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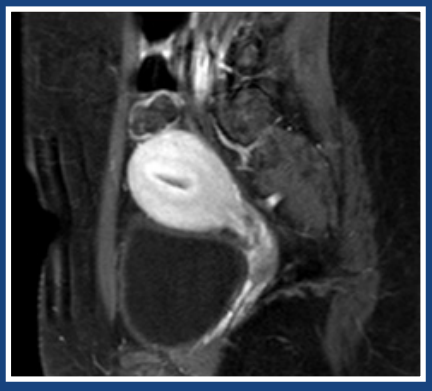

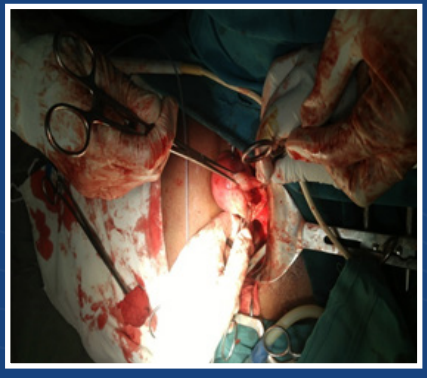



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## October, 2022



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Ethiopian Society of Obstetricians and Gynecologists (ESOG)

Tel.: +251 115 506 068/069, Fax: +251 115 506 070
P.O. Box: 8731
Addis Ababa, Ethiopia
esogeth@gmail.com
newsletter@esog.org.et
www.esog-eth.org

Address:
Head Office:
Ras Desta Damtew Avenue
Tsehafi Tizaz Teferawork Keda Building (Near Ghion Hotel)
East Wing, 2nd Floor, Room no 7
ESOG Project Office:
Kirkos District/ Kazanchis
Nigist Towers, 3rd floor

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# ANTENATAL CARE SERVICE UTILIZATION AMONG WOMEN WHO GAVE BIRTH AMID COVID-19 PANDEMIC IN WOLLEGA ZONE, WEST ETHIOPIA: COMMUNITY BASED CROSS-SECTIONAL STUDY

Ebisa Turi, MPH[1], Temesgen Tilahun, MD[2], Motuma Getachew, MPH[1], Tariku Tesfaye, MPH[1]
Belachew Etana, MPH[1], Eba Abdisa, MSc.[3], Wolkite Olani, MPH[1], Adisu Ewunetu, MSc.[1], Getahun Fetensa, MSc.[3]
Dufera Rikitu, MSc.[1], Edosa Tesfaye, MSc.[1], Melese Chego, MPH[1], Ginenus Fekadu, MSc.[4], Tadesse Tolossa, MPH[1]

## ABSTRACT

**BACKGROUND:** The counter effect of COVID-19 preventive measures is believed to affect the health care utilization of many vulnerable populations including pregnant mothers. Because of the newness of the disease, there is a dearth of information regarding maternal health service utilization amid the pandemic. Hence, this study was aimed to assess antenatal care service utilization and associated factors among women who gave birth amid the pandemic in West Ethiopia.

**METHODS:** A community-based cross-sectional study was carried out in selected districts of West Ethiopia. A systematic random sampling technique was used to select the study participants. Epi data version 3.1 and Statistical Package for the Social Sciences window (SPSS) version 25.0 were used for data entry and analysis respectively. Both bivariable and multivariable logistic regression was done.

**RESULTS:** A total of 827 participants were involved in the study with a response rate of 97.87 %. The prevalence of antenatal cares service utilization among mothers who gave birth during the pandemic was 450 (54.4 %) with 95% confidence interval (51.0, 57.6). Age of mother, residence, occupation of mother, educational level of the mother, fear related to spreading of COVID-19 in the community, fear of being infected, following government guidelines, using a facemask, covering face and mouth when coughing, and level of practice towards covid-19 prevention measures had a statistically significant association with antenatal cares service utilization.

**CONCLUSION:** The finding of this particular study revealed that there is a low antenatal care service utilization during the pandemic. Hence, health care providers should strengthen the integration of messages on COVID-19 prevention measures and health education with pregnancy risk, family planning and postnatal care. It is also advisable to start technology-based services to avert the transportation and related problems.

**KEYWORDS:** Antenatal care, prenatal care, service utilization, COVID-19, Ethiopia

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1 Department of public Health, Institute of Health sciences, Wollega University, Nekemte, Ethiopia
2 Wollega University Teaching and Referral Hospital, Department of obstetrics and gynecology, Nekemte, Ethiopia
3 School of Nursing and Midwifery, Institute of Health sciences, Wollega University, Nekemte, Ethiopia
4 Department of Pharmacy, Institute of Health Sciences, Wollega University, Nekemte, Ethiopia

## INTRODUCTION

Twenty first century brought hostile face to many peoples across the globe. About 135 million people needs help from which 35 million are women of reproductive age and 5 million are pregnant women. Ethiopia is also one of the sub-Saharan African countries suffering from this catastrophe and hundreds of thousands of women are in need of Sexual and reproductive health (SRH)[1].

Starting from the day it was declared as outbreak, the novel coronavirus disease (COVID-19) has been observed in almost all countries and costing the life of hundreds of thousands[2,3].

Low and middle income countries like Ethiopia in which health systems are previously over-whelmed are more likely to be further challenged in the context of COVID-19 preparedness and response, causing risk of disruptions in essential health services, perhaps leading to preventable maternal, newborn and child mortality and morbidity[5].

Lessons from previous pandemics like Ebola revealed that deaths from other preventable cause outweighs the death from pandemics of that time[6,7]. Therefore, to minimize impact of the COVID-19 outbreak on essential sexual reproductive, maternal, neonatal child health (SRMNCH) services, WHO recommends that countries must prioritize SRMNCH services for continuation during the pandemic as these serve vulnerable populations during emergency situations and it is imperative to meet their rights[5].

Although WHO and respective countries are implementing different measurements to mitigate the spread of COVID-19, the greatest worry is the counter effect of these measurements are suspected to cause drawbacks on routine health care service[8-10]. Beside to this a significant proportion of countries did not have an effective enabling function for public health risks and events during this pandemic[11].

Experts warn fragile healthcare systems in many African countries could be overwhelmed in the face of COVID-19[12]. The strain that the outbreak imposes on health systems will undoubtedly impact the SRMNCH people living in low- and middle-income countries (LMICs); however, SRH will also be affected by societal responses to the pandemic[10,13].

Emergency response to COVID-19 outbreak might cause resources for SRH services to be diverted to deal with the outbreak, contributing to a rise in maternal and newborn mortality, increased unmet need for contraception, and increased number of unsafe abortions and sexually transmitted infections[13]. Task shifting and task sharing is also disrupting equipment and staff involved in provision of SRH services to be diverted to fulfill other needs[14-16].

As of May 28, 2021, more than thirty-one thousands individuals were positive for the virus and four thousands of them died in Ethiopia[17]. The RMNCH is identified as essential health services by the government of Ethiopia and the ministry of health of Ethiopia set a guide for maintaining essential health services during the covid-19 pandemic[2].

Provision of maternal health services are central to women and girls' health, empowerment, and dignity, and may be affected by strains from COVID-19 pandemic response[18]. But there is no evidence regarding the level of antenatal care service utilization and its associated factors among mothers who gave birth amid the COVID-19 pandemic. Therefore, the result of this study will be helpful to fill the evidence gap regarding the level of antenatal care service utilization amid the pandemic. Furthermore, it is valuable for the local program managers to evaluate the potential effect of coronavirus on maternal health service utilization and suggest interventions to be designed accordingly for the improvement of antenatal care service utilization.

## METHOD AND MATERIALS

**Study design, Study area and period**

A community based cross-sectional study was carried out in selected districts of the three zones, i.e., East, West Wollega, and Horo Guduru Wollega of Oromia, West Ethiopia.

**Source and study population**

All reproductive age 15-49 mothers who gave birth in three zones of Wollega during COVID-19 pandemic were a source population. All randomly sampled mothers who gave birth and living in the selected districts during the study period were study population.

**Inclusion and exclusion criteria**

All mothers who gave birth in the selected Zones during COVID-19 are a source population. Women who are critically ill (physically and mentally) and unable to provide informed consent to participate in the interviews and those who lived in the respective woreda for less than six months were excluded.

**Sample size and sampling technique**

**Sample size determination**

The sample size was determined using a formula for estimation of single population proportion with the assumption of 95% confidence level, margin of error of 5% and since there is no previous study regarding this title during this pandemic, 50% expected proportion of ANC follow up. By adding 10% for non-response rate and design effect of 2 up on the calculated sample size, final sample size became 845.

**Sampling procedure**

From a total of fifty-one woredas of three Wollega Zones, six woreda were selected using simple random sampling method. Twenty-five Kebeles were selected from selected woreda using simple random sampling. Then the calculated sample size was proportionally allocated to the selected kebeles. The final households with eligible women was selected in every fifth interval using systematic random sampling.

**Data collection tools and procedures**

Data was collected using interviewer administered structured questionnaire. The questionnaire prepared in English was translated in to Afan Oromo. Total of 30 nurses/midwifes were recruited to collect the data. Training was given for two days.

**Ethical Considerations**

Ethical clearance and permission were obtained from Wollega University Institute of Health Sciences, Ethical Review Committee and Permission letter secured from all sub cities included in this survey. Verbal informed consent was obtained from each respondent before interview. Confidentiality of individual client information were ensured.

**Study Variables and Operational Definition**

**Dependent (outcome) Variable**

Level of antenatal care service Utilization: Accordingly, if the women who gave birth during the COVID-19 pandemic received at total number of four antenatal cares, they were coded as 1; if full number of antenatal cares was not received, they were coded as 0.

**Independent Variables** includes socio-demographic factors like age of mother, religion, ethnicity, occupation, education, and household income; Obstetric history like Parity, gravidity, birth interval, Number of live children; Level of Practice toward COVID-19 mitigation in which an individual was considered as having good practice towards COVID-19 mitigation measures if she was able to answer 'yes' to the median and above of the composite variables[19]; Attitude towards gov't Measure : Participants who responded with a median and above scores of the attitude questions about the COVID-19 preventive measures were labeled as having a favorable attitude otherwise unfavorable attitude[19].

**Data quality assurance**

The structured questionnaire was pre- tested on 5% of the total sample size in Arjo town. The questionnaires then assessed for its clarity, length, and completeness. Supervisors and principal investigators closely followed the data collection process.

**Data analysis**

Data was entered onto a computer using Epi-

data window version 3.1 and then exported to SPSS Windows version 25.0 for further analysis. Both bivariable and multivariable logistic regression were conducted. Violations of regression model assumption were checked by inspection multicollinearity test and variance inflation factors. Model goodness-of-fit was tested by (Hosmer-Lemeshow) model goodness of fit test. P-value of <0.05 and 95% confidence level were used as a difference of statistical significance.

