initiated sexual intercourse before the age of 18 years old were 4 times most likely to terminate pregnancy repeatedly than their counter parts. Respondents who did not perceive abortion as a painful procedure were 3 times more involved in repeated induced abortion as compared to participants who perceived abortion as a painful procedure (Table 4).

4. Discussion

The study aimed to identify determinants of repeated induced abortion among reproductive age group women in Sidama regional state Ethiopia. This study found statistically significant association between respondent's place of residence and repeated induced abortion. Urban residents were 5 times more likely to practice repeated induced abortion when compared with their counter parts of rural dwellers. The finding from this current study was in lined with other previous studies done in Kenya where rural residents had 72% reduced odds of repeated induced abortion than urban residents,²³ North West Ethiopia urban residents were 4 times at increased odds of repeated induced abortion²⁴ and Adigrat zonal hospital urban residents were 24 times at increased odds of practicing repeated induced abortion as compared to their counter parts.²⁵ The similarity between the current result and other previous studies might be due to urban residents being more exposed to risky sexual practice. Furthermore urban residents might have better access to health facilities to terminate undesirable pregnancy than to carry it until delivery time.

The study has identified participants who attended primary, secondary and college plus education had 79.0%, 89.0% and 99% reduced odds of practicing repeated induced abortion respectively as compared to illiterate participants. This finding was supported by other study done in Kenya which found study participants who attended primary, secondary and post-secondary educational level had 71.6%, 66.4% and 72.2% reduced odds of having repeated induced abortion than illiterate counter parts.²⁶ Also the finding of this study was in agreement with study conducted in Marie stopes clinics in Addis Abeba, where participants with primary, secondary and college plus educational status had 60%, 60% and 80% reduced odds of repeated induced abortion than illiterate counter parts.¹⁹ Another study in Kenya found women who attended post-secondary education had 79% reduced odds of inducing pregnancies repeatedly than women with no education.²³ The agreement between the current study and other previous studies may be explained by educated women delaying sexual intercourse or using family planning methods more effectively to avoid unplanned pregnancies. Furthermore, educated women may postpone early marriage.

This study also found that participants who reported having multiple sexual partners in the preceding twelve months were 2 folds more likely to repeatedly induce pregnancies as compared to their counter parts. The result from this study was similar with study done in Debreberhan town, participants who had multiple sexual partner were 8 times more likely to induce pregnancies repeatedly than their counter parts.²⁰ Another study done in Georgia town has documented inline study where participants who reported starting sexual intercourse before the age of 18 years old were 3.12 times at increased odds of terminating pregnancies repeatedly than their counter parts.²¹ The agreement between this finding and other previous studies might be attributed to women with multiple sexual partner might have frequent and unplanned sexual intercourse with the respective partners which might lead them to unplanned pregnancy. Moreover women with multiple sexual partners might face condom breakage due to frequent sexual intercourses.

In this study, women who had no fertility awareness when they will most likely to conceive after menstruation were 7 times at increased odds of terminating pregnancies repeatedly as compared with their

Table 4

Determinants of repeated induced abortion among women of reproductive age group who received abortion care at public health facilities and family health guidance of Sidama region Ethiopia 2020.

Variables	Induced abortion			
	Cases (n = 116)	Controls(n = 234)	COR with 95% CI	AOR with 95% CI
Residence				
Urban	77 (66.38%)	85(38.4%)	3.46 (2.17–5.53)	4.9 (2.0–11.3)**
Rural	39 (33.62%)	149 (61.6%)	1	1
Educational status				
Illiterate	26 (16.7%)	8 (3.3%)	1	1
Primary	45 (41.7%)	108(47.9%)	0.13 (0.05–0.3)	0.21 (0.06–0.76)*
Secondary	30 (35.2%)	96 (36.4%)	0.10 (0.04–0.23)	0.11 (0.03–0.41)**
College and above	7 (6.5%)	30 (12.4%)	0.07 (0.02–0.22)	0.01 (0.002–0.05)**
Multiple sexual partner				
No	30 (25.86%)	131 (55.98%)	1	1
Yes	86 (74.13%)	103 (55.55%)	3.65 (2.24–5.95)	2 (1.1–3.7)*
Fertility awareness				
No	47 (40.51%)	72 (30.76.06%)	1.53 (0.96–2.44)	6.8 (2.5–18.2)**
Yes	69 (59.48%)	162 (69.23%)	1	1
Age at first sex				
>= 18 years	23 (19.82%)	104 (43.0%)	1	1
<18 years	93 (80.17%)	130 (57.0%)	3.23 (1.96–5.46)	4 (1.9–8.7)**
Ever used family planning				
No	46 (39.66%)	75 (32.05%)	1.39 (0.88–2.21)	1.1 (0.6–1.9)
Yes	70 (60.34%)	159 (67.95%)	1	1
Abortion disclosure				
No	44 (37.93%)	120 (51.28%)	1	1
Yes	72 (62.06)	114 (48.71%)	1.72 (1.09–2.71)	1.4 (0.6–2.9)
Type of abortion				
Medical	69 (59.48%)	79 (33.76%)	2.88 (1.82–4.56)	1.5 (0.7–3.6)
Surgical	47 (40.51%)	155 (66.23%)	1	1
Perceived abortion as painful				
No	42 (36.20%)	54 (23.07%)	1.89 (1.16–3.07)	2.5 (1.2–5.3)*
Yes	74 (63.79%)	180 (76.92%)	1	1
Drunk alcohol				
No	91 (78.44%)	213 (91.02%)	1	1
Yes	25 (21.55%)	21 (8.97%)	2.79 (1.48–5.23)	1.8 (0.64–5.2)
Sexual violence				
No	75 (64.65%)	195(83.33%)	1	1
Yes	41 (35.34%)	39(16.66%)	2.73 (1.64–4.57)	1.9 (0.84–4.1)
Emotional violence				
No	89 (75.0%)	144(62.8%)	1	1
Yes	27 (25.0%)	90 (37.2%)	0.49 (0.29–0.8)	0.6 (0.31–1.1)

