

Determinants of induced abortion among second-trimester pregnant women attending Dessie City health facilities, Northeast Ethiopia: a case-control study

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Abstract

Introduction: Globally, 10-15% of induced abortions occur in the second-trimester period, over half of which is considered unsafe, and disproportionately contribute to maternal deaths. However, there are limited information about determinants of induced abortion in second-trimester in the country, particularly in the study area. Therefore, this study aimed to identify determinants of induced abortion in the second-trimester.

Material and methods: Unmatched case-control study was conducted in Dessie City Northeast Ethiopia from January to March 2019. A total sample of 390 patients were included in the study, with a ratio of 1 : 2 (case : controls). Data were assessed in Epi data version 3.1 and analyzed with SPSS version 25. Multivariable logistic regression model was applied to identify determinants of induced abortion. Adjusted odds ratio with 95% confidence interval (CI) was used to measure the effect size of predictors.

Results: The mean age of cases was 25 years (\pm 6.6) and 29.3 years (\pm 5.3) of controls. Seventy six (58.5%) cases were not currently married compared with 19 (7.3%) controls. Study participants who were currently not married (AOR = 10.82; 95% CI: 5.01-23.36%), having poor knowledge about induced abortion (AOR = 3.03; 95% CI: 1.46-6.26%), uncertainty about last normal menstrual period (AOR = 4.12; 95% CI: 2.01-8.44%), late pregnancy testing (AOR = 5.94; 95% CI: 2.5-14.15%), not using contraceptives (AOR = 3.70; 95% CI: 1.85-7.44%), having irregular menstrual cycle (AOR = 4.83; 95% CI: 2.41-9.70%), and three and more live births (AOR = 0.25; 95% CI: 0.11-0.59%) were independent predictors of induced abortion in the second-trimester.

Conclusions: This study identified several factors correlated with women having induced abortions in the second-trimester. It may be helpful for the government of Ethiopia to encourage the effort to improve healthcare counselling on reproductive health-related issues, and planning of interventions focusing on behavioral changes and social marketing as well as providing information to young adolescents on their sexuality to minimize pre-marital sex.

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Key words: induced second-trimester abortion, Ethiopia, pregnant women, case-control, matched.

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Introduction

The second-trimester induced abortion is the termination of pregnancy in a period from 13 to 28 weeks of gestation [1]. The worldwide abortion rate is estimated as 28 per 1,000 women aged 15-44 years, and in Western Europe, it is 12 per 1,000 women. However, in Eastern Europe, 43 per 1,000 women terminated their pregnancies in the second-trimester. Similarly, the overall abortion rate in Africa is 29 abortions per 1,000 women, and vast majority of abortions are illegal and unsafe. In East Africa, the rate is the highest: 38 per 1,000 women aged 15-44 years [2]. In countries where safe abortions are the norm, more than 90% of women had abortions in the first-trimester of pregnancy upon the woman's request, while in the second-trimester, a permission of one or more doctors or a designated medical committee was required and/ or more restricted grounds pertaining [3]. According to communicable disease control estimation, 66% of legal abortions occur within the first eight weeks of gestation, 92% are within the first 13 weeks, and 1.2% occur at or after 21 weeks. However, the rate of complication increases 38% for each additional week of gestation beyond eight weeks [4]. These indicate that a second-trimester abortion is associated with higher rates of complications as compared with a first-trimester abortion.

Planned parenthood of American report estimated that 1.1 million abortions were performed after the first-trimester [4]. As evidenced by various studies, the prevalence of second-trimester induced abortions ranges from 10.3 to 39% [5-7]. According to facility-based report of the Ministry of Health, abortion was the leading cause of maternal mortality in Ethiopia accounting for 32%. Furthermore, systemic review and meta-analysis done in 2014 showed that abortion was the leading direct cause of maternal mortality accounting for 31%. However, in a period of 2000-2012, it was 10%. In the 2014 World Health Organization (WHO) report, unsafe abortions accounted for 10% of avoidable maternal deaths [8].