## RESULT

### Socio-demographic Characteristics

Out of the total participants (845), 827 postpartum women participated in the interview process and making response rate 97.87%. The mean age of the participants was 27.14(SD + 4.8) years. From the total respondents, more than one third 285(34.5%) of them were in the age group of 25-29. Result for educational status of the respondent showed that about one third 164 (32.4%) have reached educational level of high school and above. (Table 1)

**Table1. Socio-demographic characteristics of the study participants**

| Variable | Categories | Frequency | Percentage |
|---|---|---|---|
| **Residence** | Urban | 396 | 47.9 |
| | Rural | 431 | 52.1 |
| **Age** | 15-19 | 32 | 3.9 |
| | 20-24 | 190 | 23.0 |
| | 25-29 | 352 | 42.6 |
| | 30-34 | 165 | 20.0 |
| | >=35 | 88 | 10.6 |
| **Religion** | protestant | 514 | 62.2 |
| | orthodox | 227 | 27.4 |
| | Muslim | 78 | 9.4 |
| | Others* | 8 | 1.0 |
| **Marital Status** | Married | 801 | 96.9 |
| | Single | 11 | 1.3 |
| | Divorced | 8 | 1.0 |
| | Widowed | 7 | .8 |
| **Educational status** | Unable to read and write | 191 | 23.1 |
| | Read and write | 117 | 14.1 |
| | Elementary | 236 | 28.5 |
| | high school | 183 | 22.1 |
| | College and above | 100 | 12.1 |
| **Occupational Status** | Housewife | 597 | 72.2 |
| | Private work | 107 | 12.9 |
| | Government employee | 59 | 7.1 |
| | merchant | 43 | 5.2 |
| | others | 21 | 2.5 |
| **Family Size** | <4 | 164 | 19.8 |
| | 4_5 | 356 | 43.0 |
| | >=6 | 307 | 37.1 |

*others: Catholic, and Wakefata

**Obstetric history, and reproductive characteristic of postpartum women**

From the total respondents, 171(20.7 %%) were gravida one or were pregnant for the first time. The majority of participants had one or more previous pregnancies. About two-third of the study participants 545(65.9%) are para one to three. Majority of them 551(66.6%) gave birth at home. (Table 2)

**Table 2. Obstetric history and reproductive characteristic of the study participants**

| Variable | Categories | Frequency | Percentage (%) |
|---|---|---|---|
| **Gravidity** | 1 | 171 | 20.7 |
| | 2_4 | 483 | 58.4 |
| | >=5 | 173 | 20.9 |
| **Parity** | 1_3 | 545 | 65.9 |
| | >=4 | 282 | 34.1 |
| **History of still birth** | No | 730 | 88.3 |
| | Yes | 97 | 11.7 |
| **History of Spontaneous abortion** | No | 762 | 92.1 |
| | yes | 65 | 7.9 |
| **Induced abortion** | No | 805 | 97.3 |
| | Yes | 22 | 2.7 |
| **Number of children alive** | 1_2 | 383 | 46.3 |
| | 3_4 | 290 | 35.1 |
| | >=5 | 154 | 18.6 |

COVID-19 related information, source of information, source to trust Most of study participants 817(98.8%) heard about the pandemic COVID-19. The major primary sources of information for study participants were radio 564(68.2%) and television 534(64.6%) respectively. (Figure 1)

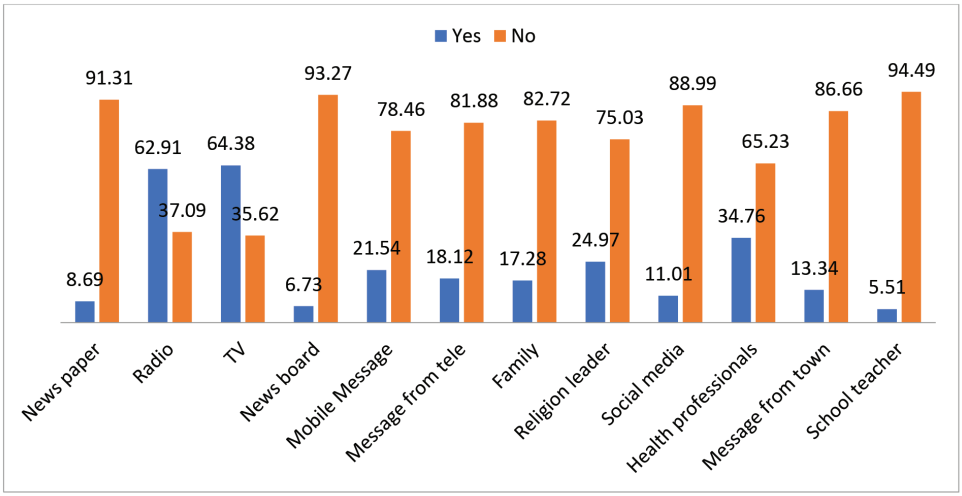


**Figure 1. Source of information regarding COVID-19 pandemic**

**Kind of information received by study participants** Majority of (70.02%) them received information regarding sign and symptoms of the COVID-19. (Figure 2)

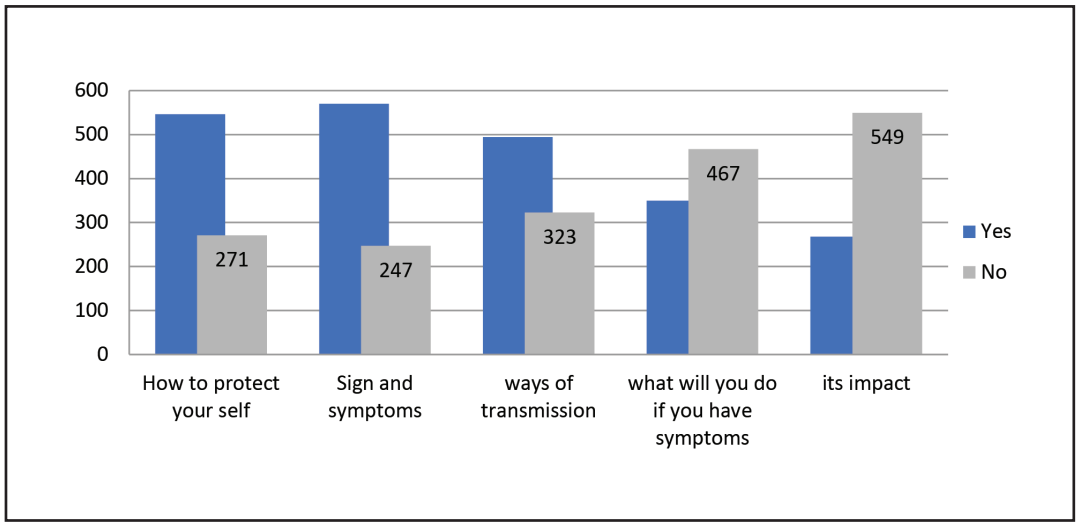


**Figure 2. Kind of information received regarding the COVID -19 pandemic**

**Practice towards COVID-19 mitigation measures** Majority of the study participants 665(80.41%) practiced washing their hands and not touching their eyes, nose, and mouth 545 (65.9%%). (Figure 3)

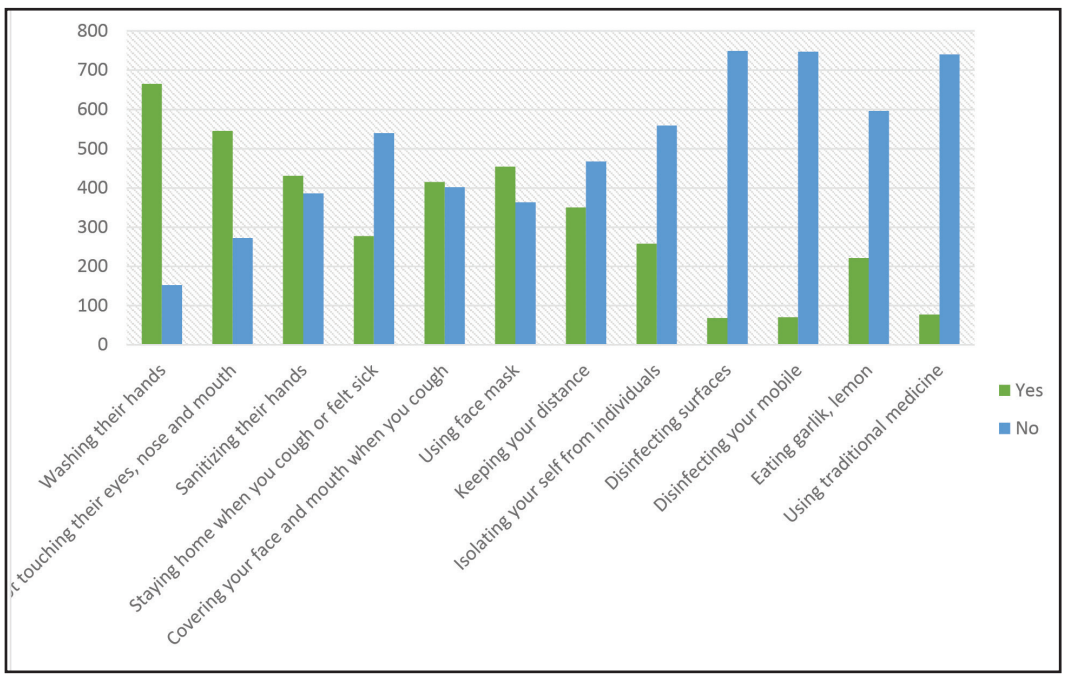


**Figure 3. Practice of some mitigation measures by mothers who gave birth during the COVID-19 pandemic.**

**Antenatal Care services Utilization among Postpartum Mothers and Potential Impact of COVID-19.**

From a total of 827 postpartum mothers who recently gave birth, more than two-fifth of them did not have ANC visit. From those who missed total ANC visit, about two third of them were due to concerns related to COVID-19 and its mitigation measures. From those who received ANC, about 46.89% of them received ANC of four and above. About three-fourth of mothers who received ANC received tetanus toxoid vaccine. (Table 3)

**Table 3. Antenatal care and related service received by mothers during the pandemic.**

| Variable | Categories | Frequency | Percentage (%) |
|---|---|---|---|
| **Received ANC visit** | Yes | 450 | 54.4 |
| | No | 377 | 45.6 |
| **Number of ANC visit** | 1 | 29 | 6.44 |
| | 2 | 85 | 18.89 |
| | 3 | 125 | 27.78 |
| | >=4 | 211 | 46.89 |
| **ANC missed due to Covid-19** | Yes | 117 | 31.03 |
| | No | 260 | 68.97 |
| **TT vaccine** | Yes | 331 | 75.56 |
| | No | 119 | 26.44 |
| **Blood tested** | Yes | 398 | 88.44 |
| | No | 52 | 11.56 |
| **Weight Measured** | yes | 412 | 91.56 |
| | No | 38 | 8.44 |
| **Urine Tested** | Yes | 373 | 82.88 |
| | No | 77 | 17.12 |
| **Stool examination** | Yes | 164 | 36.44 |
| | No | 286 | 63.56 |

**Factors Associated with Antenatal Care Utilization among Women Who gave birth during COVID-19 Pandemic West Ethiopia 2020.**

In binary logistic regression, variables that showed a p-value of 0.25 or less were considered as the candidate for multivariable regression model. Based on this socio-demographic factors like; age of mother, residence, occupation of mother, educational level of mother, fear related to spread of COVID-19 in the community, fear of being infected, following government guidelines, using facemask, covering face and mouth when you cough, and level of practice towards Covid-19 prevention measures were included in multivariable analysis.