Key: COR = crude odds ratio, AOR = adjusted odds ratio, * = $p < 0.05$, ** = $p < 0.01$.

counterparts. The finding of this study was similar with a study done in Mekele town that respondents who did not understand fertility cycle were at 2 folds more likely to repeatedly induce pregnancies.²¹ The consistency between the two studies might be accounted by

understanding fertility cycle and when most likely to perceive after menstruation helped women to avoid unplanned pregnancy either by using family planning methods or by avoiding sexual intercourse during that periods.

The study also found that women who did not perceive abortion as painful procedure were 3 times at increased odds of having repeated induced abortion compared to their counterparts. A study carried out in Debreberhan town found women who did not perceived abortion procedures as painful were 7 times at increased odds of practicing repeated induced abortion than those who perceived abortion as a painful procedure.²⁰ Another study conducted in Mekele town have reported participants who did not perceive abortion as a painful procedure were 2 times more likely to abort pregnancies repeatedly as compared with their counter parts.²¹ The consistent finding between the current and other previous studies might be accounted by women who did not perceive abortion as painful procedure might consider abortion as a family planning method and might not utilize family planning methods to prevent unintended pregnancies from the very beginning.

Substance abuse status of the respondents was assessed using validated substance abuse assessment tool and alcohol consumption showed association during bivariate analysis in this study but the association did not exist in the final model after controlling for potential confounders. Also Khat chewing and smoking cigarrate did not show association from the very beginning. Studies conducted in United States of America and Sweden revealed positive association between drug use and repeated induced abortion.^{27,28} The variation between the finding of this study and other previous studies might be accounted by difference in the life style of study participants and population difference.

In this study participants who reported starting sexual intercourse before 18 years old were 4 times at increased odds to repeated induced abortion when compared with their counter parts. This finding was in lined with other previous study conducted in Debreberhan town found those who started sexual intercourse before 18 years old were 5.9 times more likely to induce pregnancies repeatedly than their counter parts.²⁰ Another study done in Mekele town has documented similar finding where participants who reported starting sexual intercourse before the age of 18 years old were 3 times at increased odds of terminating pregnancies repeatedly than their counter parts.²¹ A possible explanation for this consistent finding might be accounted by early initiation of sexual intercourse might increase the number of sexual partners a woman to have and they might fail to utilize family planning methods.

4.1. Limitation of the study

The main limitation of this study is its reliance on women's self-reports and the lack of tools for independent verification of the information with alternative sources. The worry is particularly relevant to questions about sensitive issues (e.g., physical or sexual abuse by a male partner, smoking, or alcohol usage), where women may reply in a way they perceive is more acceptable, resulting in social desirability bias.

5. Conclusion

This study identified several factors correlated with women having repeat induced abortions in Sidama region, Southern Ethiopia. Place of residence, women's educational status, having multiple sexual partner in the preceding twelve months, age of women at first sexual initiation, fertility awareness and perception of women on painfulness of abortion procedure as determinants of repeated induced abortion in the study area. The government of Ethiopia, the community and family members should work to empower women for education, strengthen utilization of reproductive health services and to help adolescents to delay early sexual contact as well as to specify the number of sexual partners.

Consent to publication

Not applicable.

Availability of data and materials

The data will be made available whenever requested for research purpose.

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Authors' contributions

All the authors had participated in the title selection, design, proposal preparation, statistical analysis, and interpretation of results, manuscript preparation. They approved this manuscript to be published.

Declaration of competing interest

The authors declared that they have no competing interests.

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