A study from Washington found that abortions performed late in pregnancy are associated with higher death and complication rates, are more expensive, and emotionally more difficult for women as well as for staff than abortions performed in early-stage pregnancies [2]. Other studies from Kenya reported that a greater proportion of women presenting with late abortions (more than 12 weeks of gestational age) than those presenting with early abortions (46% vs. 33%) experienced severe complications [9].

Similarly, as evidenced by studies that retained products of conception, shock, severe pain, infection, fever, perforations, and hemorrhage were complications associated with second-trimester induced abortion [6, 10]. However, the access to second-trimester abortion is severely limited, and 9-10% of all facilities provide these services [5]. Previous studies attempted to assess determinants of induced abortion. However, the reason for late termination of pregnancy was not investigated separately. Also, as far as maximum searching effort and knowledge are concerned, there is limited

evidence about determinants of induced second-trimester abortion in the study area. This study can help policy-makers to promote maternal health and well-being of mothers and women of reproductive age by identifying determinants of induced abortion in the second-trimester.

Material and methods

Study area and design

An unmatched case-control study was conducted in health facilities of Dessie City, Northeast Ethiopia, from January to March 2019. There are two public and three private hospitals, eight health centers as well as twenty-seven private clinics in Dessie City. Among these, two public hospitals, three private hospitals, and two private higher clinics are providing abortion services in the second-trimester of pregnancy based on the standards [11].

Source population

Cases: All pregnant women who obtained induced abortion services, or for whom post-abortion care services were provided after presenting with an attempt of induced abortion within 1 week of presentation, with a pregnancy gestational age of 13 to 28 weeks from their last normal menstrual period (LNMP) or ultrasound results from hospitals and higher clinics in Dessie City.

Controls: All antenatal care attendees whose pregnancies' gestational age were 13 to 28 weeks from their LNMP or ultrasound results from hospitals and higher clinics in Dessie City.

Study population

Cases: All randomly selected pregnant women who obtained induced abortion services, or for whom post-abortion care services were provided after presenting with an attempt of induced abortion within 1 week of presentation with a pregnancy gestational age of 13 to 28 weeks from their LNMP or ultrasound results who visited hospitals and higher clinics during the study period in Dessie City.

Controls: All randomly selected antenatal care attendees whose pregnancies' gestational age were 13 to 28 weeks from their LNMP or ultrasound results from hospitals and higher clinics in Dessie City during the study period.

Sample size and sampling procedure

Sample size was determined by using Epi-info version 7.1, considering the proportion of antenatal care attendees who were exposed to late pregnancy suspicion as 73.1%, according to a previous study from Ethiopia [5]. 95% CI and 80% power with an adjusted odds ratio (AOR) of 0.5 and a 1 : 2 ratio of cases to controls were applied. A total sample size of 390 was determined, including 130 cases and 260 controls, which also accounted for 10% non-response.

In these health facilities, all women between 15 and 49 years of age, who came seeking for abortion or post-abortion care in the second-trimester were considered as cases. Those seeking antenatal care (ANC) (13-28 weeks of gestation) were considered as controls. First, the total sample size of both cases and controls was proportionally allocated to seven health facilities (two public hospitals, three private hospitals, and two specialty clinics in gynecology/obstetrics), which were providing induced abortion services in the second-trimester based on their 12-month previous caseload. Then, to select controls, systematic sampling technique was applied, and for cases, all women (consecutively) were enrolled until the required sample size was reached.

Data collection procedures

Data were collected using a structured questionnaire with seven midwife-nurse interviewers having experience of abortion care, and one health officer was deployed for supervision along with the principal investigator. Questionnaires included socio-demographic and economic variables, reproductive, healthcare-related and psycho-social, behavioral, and cognitive factors [12-19]. Internal consistency of the knowledge questionnaire was checked using Cronbach's α value set at 0.87. Outcome variable of this study was the second-trimester induced abortion.

Data quality

The questionnaire was prepared in English and translated into Amharic, and then back to English to ensure consistency. Data collection process was strictly supervised, and information were verified for consistency and completeness daily. Incomplete and unclearly answered questionnaires were returned to interviewers for correction.