In the multivariable analysis age of mother, residence, occupation of mother, educational level of mother, fear related to spread of COVID-19 in the community, fear of being infected, following government guidelines, using facemask, covering face and mouth when you cough, and level of practice towards Covid-19 prevention measures had statistically significant association with utilization of ANC. (Table 4)

**Table 4: Factors Associated with Antenatal Care Utilization among Women who gave birth during COVID-19**

| Variables | Categories | ANC visited | | COR | AOR |
|---|---|---|---|---|---|
| | | yes | No | | |
| **Residence** | Rural | 197 | 199 | ref | ref |
| | urban | 180 | 251 | 1.38(1.05,1.82) | 1.27(1.04-1.73) * |
| **Age** | 15-19 | 11 | 21 | ref | ref |
| | 20-24 | 108 | 82 | 2.51(1.15,5.50) | 2.76(1.19,6.4) * |
| | 25-29 | 193 | 159 | 2.32(1.08,4.95) | 2.36(1.05,5.27) * |
| | 30-34 | 48 | 40 | 2.29(1.03,5.05) | 2.52(1.07,5.92) * |
| | >=35 | 90 | 75 | 2.29(0.98,5.31) | 2.31(0.93, 5.71) * |
| **Educational status** | Unable to read and write | 109 | 82 | ref | ref |
| | Read and write | 59 | 58 | .76(0.48,1.21) | 0.72(0.44,1.20) |
| | Elementary | 137 | 99 | 1.04(0.71,1.53) | 0.938(0.61,1.44) |
| | High school | 100 | 83 | .91(0.6,1.36) | 0.72(0.46,1.15) |
| | College and above | 45 | 55 | .62(0.37,1.00) | 0.30(0.15,1.2) |
| **Occupation** | House wife | 310 | 287 | ref | ref |
| | Private work | 67 | 40 | .66(0.27,1.63) | 1.20(0.76,1.90) |
| | Gov't employee | 32 | 27 | 1.03(0.39,2.7) | 2.14(1.9,4.65) |
| | Merchant | 28 | 15 | .73(0.26,2.02) | 2.07(1.00-4.34) |
| | Others | 13 | 8 | 1.15(0.39,3.38) | 1.36(0.51,3.69) |
| **Fear spread of COVID in the community** | very worried | 294 | 287 | ref | ref |
| | Less worried | 82 | 43 | 1.86(1.24,2.78) | 1.27(0.747,2.15) |
| | to some extent | 33 | 35 | .920(0.56,1.52) | 0.711(0.34,1.47) |
| | not worried | 33 | 10 | 3.22(1.56,6.66) | 8.15(2.88,23.03)* |
| **Fear of being infected by COVID-19** | very worried | 295 | 274 | ref | ref |
| | Less worried | 98 | 47 | 1.94(1.32,2.84) | 1.78(1.08,2.94) * |
| | to some extent | 25 | 24 | .97(0.54,1.74) | 1.32(0.59,2.96) |
| | not worried | 24 | 30 | .74(0.42,1.30) | 0.27(0.11,0.66) |
| **Following government guidelines** | Not at all | 17 | 27 | ref | ref |
| | to some extent | 249 | 188 | 2.1(1.11,3.97) | 1.60(0.78,3.29) |
| | strongly follow | 176 | 160 | 1.74(0.92,3.32) | 1.44(0.68,3.04) |
| **Using face mask** | No | 176 | 187 | Ref | ref |
| | Yes | 266 | 188 | 1.50(1.14,1.98) | 1.35(1.07,1.87) * |
| **Covering your face and nose when You cough** | No | 212 | 190 | ref | ref |
| | Yes | 230 | 185 | 1.11(0.85,1.46) | 0.81(0.58,1.14) |
| **Practice towards COVID-19 prevention** | Poor | 257 | 267 | ref | ref |
| | Good | 185 | 108 | 1.78(1.33,2.38) | 1.64 (1.14,2.36) * |

NB: ref: reference group; * significant at p value <0.05

## DISCUSSION

The results of the study revealed that, from mothers who gave birth during the COVID-19, the proportion of women who utilized ANC was about 54.4% 95% CI (51.0, 57.6). The finding is lower than that of previous level of ANC visit from national demographic and health survey (64%)[20]. Similarly, the finding is lower than local studies done in West Shoa Zone, Central Ethiopia (64.8%) [21]. However, our finding is higher than that of cross-sectional survey of Jordanian in which 59.53 % of women who are currently pregnant did not receive ANC during the pandemic [22].

This difference might be attributed to sociocultural and demographic differences and study period. For instance, the national demographic and health survey was conducted before the COVID-19 pandemic period, unlike the current study. Since in the pandemic period the antenatal care service utilization was found to be low this might be due to movement restrictions, fear of infection, and economic pressure, greater disruptions to health systems due to workforce and supply chain issues and the repurposing of health workers. In the fashion, the difference between the current study and previous local studies conducted in central Ethiopia might be due to difference in measurement. i.e., the previous study included any maternal health services whereas our current study included only ANC services.

The finding from the study revealed that ANC utilization during the COVID-19 pandemic was significantly influenced by age of the participants. This is supported by findings from study done during the pandemic[23] and prior to the pandemic[24-27]. This might be because as their age increases, they are more likely to be multi-parous and their chance of contact with health facility and ability to identify the pregnancy related complication help them to utilize ANC services increases.

This study also found that there is strong relationship between being worried about COVID-19 and level of ANC service utilization. Those who are less worried about acquiring COVID-19 are more likely to use antenatal care service as compared to their counterparts. This is similar with study conducted in Northeast Ethiopia[23] This might be due to the fact that respondents who had a high risk perception of COVID-19 might have good adherence towards COVID-19 mitigation measures[19]. This might also attribute to the link between the high-risk perception of COVID-19 and anxiety, and this might in turn leads to low level of ANC service utilization.

The study finding also revealed that practice towards COVID-19 prevention measures is significantly and positively associated with antenatal care service utilization. Those who have good practice towards prevention mechanism are about two times more likely to use ANC than their counterparts. This might be due to the fact that if the population had exposure to prior information about the mitigation measures, they might develop a good attitude towards these preventive measures which in turn increase their adherence the service utilization[19].

## CONCLUSION AND RECOMMENDATION

The finding of the study revealed antenatal care service utilization during the pandemic was found to be low as compared with the previous studies. Accordingly, the age of the mother, fear of being infected by COVID-19, and poor prevention practice were significant factors which contributed to the low antenatal care service utilization.

Hence, health care providers should make sure that all reproductive age women should be encouraged and advised on the service utilization amid the pandemic as part of an assessment of overall well-being. And also, health care providers should strengthen the integration of messages on COVID-19 prevention measures including self-care and health education with pregnancy risk, family planning and postnatal care. It is also advisable to start technology-based services to avert the transportation and related problems.

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**Availability of data and materials**

Data will be available upon request from the corresponding authors.

**Competing interest**

The authors declare that they have no competing interests.

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## CORRESPONDING AUTHOR

Ebisa Turi, MPH
Department of Public Health, Institute of Health Sciences, Wollega University, Nekemte, Ethiopia
Email: ebakoturi@gmail.com

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# EMERGENCY CONTRACEPTION AMONG FEMALE REGULAR UNDERGRADUATE STUDENTS OF DEBRE MARKOS UNIVERSITY - KNOWLEDGE, ATTITUDE, UTILIZATION, AND ASSOCIATED FACTORS, 2021: A CROSS-SECTIONAL STUDY

Mamaru Getinet[1]

## ABSTRACT

**INTRODUCTION:** Contraception failure, condom breakage, missed doses of oral contraceptives, and failure to use any method of contraception are all common reasons for emergency contraception. To prevent such problems, emergency contraceptives are the only method that can be used after unprotected sex. Therefore, this study aimed to determine the knowledge, attitude and practice of emergency contraception in the study area.

**METHODS:** An institutional-based cross-sectional study was conducted on 446 students using multistage stratified sampling was conducted at Debre Markos University from June 27 to July 15, 2021. Data were entered into EPI info and translated into a statistical package for social sciences (SPSS) for window version 26 for data analysis. Multiple logistic regressions were employed.

**RESULTS:** Most of the participants 330 (74.4%) reported having heard about emergency contraception (EC). Out of those who heard about EC, 58.1% identified oral pills as a possible method of EC, followed by injectable 18%. Around half, 207 (46.7%) of the study participants indicated that they recommended others to use ECs. Among the respondents who had ever heard of EC, almost a quarter of 104 (23.3%) of them had ever used EC pills. Females who are 5th year (AOR: 0.25, 95% CI: 0.66-.97), respondents who are from health science (AOR: 2.25, 95% CI: 1.01-5.07), and respondents whose father had a first degree and above (AOR: 6.297, 95% CI: 2.06-19.26) were strongly associated with knowledge of female students with ECs.

**CONCLUSIONS AND RECOMMENDATIONS:** This study showed that the awareness of emergency contraception among the respondents was fair. Furthermore, their attitude towards the use of emergency contraception and advising others to use and practice was low. Therefore, to further increase the knowledge, attitude, and practice of user-friendly emergency contraception services, basic training on reproductive health and family communication services should be promoted.

**KEYWORDS:** Emergency Contraception, Knowledge, Attitude, Practice, Ethiopia

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1 Department of Biomedical Sciences, College of Medicine and Health Sciences, Debre Markos University, Debre Markos, Ethiopia

## INTRODUCTION

Emergency contraception, often known as post-coital contraception is a method of preventing pregnancy after a sexual act that is unprotected or inadequately protected. Contraceptive failure, condom breakage, missed oral contraceptive doses, and failure to use any type of contraception are all common reasons for emergency contraception[1]. Oral estrogen-progestin, progestin-only, or selective progesterone receptor modulators, as well as insertion of a copper intrauterine device (IUD), are all options for emergency contraception. Oral progestin only pills; Levonorgestrel is the most popular emergency contraceptive treatment, but a mixed regimen of high doses of ethinylestradiol and progestin is also effective[2].

Progestin-only emergency contraception is better tolerated and more efficacious than the combined regimen. In the United States, two regimens with levonorgestrel alone are available: a single-dose regimen (1.5 mg of levonorgestrel) and a two-dose regimen (two tablets of 0.75 mg of levonorgestrel taken 12 hours apart)[3].

EC is used before the potential time of implantation, unlike the regular contraceptive methods that are administered before the act, and can reduce the risk of unintended pregnancy by 75% to 99% if taken within 72 hours of sexual intercourse. Emergency contraceptives are cost-effective, medically safe, and highly effective for use in the prevention of unplanned pregnancy and subsequently avoiding unsafe abortion and other consequences[4].

Among the 1.9 billion women of reproductive age worldwide in 2019, 1.1 billion have a demand for family planning; of these, 842 million are using modern contraception, and 270 million have an unmet need for modern methods. An additional 172 million women use no method at all, despite their desire to avoid pregnancy, and thus are considered to have an unmet need for family planning[5]. The World Health Organization (WHO) indicates that 75% of sexually active women are at risk of unwanted pregnancy due to the lack of contraceptives, where one in four pregnancies is unplanned[6].

In Ethiopia, unsafe abortion is the second most common cause of maternal mortality, which accounts for 19.6% of maternal mortality[7]. Unwanted pregnancy and unsafe abortion can be prevented by accessing to contraceptive methods including (EC)[4]. The Ethiopian Demographic and Health Survey (EDHS) 2019 report indicated that the prevalence of contraception among married women is 41 %[8]. Despite the increase in the use of modern contraceptives, the rate of unintended pregnancy per 1000 women of reproductive age in Ethiopia ranges from 13.7 to 41.5 %[9]. One-fourth of maternal deaths are due to unsafe abortion, and approximately 60 percent of admitted obstetrics and gynecologic cases of unsafe abortion could have used emergency contraceptives[10]. University life for many students represents a move toward independence from parental supervision, new friendships, and a chance to experience romantic or sexual relationships. An emergency contraceptive method plays a critical role in limiting unwanted pregnancies and ultimately reducing maternal mortality and morbidity rates[11].

Knowing about knowledge, attitudes, and practice associated factors towards emergency contraceptives among female students will help local planners design a better strategy and implementation program. This study provides information on the barriers to the use of EC, allows an initial process to understand the reasons for the low adoption of EC, and will help further studies to be conducted and to make possible recommendations.

## METHOD AND MATERIALS

### Study design and population

An institution-based cross-sectional study was conducted from June 27 to July 15, 2021, among female undergraduates of Debre Markos University. The subject source population for the study was all regular undergraduate female students registered in the 2020/2021 academic year at Debe Markos University. According to the university's registrar office, there are about 2078 female regular

undergraduate students in 2020/2021, 440 (21%) of them were enrolled to health science departments, and 1638 (79%) are enrolled to non-health science departments. All university undergraduate regular female students were available on campus during data collection were source population. Selected female students who gave their consent were eligible to participate in the study. Students who are sick, unable to communicate, and unable to see during data collection were excluded.

**Sample size calculation**

The sample size was calculated using the single population proportion formula

$$\frac{(n=(Z^{a}/2)^{2}\ P\ (1-P)}{D^{2}}$$

(n=sample size, Z = level of confidence interval, P = proportion of the event to be studied, D = margin of error)) and considering the level of significance to be 5%, 95 confidence interval, the proportion of students who know about emergency contraceptive methods was 72%[12], 1.5 design effect, adding a 10% non-response rate. Therefore, the final sample size was 446. The sample size was proportionally allocated to two departments; 94 health science department students and 352 from non-health science departments.

**Sampling methods**

To obtain a representative sample, multistage stratified sampling was applied to select study participants. First, 16 departments were selected from a total of 56 departments using the lottery method. Next to this, the students were divided into two practical strata, which were health science students and non-health science students. From each stratum, participants were selected by systematic random sampling based on the proportion of the number of female students in each stratum, that is, 440 (21%) health science students and 1638 (79%) non-health science students.

**Study variables**

**Dependent variable**: Knowledge, attitude, and practice of EC, and independent variables: Age, Marital status, Parents' educational level, Availability of services, Affordability of services, and Mass media.

**Operational definition**

**Emergency contraception**: A kind of contraception indicated after unprotected sexual intercourse to prevent unwanted pregnancy.

**Sexually active**: having a history of vaginal sexual intercourse.

**Unintended pregnancy**: the pregnancy occurred without a plan.

**Good knowledge** -a is assigned to respondents who answered ≥50% of the knowledge questions correctly, and "poor knowledge" to those answering <50% of questions.

**Attitude**: Intending to use or recommend is considered a positive attitude, and no intention is a negative attitude.

**Practice**: Any history of EC usage.

**Media**: Radio, Television

**Data collection methods**

A structured and self-administered questionnaire was used to collect data from individual participants. The questionnaires contained open and closed questions that address sociodemographic characteristics, knowledge, attitudes, and practices on EC utilization patterns. The questionnaires are prepared in English and translated to the Amharic version.

The quality of the data was ensured by properly designing the structured questionnaires. Every day after data collection, the principal investigator reviewed and verified the competency and relevance of the questionnaires and the necessary correction was made. Before data collection, a questionnaire pretest was done among 5% (23 students) of the extension students, and necessary corrections was taken accordingly.

**Data processing and analysis**

All questionnaires were visually coded and entered into EPI info, and translated into the SPSS version[26] software package for analysis, collecting errors, and frequency checks was done. The results are presented in free-form tables, figures and text using

frequencies and summary statistics such as mean, standard deviation, and percentage to describe the study population about relevant variables.

**Ethics approval**

A letter of ethical clearance with code number S/R/C/59/2021 was obtained from DMU School of Medicine after approval. The study was carried out in accordance with the Declaration of Helsinki. The study participants were approached while in class. Informed written consent was obtained from participants after being informed about the voluntary basis of participation. The confidentiality of respondent's information was protected.

## RESULT

**Sociodemographic characteristics of respondents**

A total of 446 students participated in the study with an overall response rate of 100%. The age of the study participants ranged from 18 to 35 years with a mean of 22 years SD (± 2.14) years. The majority of the respondents, 392 (88.1%) were never married and more than half of the respondents were from the non-health science departments. Most of the respondents, 93%, were followers of Orthodox Christianity followed by Protestants, representing 6.5% of the respondents.

Approximately 177 (39.7%) of the students responded that their mother cannot write and read, and about 70 (15.7%) reported that their mother attended higher education. Regarding their father's education, 90 (20%) reported that their father attended higher education, and about 43 (9.6%) responded that their father cannot write and read. The majority of the 302 respondents (67.7%) were from a rural residence (Table 1).

**Table 1: Sociodemographic characteristics of female regular undergraduate students of Debre-Markos University, 2021 (N=446).**

| Background variables | Frequency | Percent (%) |
|---|---|---|
| **Age** | | |
| 18-22 years | 325 | 72.9 |
| 23-27 years | 103 | 23.1 |
| 28-32 years | 14 | 3.1 |
| Above 33 years | 4 | 0.9 |
| **Marital status** | | |
| Single | 392 | 87.9 |
| Married | 39 | 8.7 |
| Divorced | 8 | 1.8 |
| Widowed | 4 | 0.9 |
| Separated | 3 | 0.7 |
| **Religion** | | |
| Orthodox | 415 | 93 |
| Protestant | 30 | 6.8 |
| Muslim | 1 | 0.2 |
| **Place of residence** | | |
| Urban | 144 | 32.3 |
| Rural | 302 | 67.7 |
| **Mother educational level** | | |
| Can't read & write | 177 | 39.7 |
| Read and write | 125 | 28 |
| Grade 1-6 | 34 | 7.6 |
| Grade 7-12 | 39 | 8.7 |
| Diploma | 33 | 7.4 |
| First degree and above | 37 | 8.3 |
| **Father educational level** | | |
| Can't read & write | 43 | 9.6 |
| Read and write | 190 | 42.6 |
| Grade 1-6 | 65 | 14.6 |
| Grade 7-12 | 57 | 12.8 |
| Diploma | 19 | 4.3 |
| First degree and above | 71 | 15.9 |
| **Department** | | |
| Health Science | 94 | 21.1 |
| Non-Health Science | 351 | 78.7 |

Most of the participants 330 (74.4%) reported that they had heard about EC. Out of those who heard about emergency contraceptives, 58.1% identified oral pills as a possible method of emergency contraceptive, followed by injectable 18% and intrauterine contraceptives (13.5%).

The main sources of information about EC were health facilities (28%), followed by hearing from a friend or a relative (19.7%), and mass media (18.2%). Most of the 272 respondents (61%) could identify the correct timing for the administration of emergency contraceptive pills after unprotected sex. The overall summary index of knowledge revealed that 372 (83.6%) of the study participants had good knowledge about EC and 16.4% of the respondents had no adequate knowledge about emergency contraceptives.