Data processing and analysis

Data were cross-checked, coded, entered into Epi Data version 3.1, and analyzed using SPSS version 25.0. Data cleaning was done by running frequencies, cross-tabulation, and sorting among reported cases or variables. Frequency and mean values were obtained for variables. Wealth index was analyzed by principal component analysis. Knowledge status of respondents on induced abortion was identified by a composite analysis. Multicollinearity test was applied with standard error to evaluate the correlation between independent variables; however, no collinearity was detected. Goodness-of-fit of the model was verified with Hosmer-Lemeshow test, and p -value of greater than 0.05 was considered as the model fit to logistic regression. Bivariable logistic regression analysis was utilized to depict the association between independent and dependent variables, and a multivariable logistic regression analysis was applied to identify predictors of outcome variables.

Variables with a p -value of 0.25 or less in bivariable logistic regression were included in multivariable logistic regression. Finally, p -value < 0.05 was considered statistically significant for all independent variables in the multivariable logistic regression. An adjusted odds ratio with 95% confidence interval (CI) was considered to estimate the strength and direction of the association.

Results

Socio-demographic characteristics of study participants

All pregnant case and control women were interviewed. The mean (\pm SD) age of cases and controls were 25 (\pm 6.6) and 29.3 (\pm 5.3) years, respectively. Among pregnant women, 46 (35.4%) cases and 34 (13.1%) controls were aged between 20 and 24 years. Seventy-six (58.5%) cases and nineteen (7.3%) controls were not currently married. Most of the respondents were Muslims. Among the interviewed women, 80 (61.5%) cases and 154 (59.2%) controls were urban residents. Regarding the educational status of women, 105 (80.8%) cases and 191 (73.5%) controls were educated primary and above. In terms of occupation, 21 (16.2%) cases and 69 (26.5%) controls were government employees. Twenty-six (20.0%) cases and 52 (20.0%) controls were within the lowest wealth quintile (Table 1).

Psycho-social, cognitive, and behavioral characteristics

Seventeen (13.1%) cases were raped, and there was no such response among controls. Nineteen (14.6%) cases and 3 controls faced IPV. Regarding partner or husband estrangement, 27 (20.8%) cases and 5 (1.9%) controls experienced partner or husband estrangement. Fifty (38.5%) cases and 123 (47.3%) controls presented good knowledge about induced abortion (Table 2).

Reproductive health-related characteristics

Seventy-six (58.5%) cases and 56 (21.5%) controls were not certain about their LNMP. Sixty-seven (51.5%) cases and 53 (20.4%) controls administered pregnancy tests with a gestational age of 13 and above weeks of their pregnancies. Regarding fetal anomaly, 43 (33.1%) cases and 1 control had a fetal anomaly. Concerning regularity of menstrual bleeding, 70 (53.8%) cases and 43 (16.5%) controls had irregular menstrual bleeding. Of all the respondents, 41 (31.5%) cases and 193 (74.2%) controls were users of modern contraceptive methods. 6.2% of cases and 6.9% of controls had a history of induced abortion, and among those, 3 cases and 7 controls were terminating their pregnancies after three months of gestation (Table 3).

Table 1. Socio-demographic characteristics of women visiting maternity care unit in Dessie City Administration, 2019 (*n* = 390)

Variables	Case, <i>n</i> (%)	Control, <i>n</i> (%)
Age of women (years)		
15-19	21 (16.2)	6 (2.3)
20-24	46 (35.4)	34 (13.1)
25-29	30 (23.1)	102 (39.2)
≥ 30	33 (25.4)	118 (45.4)
Marital status		
Currently married	54 (41.5)	241 (92.7)
Currently not married	76 (58.5)	19 (7.3)
Religion		
Muslim	78 (60.0)	135 (51.9)
Orthodox Tewahido	44 (33.8)	96 (36.9)
Others*	8 (6.2)	29 (11.2)
Residence		
Urban	80 (61.5)	154 (59.2)
Rural	50 (38.5)	106 (40.8)
Educational status		
No formal education	25 (19.2)	69 (26.5)
Primary	50 (38.5)	57 (21.9)
Secondary	29 (22.3)	54 (20.8)
College and above	26 (20.0)	80 (30.8)
Occupation		
Government employed	21 (16.2)	69 (26.5)
Private employed	19 (14.6)	35 (13.5)
Housewife	27 (20.8)	87 (33.5)
Merchant	11 (8.5)	34 (13.1)
Others**	52 (40.0)	35 (13.5)
Wealth quintile		
Lowest	26 (20.0)	52 (20.0)
Second	25 (19.2)	56 (21.5)
Middle	29 (22.3)	45 (17.3)
Forth	24 (18.5)	58 (22.3)
Highest	26 (20.0)	49 (18.8)

*Protestant and Catholic.

**Farmer, daily laborer, and student.

Healthcare-related characteristics

Out of all pregnant women, 63 (48.5%) cases and 253 (97.3%) controls obtained services at public health facilities. Among the interviewed women, 85 (65.4%) cases and 182 (70.0%) controls were accessing health facilities directly without the need for referral. Out of the participants, 101 (77.7%) cases and 179 (68.8%) controls had no community health insurance.

Table 2. Psycho-social, cognitive, and behavioral factors of women visiting maternity care units in Dessie City Administration, 2019 (*n* = 390)

Variable	Case, <i>n</i> (%)	Control, <i>n</i> (%)
IPV		
Yes	19 (14.6)	3 (1.2)
No	111 (85.4)	257 (98.8)
Rape		
Yes	17 (13.1)	0 (0.0)
No	113 (86.9)	260 (100.0)
Partner or husband estrangement		
Yes	27 (20.8)	5 (1.9)
No	103 (79.2)	255 (98.1)
Death of husband		
Yes	6 (4.6)	2 (0.8)
No	124 (95.4)	258 (99.2)
Knowledge about induced abortion		
Good	50 (38.5)	123 (47.3)
Poor	80 (61.5)	137 (52.7)

IPV – intimate partner's violence

Determinants of induced second-trimester abortion

Adjusting for other variables, the odds of having induced second-trimester abortion for women who were not currently married was 10.82 times (AOR = 10.82; 95% CI: 5.01-23.36%) more likely as compared with currently married women. Moreover, the odds of having induced second-trimester abortion were 3.03 times (AOR = 3.03; 95% CI: 1.46-6.26%) more likely for women with poor knowledge as compared with women having good knowledge status. Furthermore, the odds of having induced second-trimester abortion of women who were uncertain about their LNMP were 4.12 times (AOR = 4.12; 95% CI: 2.01-8.44%) more likely as compared with their counterparts. Those women who administered pregnancy tests with a gestational age of 13 weeks and above of their pregnancy were 5.94 times (AOR = 5.94; 95% CI: 2.5-14.15%) more likely to have induced second-trimester abortion as compared with women whose test showed 4 to 8 weeks gestational age. Women who had three and above live births were 75% less likely to have induced second-trimester abortion as compared with women who had no live births (AOR = 0.25; 95% CI: 0.11-0.59%). The odds of induced second-trimester abortion was 4.83 times (AOR = 4.83; 95% CI: 2.41-9.70%) and 3.7 times (AOR = 3.70; 95% CI: 1.85-7.44%) more likely among women who had irregular menstrual cycle and women that did not use contraceptives, as compared with their counterparts, respectively (Table 4).