**Table 2: Knowledge of emergency contraceptives among female regular undergraduate students of Debre-Markos University, 2021 (N=446)**

| Background variables | Frequency | Percent (%) |
|---|---|---|
| **Have you ever heard of emergency contraceptives (EC)?** | | |
| Yes | 332 | 74.4 |
| No | 114 | 25.6 |
| **What type of ECS do you know?** | | |
| Emergency contraceptive pills | 259 | 58.1 |
| IUCD | 60 | 13.5 |
| Both | 55 | 12.3 |
| Injectable | 72 | 16.1 |
| **Where do you get the information about EC?** | | |
| Media | 81 | 18.2 |
| Health facilities | 125 | 28 |
| Informal education | 68 | 15.2 |
| Internet | 18 | 4 |
| Magazine | 4 | 0.9 |
| Friend or relative | 88 | 19.7 |
| **Time to take ECs?** | | |
| Within 72 hours | 272 | 61 |
| After 72 hours | 17 | 3.8 |
| Don't know | 156 | 35 |
| **The recommended dose of Emergency contraceptive pills** | | |
| One | 126 | 28.3 |
| Two | 32 | 7.2 |
| Three | 12 | 2.7 |
| Don't know | 275 | 61.7 |
| **Effectiveness of EC pills** | | |
| 75-99% | 98 | 22 |
| 30-50% | 33 | 7.4 |
| Not sure | 314 | 70.4 |
| **A place to obtain EC** | | |
| Health institutes | 368 | 82.5 |
| Supermarket | 23 | 5.2 |
| Social worker | 1 | 0.2 |
| Don't know | 45 | 10.1 |
| Impossible to obtain | 8 | 1.8 |
| **Importance of EC** | | |
| Post rape | 184 | 41.3 |
| Back up when a condom break | 24 | 5.4 |
| **When the oral contraceptive pill is forgotten** | 238 | 53.3 |
| **Knowledge of EC (summary index)** | | |
| Good knowledge | 372 | 83.4 |
| Poor knowledge | 73 | 16.4 |

**Attitude and Practice of EC among female Debre Markos University Students**

The attitude score was calculated from the questionnaire and the mean value of the response was taken to classify favorable and unfavorable. Around half, 207 (62.3%) of the study participants indicated that they recommended others to use ECs and about 174 (39%) respondents believed ECs were unsafe. Of the total, 141 (31.6%) students supported the idea of making available emergency contraceptives for all females. Of the respondents (47%) the students have a favorable attitude towards emergency contraceptives.

Among the respondents who had ever heard of EC, almost a quarter of 104 (31.3%) of them had ever used EC Pills. However, none of the women had ever used IUCD. After rape, missing pills and condom slippage were the commonly stated reasons for using EC accounting for 272 (61%), 156 (35%), and 18 (4%), respectively. Among the sexually active students, 36 (8.1%) had an unintended pregnancy.

**Factors associated with knowledge of emergency contraceptives**

In bivariate analysis, a significant difference was observed between predictors; the mother's educational level, the father's educational level, the field of study, and the year of study were associated with knowledge of emergency contraception. By using variables that have a p-value < 0.25 in the multivariable logistic regression analysis, the model was fitted with a backward stepwise procedure. After controlling, the effect of other variables, they were significantly associated with knowledge of EC. Socio-demographic factors; father's educational level, a field of study, and year of study showed a significant association with good knowledge of EC in multivariate logistic regression analysis. Females in the fifth year were 75% less likely to have good knowledge of EC than students in the second year (AOR: 0.25, 95% CI: 0.66-0.977, P = 0.048). Respondents who are health science students were 2.2 times more likely to have good knowledge of EC compared to those of non-health science departments (AOR: 2.25, 95% CI: 1.01-5.07, P = 0.05). On the other hand, respondents whose father had a first degree and above were 6.29 times more likely to have good knowledge of EC compared to those with a father who can't read and write (AOR: 6.29, 95% CI: 2.06-19.26, P = 0.001).

**Table 3 Bivariate and multivariate analysis of factors associated with knowledge of EC among Female Regular Undergraduate Students of Debre-Markos University, 2021 (N=446).**

**Notes: *P<0.05;1, reference**

| Variable and Category | Knowledge | | COR (95% CI) | P value* | AOR (95% CI) | P value* |
|---|---|---|---|---|---|---|
| | Good | Poor | | | | |
| **Father educational level** | | | | | | |
| Can't read & write | 29 | 14 | 6.372 (2.099-19.347) | 0.001 | 6.29 (2.059-19.257) | 0.001* |
| Read and write | 150 | 40 | 3.520 (1.329-9.320) | 0.011 | 3.12 (1.169-8.315) | 0.023* |
| Grade 1-6 | 57 | 8 | 1.853 (0.574-5.982) | 0.303 | 1.86 (0.573-6.041) | 0.301 |
| Grade 7-12 | 54 | 3 | 0.733 (0.168-3.208) | 0.680 | 0.67 (0.152-2.936) | 0.593 |
| Diploma | 16 | 3 | 2.475 (0.535-11.453) | 0.246 | 2.72 (0.580-12.787) | 0.204 |
| First degree and above | 66 | 6 | 1 | | 1 | |
| **Field of study** | | | | | | |
| Health science | 86 | 8 | 1 | | 1 | |
| No health science | 286 | 66 | 3.96 (1.549-10.16) | 0.039 | 2.25 (1.06-5.067) | 0.048* |
| **Year of study** | | | | | | |
| 2nd year | 189 | 28 | 0.333 (0.096-1.155) | 0.083 | 0.253 (0.066-.977) | 0.046* |
| 3rd year | 149 | 37 | 0.559 (0.163-1.915) | 0.354 | 0.375 (0.098-1.436) | 0.152 |
| 4th year | 25 | 4 | 0.360 (0.074-1.750) | 0.205 | 0.28 (0.051-1.499) | 0.136 |
| 5th year | 9 | 4 | 1 | | 1 | |

**Factors associated with the practice of emergency contraceptives**

The association of selected variables was investigated using both bivariate and multivariate logistic regression techniques. Accordingly, the variables considered in the bivariate analysis were: age, marital status, religion, college/department, and overall knowledge about EC. Explanatory variables that showed an association with a p-value <0.25 were included in the multivariable logistic regressions. Finally, the field of study, the knowledge of the respondents, and marital status remained to be significantly associated with the utilization of EC. Respondents from health science were two times more likely to use emergency contraceptives compared to respondents from non-health science departments respondents (AOR = 2.14, 95% CI= 1.265-3.532). Single female students were 41% more likely to use EC as compared to those respondents who were married (AOR=0.41, 95% =0.21-.824, p = 0.01). Respondents with poor knowledge were 1.7 times less likely to use EC compared to those who had good knowledge (AOR = 1.69, 95% CI; 1.819-3.482, p = 0.015).

**Table 4: Bivariate and multivariate analysis of factors associated with the practice of EC among Female Regular Undergraduate Students of Debre-Markos University, 2021 (N=446).**

| Variable and Category | EOC use | | COR (95% CI) | P value* | AOR (95% CI) | P value* |
|---|---|---|---|---|---|---|
| | Yes | No | | | | |
| **Field of study** | | | | | | |
| Health science | 33 | 61 | 1 | 1 | 1 | 1 |
| No health science | 71 | 281 | 1.848 (1.298-3.508) | 0.004 | 2.11 (1.265-3.532) | 0.004* |
| **Marital status** | | | | | | |
| Single | 81 | 311 | 1 | 1 | 1 | 1 |
| Married | 15 | 24 | 0.417 (0.209-0.831) | 0.013 | 0.41 (0.204-0.824) | 0.012* |
| Divorced | 3 | 5 | 0.434 (0.102-1.854) | 0.260 | 0.59 (0.134-2.617) | 0.489 |
| Widowed | 3 | 1 | 0.087 (0.009-1.846) | 0.035 | 0.10 (0.010-1.025) | 0.053 |
| Separated | 2 | 1 | <0.01 | 0.999 | <0.01 | 0.999 |
| **Overall knowledge** | | | | | | |
| Good knowledge | 94 | 278 | 1 | 1 | 1 | 1 |
| Poor knowledge | 10 | 64 | 2.130 (1.050-4.320) | 0.036 | 1.69 (1.819-3.482) | 0.015* |

Notes: *P<0.05;1, reference

## DISCUSSION

The study aimed at examining the level of knowledge and attitudes toward EC among female students at Debre Markos University. Most of the participants (74.4%) reported having heard about EC, this finding was lower compared to a study conducted at Adis Ababa University (84.2% )[13]. However, this finding is superior to the result of studies at Arbaminch University (63%). This difference might be attributed to a lack of free discussion on sex and sexuality among female students at Debre Markos University.

Furthermore, in this study 272 (61%) of the participants correctly identified the time limit of EC pill use, which was lower than a study done on university students in Ghana (78.7%)[14], Arbaminch university (70.2%) (15), Haramaya University (81.4%)[12, 15, 16]. The finding showed that unintended pregnancies were observed in 36 (8.1%) of the respondents, which was slightly lower than the study conducted at Arbaminch University 20 (15.7%), Harar town 30 (23.6%)[4, 17]. This may be explained by the wide availability of other contraceptive methods. Around half, 207 (46.7%) of the study participants

indicated that they recommended others to use ECs, this was again lower than the findings of similar studies conducted in Dangila Hdasie high school 147 (77.4%). This could be because of the lack of free discussion on sex and sexuality among female students at Debre Markos University. The present study also showed that female students who had adequate knowledge of EC were more likely to use EC than their counterparts, which was in line with other studies[4, 13].

## CONCLUSIONS AND RECOMMENDATION

This study showed that the awareness of emergency contraception among Female Regular Undergraduate Students of Debre-Markos University was fair. The students had also optimal knowledge of the timeframe for the use of EOC. Moreover, their attitude to using emergency contraception and to advising others to use and practice was low. There was a strong association between the field of study, marital status, and knowledge about emergency contraceptive communication with the practice of emergency contraception. Therefore, further to increase the knowledge, attitude, and practice of emergency contraception user-friendly services, basic training about reproductive health and family communication services should be promoted.

## ABBREVIATIONS

DMU Debre Markos University
EC Emergency Contraception
ECPs Emergency Contraceptive Pills
EOC Emergency Oral Contraceptive
IUCD Intrauterine Contraceptive Device
KAP Knowledge Attitudes and Practice
WRA Women of Reproductive Age
WHO World Health Organization

## DECLARATIONS

### Data Sharing

The data used to support the findings of this study are available from the corresponding author. upon request.

### Acknowledgments

We would like to thank Debre Markos University for giving us ethics approval to start the study. Our deep appreciation goes to the head departments for their permission. We would also like to thank the study participants for their time.

### Author Contributions

I the author made substantial contributions to the conception and design, acquisition of data, or analysis and interpretation of data, took part in drafting the article or revising it critically for important intellectual content, agreed to submit it to the current journal, gave final approval to the version to be published, and agree to be accountable for all aspects of the work.

### Disclosure

The authors declare that they have no competing interests regarding the publication of the paper.

## CORRESPONDING AUTHOR

Mamaru Getinet
Department of Biomedical Sciences, College of Medicine and Health Sciences, Debre Markos University, Debre Markos, Ethiopia
Email: mamaru_getinet@dmu.edu.et

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# THE SIGNIFICANCE OF THREE-DIMENSIONAL SOFT TISSUE MARKERS IN ESTIMATING FETAL WEIGHT AMONG IRAQI WOMEN: A CROSS-SECTIONAL STUDY

Wassan Nori[1], Esraa Hameed Humadi[1], Nabeeha N. Akram[2]

## ABSTRACT

**BACKGROUND:** Estimating fetal weight (EFW) is essential for safeguarding laboring mothers and newborns. Higher birth weight is associated with poor delivery outcomes; earlier detection is crucial to improve the outcome. Current use of a two-dimensional ultrasonic shows limitations, especially among higher birth weight and those in the late third trimester. We aimed to examine whether the fractional thigh volume (FTV), a three-dimensional ultrasonic parameter, can predict fetal birth weight at 38-42 weeks.