Discussion

Adjusting for other variables, the study participants who were currently not married, having poor knowledge about induced abortion, not using contraceptives, having irregular menstrual cycle, uncertainty about LNMP, late pregnancy testing, and three and above live births were identified as the determinants of induced second-trimester abortion. Among socio-demographic factors, the marital status of women appeared to be the most important predictor in determining the utilization of induced second-trimester abortion. Women who were currently single were more likely to undergo second-trimester induced abortion than married ones. This is in line with studies conducted in Ethiopia and Brazil [12, 13]. Possible reasons influencing this association could be economic issues, social factors, and psychological impact related to mother and new-born while growing in the environment without a father. Another predictor that has also been shown as important impact on utilization of induced second-trimester abortion was poor knowledge status. This finding is in line with previous study conducted in Brazil [12], which suggested that poor knowledge status about the second-trimester induced abortion was a statistically significant variable impacting the utilization of second-trimester induced abortion. In addition, this finding was supported by descriptive statistics, in which majority of cases had poor knowledge about induced abortion in this study. The possible explanation might be women with good knowledge about induced abortion may know the legal indication and medical and psycho-social consequences of induced second-trimester abortion, which may contribute to services of early-stage pregnancy induced abortion. In this study, the level of modern contraceptive use among cases was 31.5%. Those women who did not use modern contraceptives were positively associated with induced second-trimester abortion, which is consistent with previous studies conducted in Zambia and the United States [6, 16]. The possible reason might be women who did not use modern contraceptives could be at risk of having unwanted pregnancies, and finally, they may end up with induced abortions. In this study, women who had irregular menstrual cycle were more likely to have induced second-trimester abortion. This is in line with studies conducted in Amhara Region Referral Hospitals and South Africa, which revealed that irregular menstrual cycle has a significant association with induced second-trimester abortion [5, 7]. The possible explanation might be the irregular nature of women's menses results unsure of the missing period, thereby unable to recognize early symptoms of pregnancy, and still, time is needed for arrangements to know pregnancy status. Finally, this may contribute to come late for induced abortion services [5]. Another predictor that has shown an important influence on utilization of induced second-trimester abortion was a woman who was uncertain about LNMP. This finding is in line with previous studies conducted in South Africa and United States (2010), and United States (2007), which suggested that uncertainty about LNMP has a statistical significance on induced sec-

Table 3. Reproductive health-related characteristics of women visiting maternity care unit in health facilities of Dessie City Administration, 2019 (*n* = 390)

Variable	Case, <i>n</i> (%)	Control, <i>n</i> (%)
Certainty of last normal menstrual period		
Yes	54 (41.5)	204 (78.5)
No	76 (58.5)	56 (21.5)
Early pregnancy symptoms		
Yes	76 (58.5)	180 (69.2)
No	54 (41.5)	80 (30.8)
No. of live births		
0	80 (61.5)	46 (17.7)
1	15 (11.5)	61 (23.5)
2	13 (10.0)	68 (26.2)
≥ 3	22 (16.9)	85 (32.7)
Time of pregnancy test (weeks)		
4-8	23 (17.7)	91 (35.0)
9-12	40 (30.8)	116 (44.6)
≥ 13	67 (51.5)	53 (20.4)
Multiple sexual partners		
Yes	7 (5.4)	5 (1.9)
No	123 (94.6)	255 (98.1)
Maternal complication		
Yes	5 (3.8)	0 (0.0)
No	125 (96.2)	260 (100.0)
Fetal anomaly		
Yes	43 (33.1)	1 (0.4)
No	87 (66.9)	259 (99.6)
Intendedness of pregnancy		
Yes	43 (33.1)	254 (97.7)
No	87 (66.9)	6 (2.3)
Regularity of menstrual bleeding		
Yes	60 (46.2)	217 (83.5)
No	70 (53.8)	43 (16.5)
Ever used contraceptive		
Yes	41 (31.5)	193 (74.2)
No	89 (68.5)	67 (25.8)
Ever had an induced abortion		
Yes	8 (6.2)	18 (6.9)
No	122 (93.8)	242 (93.1)
Time of induced abortion		
First 3 months	5 (62.5)	11 (61.1)
After 3 months	3 (37.5)	7 (38.8)

Table 4. Determinants of induced second-trimester abortion among pregnant women of Dessie City Administration, 2019