**METHOD:** A cross-sectional study recruited 80 pregnant women who fulfilled the criteria; at University Hospital from June 2018 for 14 months. Patients were referred cases for labor induction. Women were assessed by clinical and obstetrical examination. A three-dimensional ultrasound evaluated FTV at the labor ward; 24-48 hours before delivery. Maternal demographics, an indication of admission, and outcomes were recorded. After delivery, the infants' actual birth weight was recorded.

**RESULTS:** The actual birth weight versus EFW by FTV was 3438.01 ±693.04 vs. 3548.47±706.71 grams. A third-degree polynomial equation highlighted the correlation between the EFW by FTV versus actual birth weight. ANOVA tested the equation accuracy, as F-ratio was 299.58, P value< 0.0001. The concordance correlation coefficient was 0.95.

**CONCLUSION:** The strong correlations of FTV in predicting fetal weight with a substantial concordance agreement, besides its simplicity and rapid examination time, especially when incorporated into commercial software, makes FTV a recommended marker for predicting EFW.

**KEYWORDS:** Prediction, fractional thigh volume, birth weight, estimated fetal weight, three-dimensional US.

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1 College of Medicine/ Department of Obstetrics and Gynecolog Mustansiriyah University, Baghdad, Iraq

2 College of medicine/Department of pediatrics/MustansiriyahUniversityy Baghdad, Iraq

## INTRODUCTION

Accurate estimation of fetal weight is challenging and represents an essential aspect of obstetric practice, especially when growth problems are suspected; larger-weight infants were linked to many bad labor outcomes[1]. Shoulder dystocia and neonatal respiratory distress showed increased incidents among those infants. Mothers show a higher risk of operative delivery, vaginal tears, and postpartum bleeding complicating many deliveries[2]. Estimating fetal weight (EFW) based on previous obstetrical history and fundal height estimation showed poor performance[3].

The giant leap presented by 2-Dimensional Ultrasonic (2D) estimation has improved our prediction. Hadlock formula is currently used in practice to determine EFW with a sensitivity of 62 percent and a specificity of 93 percent[4]. However, a 2D assessment was further subjected to analysis. It shows some drawbacks, particularly for fetuses less than 34 weeks and those with higher birth weight[5,6]. Because 2D assessments rely on bone measurements, they underestimated soft tissue mass and fetal visceral fat; visceral fat is a good indicator of the true nutritional state of the growing fetus[7]. Since fetal fat is accredited for 45% of birth weight variance thus, EFW accuracy by 2D is only 62%[8]. Earlier studies discussed the role of thigh circumference and mid-thigh soft tissue thickness in improving the accuracy of predicted fetal weight. This ultrasonic parameter has the advantage of simplicity, practicality, and feasibility to be used in practice[9].

However, these proposed fetal diameters were difficult to assess through 2D studies due to the irregular thigh morphology. From that came the necessity to apply 3D studies, which provided an accurate estimation of the thigh volume, thus enhancing EFW[10]. Using 3D measurements for EFW showed to be more precise; fractional thigh volume FTV is a 3D sub-volume assessing soft-tissue growth as a surrogate for fetal nutritional condition. Earlier reports proposed using the thigh; or the arm volume; others used both[11]. They recommended their use owing to the lower absolute errors and better accuracy compared to the current 2D formulae.

Combining 3D measurements with additional fetal biometric data such as femur length (FL), head circumference (HC), and bi-parietal diameter (BPD) allowed for a more reliable assessment of fetal weight in the extremities of fetal weight[12]. Still, this alternative approach was more time-consuming. Each limb measurement lasted 10 to 15 minutes[13]. To reduce the time needed to complete the measurements, researchers used a commercial software program[14] to reduce the examination time to 10 seconds. Moreover, other studies confirmed the value of FTV in improving the accuracy for gestational age in 34 – 36 weeks and not only the EFW[15].

3D ultrasound can provide important details about the soft tissue development of growing fetuses. However, it is unclear how accurate FTV can be in predicting fetal birth weight versus actual birth weight. Little evidence exists regarding its use among the Iraqi population. This study aimed to verify the significance of FTV, a three-dimensional ultrasonic parameter, in evaluating EFW among term pregnant women.

## METHOD AND MATERIALS

A cross-sectional study recruited 80 pregnant women from The University Hospital. The study lasted 14 months, from June 2019-August 2020. The study was approved by the Institutional Review Board of Mustansiriyah University/Faculty of Medicine, Department of obstetrics and gynecology (IRB 158 dated March 2019). Informed written and verbal consent was taken from all participants.

The study participants were referred cases for labor induction in the labor ward of our maternity center, all were briefed about the study's aim, and they gave their consent to participate. We included cases with confirmed dates; between 38 - 42 weeks of singleton pregnancy calculated on a regular LMP and early pregnancy dating ultrasound. The participant

should have a viable normal-cephalic presented fetus.

Cases with twin pregnancies, non-viable or malformed fetuses, and mal-positioned or mispresented fetuses were all an exclusion. Patients with hypertensive disorders or chronic renal diseases and those with suspected fetal growth restriction were excluded. As for diabetic cases, we included Gestational DM cases discovered late in pregnancy and not started treatment; we aimed to see the performance of FTV among higher-weight infants.

A detailed history was taken, and general and obstetrical examinations were performed. In the labor ward, a trained sonographer conducted 3DU exanimation for the participant by ultrasound equipment (Philips HD11XE) via a transabdominal probe 24-48 hours before labor. Estimation was made for the fetal weight by FTV; all Digital data images were saved to digital media for further examination offline.

The total fractional thigh volume was determined in the same way as the fetal limb lean volume and was calculated by commercially available Virtual dub v1.10.4 software formulae:

Volume (mL) = Avg (A1 + A2 + A3 + A4 + A5) × FL/2

(A = Area, Avg = Average of all areas calculated on five slices) described by Lee et al.

After the delivery, anthropomorphic measurements for newly born in addition to birth weight were taken by an electronic scale as the actual birth weight[16].

**Method for Three-Dimensional FTV:**

The entire length of the thigh was primarily scanned in the sagittal plane, then measured with a transabdominal probe, which was rotated 90 degrees and linear sweeps from the beginning of thigh diaphysis till its end. The volume of interest should occupy at least 2/3 of the digital video display; we tuned the image's depth and magnifications. Near the thigh diaphysis, the acoustic focus zone was positioned. During the maternal breath-hold, soft tissues were included in the volume assessment. The midpoint of the femur was determined using 3 -dimensional multiplanar imaging. The fractional limb volume was calculated using five evenly spaced sections around the femur's midpoint, shown in Figure 1. The skin, fat, muscle, and bone of the fetus were all included in each section. The lean and fat regions of the fetal thighs were differentiated in cross-section by their differing echogenicity. We assessed the inner lean limb mass after identifying the outside more echogenic fat part and the inner less echogenic lean section of the thigh.

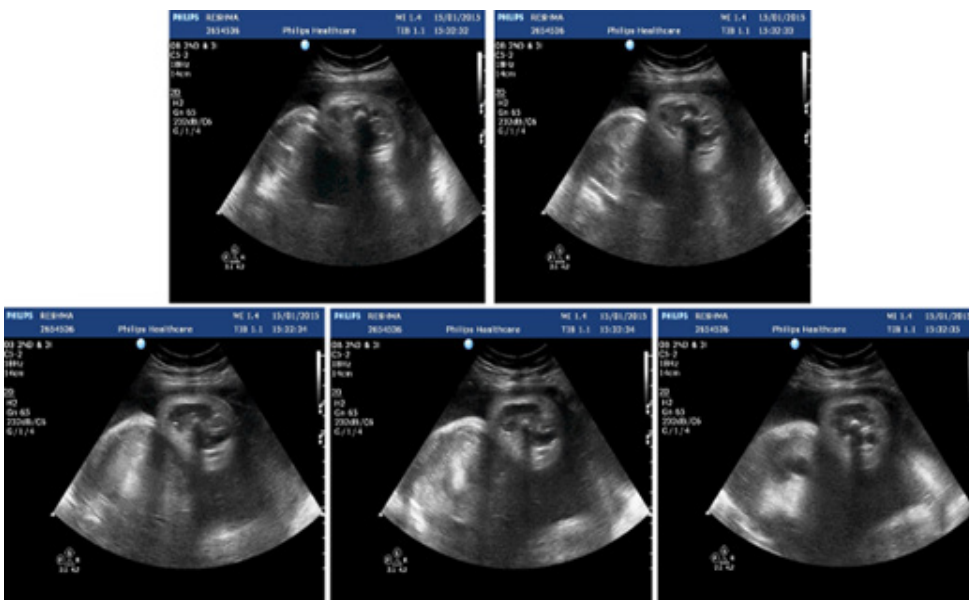

**Figure 1. The technique of fractional thigh volume measurements; it's calculated using five evenly spaced sections around the femur's midpoint**

**Sample size calculation**

According to the equation; sample size =(Z1-/2) 2 SD2 /d2 [17]

**Where**: Z1-/2 equals to 1.96; represent the usual normal variate

**SD**: stands for standard deviation that might have different values extracted from a previously completed study

**d**: denotes the researcher's absolute precision.

(1.96)2 sample size

(0.4)2 / (0.1) (0.1)2 = sixty patients is needed; we recruited eighty cases.

**Statistical analysis**

Continuous data were expressed as Mean ± standard deviations (SD) with respective SE of the Mean. Schapiro Wilkinson's test tested the data normality. A third-degree polynomial equation was used to link the Fractional thigh volume FTV as an independent variable versus actual fetal weight as a dependent variable. The equation accuracy was tested by the ANOVA test and its respective F ratio. A linear equation was constructed to highlight the correlation between EFW measured by Fractional thigh volume and actual birth weight. Concordance correlation coefficient(pc) was used to assess the inter-rater observational agreement between the EFW measured by fractional thigh volume FTV versus the actual birth weight. Significance was set at <0.05 for all tests; analysis was done by MedCalc - version 20.

## RESULTS

In this cross-sectional study, 80 pregnant women we recruited. A comparison was made to EFW calculated by FTV versus actual birth weight measured post-delivery. The essential demographic criteria of participants were illustrated in Table. 1 as Means, SD, and SE of the mean. The actual birth weight versus the EFW by the FTV was 3438.01 ±693.04 vs. 3548.47±706.71 grams, respectively. Among the causes of inducing labor, ruptured membrane in 35 cases (43%), diabetic cases in 20 (25%), non-reassuring biophysical profile in 15 cases (18 %), and postdate10 cases (14 %) summarized in Table 2. Figure 2. demonstrated a third-degree polynomial equation that showed the correlation between the EFW by FTV versus the actual birth weight. ANOVA confirmed the accuracy of the equation, as F-ratio was: 299.58, P value< 0.0001. Figure 3. showed a linear regression for EFW by FTV and actual birth weight; it proved a strong positive correlation as (r)=0.82, P<0.001. Table 3 illustrated that the concordance correlation coefficient (pc) estimated value as: 0.95, which was interpreted as a substantial strength of agreement for the weight estimated by FTV and actual birth weight.

**Table1. The basic demographic criteria of the study participants**

| Parameters, N= 80 women | Mean ±SD | SE of Mean |
|---|---|---|
| Maternal Age (years) | 31.58 ± 6.49 | 0.64 |
| BMI (kg/m2) | 25.43 ± 4.06 | 0.04 |
| Gestational age by LMP dating (weeks) | 38.59±2.31 | 0.23 |
| EFW by Fractional Thigh Volume FTV (grams) | 3548.47±706.71 | 70.67 |
| Actual birth weight post-delivery ( grams) | 3438.01±693.04 | 69.30 |

**Table 2. The causes for induction among the study participants**

| The cause of induction | No.of cases | Percentage |
|---|---|---|
| Rupture of membrane | 35 | 43% |
| Diabetic related indication | 20 | 25% |
| Non-reassuring biophysical profile | 15 | 18% |
| Postdate | 10 | 14% |
| Total | 80 | 100% |

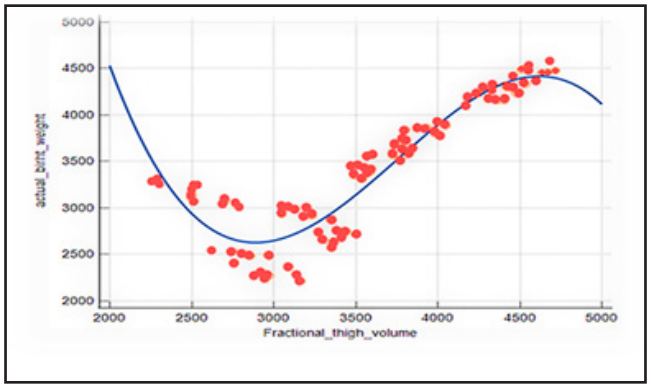


**Figure 2. Non-linear regression,where X = fractional thigh volume , and Y= actual birth weight ;**

F ratio=299.58, P<0.0001
Regression Equation
a+b*x+c*x^2+d*x^3
Parameter Coefficient
a =34283.05
b =-27.69
c =0.008
d= -0.00000069

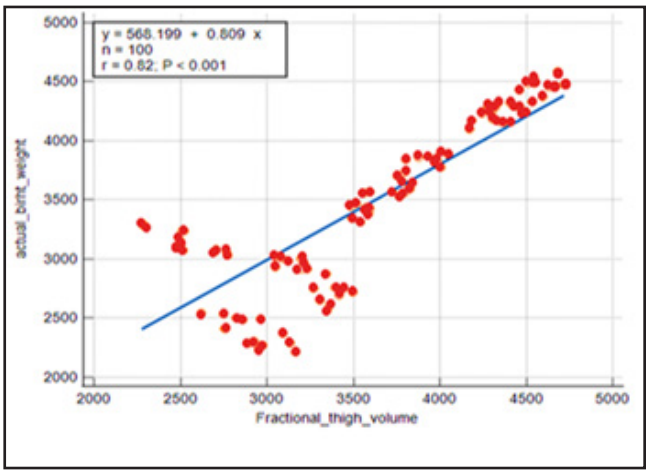


**Figure 3. The linear correlation between the actual birth weight as an independent variable versus fractional thigh volume as a dependent variable, there was a strong positive correlation as r =0.82, P<0.001**

**Table 3. Concordance correlation coefficient (Pc)**

| Parameters | Value |
|---|---|
| Sample size | 80 participants |
| Concordance correlation coefficient | 0.95 |
| 95% Confidence interval | 0.93-0.96% |

Strength of agreement can be interprtated based on Pc value as : < 0.90 = poor , 0.90-0.95 = moderate , 0.95 - 0.99 = substantial , and > 0.99 = almost perfect .

## DISCUSSION

Fetal weight is an essential prerequisite to ensure feto-maternal outcomes during labor. This study tested a model for estimating fetal weight using a three-dimensional limb volume ultrasonography; FTV showed a correlation to the actual birth weight, and ANOVA proved its accuracy; as F- ratio was 299.6, P-value <0.05. Furthermore, we confirmed a strong positive correlation between FTV and actual birth weight r = 0.82, P<0.001. The concordance correlation coefficient highlighted a substantial strength of agreement for the weight estimated by FTV and actual birth weight. The conventional 2D has 20 % errors in EFW, besides difficulties in visualizing fetuses attributed to maternal obesity, anteriorly located placenta, and oligohydramnios [18]. As a result, scientists seek other sonographic markers that correlate with a fetal weight with a greater predictive value[19].

Lee et al.in 2001 assessed the performance of multiple 3-Dimensional Ultrasonic parameters versus 2D in evaluating the EFW for an unselected population in the late 3rd trimester. He declared that abdominal circumference and FTV gave the best prediction with a difference from actual birth weight by -0.026% ±7.8% compared to the use of conventional Hadlock formulae. The newly tested prediction model accuracy was 2.32% ± 6.61%[14].

Li Kang et al. conducted a study on predicting fetal weight in 28–34-week pregnant women by semi-automatic 3D limb volume. The researchers calculated FTV and FAV combined with abdominal circumference; their prediction model showed high accuracy. The sensitivity and the specificity were 87.2% and 91.2%, respectively, and they declared higher predictive efficiency than Hadlock formulae, especially for the diagnosis of macrosomia[20].

Khoury et al. declared that 3D volume-based fetal weight scored higher accuracy for both underdeveloped fetuses and the low-risk general population. By including soft tissue assessment in the birth weight prediction process[21]. Pagani et al. tested the value of FTV in pregnant women with gestational diabetes mellitus at 34 + 0 to 36 + 6 weeks gestation, highlighting its precision in predicting EFW compared to the traditional Hadlock's formula. Furthermore, FTV predicted neonatal macrosomia with a similar sensitivity but higher specificity than the Hadlock method[22]. O'Connor investigated the value of FTV throughout gestation and tested its correlation with EFW and neonatal body composition. At 33-38 weeks of gestation, the author recommended FTV as a screening for cases at increased risk of macrosomia and FGR. The study correlated FTV to EFW and lean body mass among newborns as P =0.03[23].

Xining Wu et al. compared EFW in term pregnancies 7 days before the delivery; by an automated three-dimensional fractional limb volume model versus a traditional 2D. They concluded that automated fractional limb volume has better performance [particularly for fetuses < 3500 g] than that of the traditional 2D model. The inter-observer reliability of measuring fetal Fractional arm volume and FTV were high, with the interclass correlation coefficient of 0.92 and 0.96, respectively[24].

Cinar et al. investigated the associations between prenatal FTV and FAV versus neonatal anthropometric indicators within 24 h of scheduled caesarian deliveries. FAV showed moderate correlations to most neonatal parameters. In contrast to the weak correlation of FTV to some neonatal parameters. After controlling other variables, FTV showed no correlation; only FAV was independently correlated to neonatal anthropometric parameters irrespective of maternal criteria. The authors acknowledge that most of their participants were Caucasian women having higher BMI, which hinders their results[25].

Gembicki et al. examined the performance of modified FTV and arm volume in unselected pregnant women during the third trimester. Their result showed less accuracy for modified FTV than Hadlock's but presented a more precise result. The authors recommended modified FTV as a predictor for birth weight within (±10%) of actual weight in comparison to Hadlock's model[26].

Mlodawski et al. investigated the value of adding FTV to the Lee formulae and compared their performance to the Hadlock formulas in predicting fetal weight for term pregnant mothers. Their proposed method did not score significant differences compared to the Hadlock I formula in terms of accuracy or timeframe for conducting the examination. The authors rerecommended Lee formula in women with deep engaged fetal heads where it becomes challenging to estimate abdominal circumference and biparietal diameters[27].

Although over 30 equations are available for predicting EFW[28], we used a simple, rapid, yet applicable clinical model with high accuracy and substantial strength of agreement with the actual birth weight. Using commercial software could reduce examination time, a major limiting step for FTV use. Fractional thigh volume is already a validated marker for fetal growth disorders. It is used for estimating fetal weight, screening for macrocosmic fetuses, and in growth-restricted fetuses, so we needed no validation for its use[14,29].

Limitations; FTV showed technical difficulties; experienced sonographers can enhance its performance. Our study was a single-center study with a relatively small sampling size. In addition, some of the confounding factors that affect fetal fat that was not addressed; as race, maternal body mass index, weight gain during pregnancy, and fetal sex.

Birth weight is an important predictor of maternal and perinatal wellbeing[30]. An accurate assessment of fetal weight is crucial as it can guide the obstetrician's decision regarding the time and mode of delivery. In addition to considering the triangular trade-off between low - and adequate fetal weight-related complications and maternal indications for induction[31,32]. Randomized control studies are needed to appreciate FTV performance among high-risk Iraqi populations and at a wider gestational range.

## CONCLUSION

Fractional thigh volume, a three-dimensional ultrasonic parameter, showed high accuracy in estimating actual birth weight. Using commercial software overcomes technical limitations that preclude three-dimensional ultrasound application in practice. Its strong correlation and inter-observer reliability make it an interesting option for improving fetal weight estimation.

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**Conflict of interest**: The corresponding author states no conflict of interest on behalf of all authors.

**List of abbreviation**

| | |
|---|---|
| EFW | estimated fetal weight |
| FTV | fractional thigh volume |
| 2D | two dimensional ultrasound |
| 3D | three dimensional ultrasound |
| FAV | Fractional arm volume |

## CORRESPONDING AUTHOR

Wassan Nori

College of Medicine/ Department of Obstetrics and Gynecology Mustansiriyah University, Baghdad, Iraq

E-mail: Dr.wassan76@uomustansiriyah.edu.iq

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# COMPLICATIONS OF INDUCED ABORTION COMPARED TO THOSE OF SPONTANEOUS ABORTION IN YAOUNDÉ-CAMEROON: A COHORT STUDY

Fouedjio Jeanne Hortence, MD, MPH[1,2], Teufack Patrick, MD[1], Fouelifack Ymele Florent,MD, MPH[2,3], Ebong Cliford,MD, MPH[1,2], Foumane Pascal, MD[1,4]

## ABSTRACT

**BACKGROUND:** Induced abortion is a major public health challenge worldwide particularly in developing country. It is one of the leading causes of maternal death. However some spontaneous abortions can also lead to major complications.