Variables	Case, n (%)	Control, n (%)	COR (95% CI)	AOR (95% CI)
Marital status				
Currently married	54 (41.5)	241 (92.7)	1	
Currently not married	76 (58.5)	19 (7.3)	17.85 (9.96-31.97%)*	10.82 (5.01-23.36%)*
Knowledge of the induced abortion				
Good	50 (38.5)	123 (47.3)	1	
Poor	80 (61.5)	137 (52.7)	1.44 (0.93-2.21%)	3.03 (1.46-6.26%)*
Certainty of last normal menstrual period				
Yes	54 (41.5)	204 (78.5)	1	
No	76 (58.5)	56 (21.5)	5.12 (3.24-8.10%)*	4.12 (2.01-8.44%)*
Time of pregnancy test (weeks)				
4-8	23 (17.7)	91 (35.0)	1	
9-12	40 (30.8)	116 (44.6)	1.36 (0.76-2.44%)	1.37 (0.57-3.27%)
≥ 13	67 (51.5)	53 (20.4)	5.00 (2.79-8.95%)*	5.94 (2.50-14.15%)*
No. of live births				
0	80 (61.5)	46 (17.7)	1	
1	15 (11.5)	61 (23.5)	0.14 (0.07-0.27%)*	0.44 (0.17-1.16%)
2	13 (10.0)	68 (26.2)	0.11 (0.05-0.22%)*	0.31 (0.12-0.82%)*
≥ 3	22 (16.9)	85 (32.7)	0.15 (0.08-0.27%)*	0.25 (0.11-0.59%)*
Regular menstrual bleeding				
Yes	60 (46.2)	217 (83.5)	1	
No	70 (53.8)	43 (16.5)	5.88 (3.66-9.47%)*	4.83 (2.41-9.70%)*
Ever used contraceptives				
Yes	41 (31.5)	193 (74.2)	1	
No	89 (68.5)	67 (25.8)	6.25 (3.94-9.93%)*	3.70 (1.85-7.44%)*

COR – crude odds ratio, AOR – adjusted odds ratio

*Significant at $p < 0.05$. **Significant at $p < 0.01$. ***Significant at $p \leq 0.001$ in bivariable and multivariable analysis

Adjusted variables: Early pregnancy symptoms, age, presence of health insurance, multiple sexual partner, and occupation.

ond-trimester abortion [7, 16, 20]. The possible explanation for this may be women who did not know their exact LNMP may not suspect pregnancy timely, therefore, this may contribute to induced second-trimester abortion. In this study, woman who had late pregnancy testing (≥ 13 weeks of gestation) was more likely to have induced second-trimester abortion. This is similar with previous studies conducted in Amhara Region Referral Hospitals, South Africa, and Vietnam, which showed that late suspicion of pregnancy and testing has a significant association with induced second-trimester abortion [5, 7, 15]. This may be due to those women who suspect and administer pregnancy tests late in pregnancy, and who would miss the opportunity to obtain abortion services in the first-trimester.

Women having three and above live births were less likely to undergo induced second-trimester abortion, and this finding is in line with a study done in Kenya that revealed that women having one and above live births were less likely to undergo induced second-trimester abortion [9]. However, evidence from a study in Jimma showed that women with

para3+ were more likely to have induced second-trimester abortion [13]. The possible reason may be women who had three and above live births had an experience of pregnancy-related symptoms; therefore, they may be conscious about the issue and know the status of pregnancy early. Moreover, the reason could be socio-economic burden of children that may alert women to suspect and confirm pregnancy early, and this all decrease the likelihood of induced second-trimester abortion among women having three and above live births. The difference could be due to variation in the study design and study time.

Conclusions and recommendations

The current study identified several factors correlated with women having the second-trimester induced abortion in Dessie City, Ethiopia. It may be helpful if the Government of Ethiopia encourages women to delay sexual debut and woman's participation to improve family planning services utilization. Planning of interventions focusing on behavioral

changes, clinical counselling, provider's education, school-based sexuality education, and social marketing to ensure appropriate contraceptive practices and using oral contraceptive pills to make their menstrual cycle regular, should all be implemented to minimize the risk of induced second-trimester abortion.

Disclosures

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References

1. Lee VC, Ng EH, Ho P. Issues in second trimester induced abortion (medical/surgical methods). *Best Pract Res Clin Obstet Gynaecol* 2010; 24: 517-527.
2. World Health Organization. Facts on induced abortion worldwide. 2012. Available from: http://www.who.int/reproductivehealth/publications/unsafe_abortion/induced_abortion_2012.pdf.
3. Denberu B, Alemseged F, Segni H. Determinants of abortion among youth seeking reproductive health care in selected health facilities, in Addis Ababa, Ethiopia. *Global J Reprod Med* 2017; 1: 27-38.
4. Planned Parenthood Federation of America. Abortion after the first trimester in the United States. Washington DC: Planned Parenthood Federation of America Inc.; 2004.
5. Mulat A, Bayu H, Mellie H, Alemu A. Induced second trimester abortion and associated factors in Amhara region referral hospitals. *Biomed Res Int* 2015; 2015: 256534. DOI: 10.1155/2015/256534.
6. Muyuni LM, Vwalika B, Ahmed Y. Determinants and outcomes of second trimester abortions at the University Teaching Hospital. *Med J Zambia* 2014; 41: 37-47.
7. Harries J, Orner P, Gabriel M, Mitchell E. Delays in seeking an abortion until the second trimester: a qualitative study in South Africa. *Reprod Health* 2007; 4: 7. DOI: <https://doi.org/10.1186/1742-4755-4-7>.
8. Federal Democratic Republic of Ethiopia Ministry of Health. National Reproductive Health Strategy. 2016.
9. Ushie BA, Izugbara CO, Mutua MM, Kabiru CW. Timing of abortion among adolescent and young women presenting for post-abortion care in Kenya: a cross-sectional analysis of nationally-representative data. *BMC Womens Health* 2018; 18: 41. DOI: <https://doi.org/10.1186/s12905-018-0521-4>.
10. Grossman D, Blanchard K, Blumenthal P. Complications after second trimester surgical and medical abortion. *Reprod Health Matters* 2008; 16 (Suppl 31): 173-182.
11. Dessie City Health Office. Dessie City Health Office health facility profile. 2018.
12. de Toledo M, Drezett J, Machi GS, Pereira VX, Raimundo RD, Oliveira FR, et al. Factors associated with the delay in seeking legal abortion for pregnancy resulting from rape. *Int Arch Med* 2015; 8. DOI: 10.3823/1628.
13. Bonnen KI, Tuijje DN, Rasch V. Determinants of first and second trimester induced abortion-results from a cross-sectional study taken place 7 years after abortion law revisions in Ethiopia. *BMC Pregnancy Childbirth* 2014; 14: 416. DOI: 10.1186/s12884-014-0416-9.
14. Jones RK, Finer LB. Who has second-trimester abortions in the United States? *Contraception* 2012; 85: 544-551.
15. Gallo MF, Nghia NC. Real life is different: a qualitative study of why women delay abortion until the second trimester in Vietnam. *Soc Sci Med* 2007; 64: 1812-1822.
16. Drey EA, Foster DG, Jackson RA, Lee SJ, Cardenas LH, Darney PD. Risk factors associated with presenting for abortion in the second trimester. *Obstet Gynecol* 2006; 107: 128-135.
17. Ingham R, Lee E, Clements SJ, Stone N. Reasons for second trimester abortions in England and Wales. *Reprod Health Matters* 2008; 16 (Suppl 31): 18-29.
18. Svensson E, Ehrenstein V, Nørgaard M, Bakketeig LS, Rothman KJ, Sørensen HT, et al. Estimating the proportion of all observed birth defects occurring in pregnancies terminated by a second-trimester abortion. *Epidemiology* 2014; 25: 866-871.
19. Worku S, Fantahun M. Unintended pregnancy and induced abortion in a town with accessible family planning services: the case of Harar in eastern Ethiopia. *Ethiopian Journal of Health Development* 2006; 20: 79-83.
20. Foster DG, Jackson RA, Cosby K, Weitz TA, Darney PD, Drey EA. Predictors of delay in each step leading to an abortion. *Contraception* 2008; 77: 289-293.