**OBJECTIVE:** To compare the complications of induced abortion with those of spontaneous abortion in Yaoundé.

**METHODOLOGY:** The researchers conducted a cohort study from November 1st 2019 to May 31st, 2020 with prospective data collection in the gynecology departments of the Yaoundé Gyneco-Obstetric and Pediatric Hospital and the Yaoundé Central Hospital. . The participants were all patients admitted for abortion and who gave their informed consent. All patients known to have co-morbidities were excluded because it could be confused with one or more complications of abortion. Patients lost during the period of follow-up were also excluded. Sampling was consecutive and exhaustive, with a minimum sample size calculated of 40 participants for each group. The questionnaire was used to collect the data which were analyzed using SPSS 23.0. To compare the different observations, the Odds Ratio with 95% confident interval and the significance threshold was set at less than 5%.

**RESULTS:** A total of one hundred and fifteen (115) abortion cases were included during our study period: 56 for the induced abortion group and 59 for the spontaneous group. Patients with induced abortion were significantly younger than those with spontaneous one (median age: 24 years [20-30] vs. 28 years [24-32]; p = 0.013). Clinically, fever was significantly more common in induced abortion group (28.6%) than in spontaneous one (6.8%) (p= 0.004). The rate of complication was higher in the induced abortion group. Induced abortion increases the risk of sepsis by 4.48. Some complications were observed only in cases with induced abortion, namely uterine perforation (8.9%), pelvic peritonitis (7.1%), septic shock (3.6%) and intestinal lesions (1.8%). However, haemorrhage and anaemia were observed in both groups with no significant difference. In terms of management, induced abortion carries twice the risk of blood transfusion (p = 0.030). The overall post-abortion contraceptive use rate was only 40.9%. In terms of prognosis, the lethality rate was 3.6% among patients with induced abortion.

**CONCLUSION:** Induced abortion, compared to spontaneous abortion, is the prerogative of adolescents. Abortion remains a major provider of maternal morbidity and mortality in the poor settings, where the unmet needs of contraception are high. We recommend a full implementation of post abortion care.

**KEYWORDS:** Induced abortion, spontaneous abortion, miscarriage, infection, maternal death, family planning

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1 Faculty of Medicine and Biomedical Sciences, University of Yaounde I
2 Gyneco-Obstetric Unit, Central Hospital of Yaounde
3 Institute of medical technologies Nkolondom
4 Yaoundé Gyneco-obstetric and pediatric Hospital

## INTRODUCTION

Abortion refers to the expulsion of the product of conception before the age of viability which according to WHO is 22 weeks gestation. It is termed induced abortion when it results from the deliberate action of the woman or a third party; and spontaneous (or miscarriage) if it occurs without any deliberate action[1].

Induced abortion is a major public health problem worldwide, with a prevalence in the general population of 7-16%[2]. It is the fifth leading cause of maternal death, accounting for 13%[3]. A recent study estimates that during the period 2010-2014, 55.7 million abortions took place each year worldwide[4]. Miscarriage is the most common complication during pregnancy with an estimated prevalence of 12-16%[5]. In Africa, data on abortion have limitations: on the one hand, there is a lack of completeness due to under-reporting of women, and on the other hand, problems of representativeness because surveys often only cover specific populations. With respect to induced abortion, a study conducted in Kinshasa in 2016 in a hospital setting reported a rate of 56 per 1,000 women aged 15 to 49 years[5]. In Cameroon, induced abortion is most often unsafe because of restrictive laws. This results in complications that often lead to maternal death. Estimates published by the WHO in 2010 for our country showed a maternal mortality rate of 600 per 100,000 live births, among which abortion complications were about 32% of the causes of these deaths[1]. In a study conducted by Foumane et al. in 2015 at the Yaoundé Gyneco-Obstetric and Pediatric Hospital (HGOPY), septic abortion alone was responsible for 17.2% of maternal deaths[6]. Most studies conducted in our context do not clearly distinguish the responsibility for each type of abortion. This justifies our study; whose general objective was to compare the early complications of induced abortion with those of spontaneous abortion in Yaoundé.

## METHOD AND MATERIALS

The conduct of the study was authorized by the Institutional Committee of Ethics and Research of the Faculty of Medicine and Biomedical Sciences CIER/FMSB of the University of Yaounde. All participants gave their prior informed consent. It was a cohort study with prospective data collection in the Gynecology-Obstetrics departments of the Yaounde Gyneco-Obstetrics and Pediatrics Hospital (HGOPY) and the Yaounde Central Hospital (HCY) for a duration of seven months from November 1, 2019 to May 31, 2020. The participants were all patients admitted for abortion and who had given their informed consent. All patients known to have co-morbidities were excluded because it could be confused with one or more complications of abortion. Patients lost during the period of follow-up were also excluded.. Sampling was consecutive and exhaustive, with a minimum sample size of 40 participants for each group. . Once their agreement to participate in the study was obtained through an informed consent form, the participants were interviewed using a standardized, pre-tested questionnaire. The researcher then performed a physical examination of these patients to complete the information in the questionnaire. The variables of the study were the socio-demographic, clinical and reproductive characteristics, as well as the management of abortions. Patients were followed up during their stay in the hospital and those managed as outpatient were called to get their evolution during the first seven days following the abortion The data were analyzed using SPSS (Statistical Package of the Social Science) version 23.0. Categorical variables were described as percentages, proportions, and/or frequencies. To compare the different observations, the Odds Ratio (OR) with 95% confident interval and the significance threshold was 5%.

## RESULTS

One hundred and fifteen (115) abortion cases were collected during our study period: 56 for the induced abortion group and 59 for the spontaneous group (Table I).

- **Socio-demographic profile of abortion patients**

The socio-demographic profile of the study population shows that participants in the induced abortion group were significantly younger. The marital status and the level of education don't influence the occurrence of induced or spontaneous abortion (table I).

**Table I: distribution of participants according to socio-demographic profile**

| Variables | Abortion | | Total (N=115) | OR (95% CI) | p-value |
|---|---|---|---|---|---|
| | Induced (N=56) n (%) | Spontaneous (N=59) n (%) | | | |
| **Age (years)** | | | | | |
| <20 | 9 (16.1) | 0 (0.0) | 9 (7.8) | - | 0. 030 |
| [20-25[ | 20 (35.7) | 17 (28.8) | 37 (32.2) | 1.37 (0.63-3.01) | 0 .427 |
| [25-30[ | 12 (21.4) | 16 (27.1) | 28 (24.3) | 0.73 (0.31-1.73) | 0.478 |
| ≥30 | 15 (26.8) | 26 (44.1) | 41 (35.7) | 0.46 (0.21-1.02) | 0.055 |
| **Marital status** | | | | | |
| Single* | 50 (89.3) | 43 (72.9) | 93 (80.9) | 1.02 (0.81-1.29) | 0.856 |
| Married** | 6 (10.7)16 (27.1) | 22 (19.1) | | | |
| **Level of education** | | | | | |
| Not attending school | 2 (3.6) | 1 (1.7) | 3 (2.6) | 2.15 (0.19-24.37) | 0.537 |
| Primary | 3 (5.4) | 8 (13.6) | 11 (9.6) | 0,36 (0.09-1.43) | 0.148 |
| Secondary | 37 (66.1) | 33 (55.9) | 70 (60.9) | 1.53 (0.72-3.26) | 0.267 |
| University | 14 (25.0) | 17 (28.8) | 31 (27.0) | 0.84 (0.36-1.88) | 0.645 |

* non-legalized union

**legalized union by competent authorities

Median age: 24 years [20-30] vs 28 years [24-32]

**- Reproductive variables**

Comparing the two populations (induced abortion vs. spontaneous abortion) on their reproductive variables, there were no statistically significant differences in gestation, parity, history of abortion and number of live children (Table II).

**Table II: distribution of participants by reproductive profile**

| Variables | Abortion | | Total (N=115) | OR (95% CI) | p-value |
|---|---|---|---|---|---|
| | Induced (N=56) n (%) | Spontaneous (N=59) n (%) | | | |
| **Gestity** | | | | | |
| Primigeste | 17 (30.4) | 13 (22.0) | 30 (26.1) | 1.54 (0.67-3.57) | 0.311 |
| [2-4] | 26 (46.4) | 30 (50.8) | 56 (48.7) | 0.84 (0.40-1.74) | 0.636 |
| ≥5 | 13 (23.2) | 16 (27.1) | 29 (25.2) | 0.81 (0.35-1.89) | 0.630 |
| **Parity*** | | | | | |
| Nulliparous | 20 (35.7) | 15 (25.4) | 35 (30.4) | 1.63 (0.73-3.63) | 0.232 |
| Primipara | 18 (32.1) | 16 (27.1) | 34 (29.6) | 1.27 (0.57-2.84) | 0.555 |
| Paucipara | 12 (21.4) | 17 (28.8) | 29 (25.2) | 0.67 (0.29-1.58) | 0.363 |
| Multipara | 5 (8.9) | 8 (13.6) | 13 (11.3) | 0.62 (0.19-2.04) | 0.436 |
| Grand multipara | 1 (1.8) | 3 (5.1) | 4 (3.5) | 0.34 (0.03-3.36) | 0.356 |
| **History of abortion** | 18 (32.1) | 15 (25.4) | 33 (28.7) | 0.90 (0.60-1.33) | 0.588 |
| Not precised | 38 (67.9) | 44 (74.6) | 82 (71.3) | 0.72 (0.32-1.62) | 0.427 |
| [1-2] | 16 (28.6) | 13 (22.0) | 29 (25.2) | 1.41 (0.61-3.29) | 0.421 |
| ≥3 | 2 (3.6) | 2 (3.4) | 4 (3.5) | 1.06 (0.44-7.76) | 0.958 |
| **Number of children alive** | | | | | |
| 0 | 20 (35.7) | 15 (25.4) | 35 (30.4) | 1.63 (0.73-3.63) | 0.232 |
| [1-2] | 27 (48.2) | 27 (45.8) | 54 (47.0) | 1.10 (0.53-2.29) | 0.792 |
| ≥3 | 9 (16.1) | 17 (28.8) | 26 (22.6) | 0.47 (0.19-1.17) | 0.107 |
| **Gestational age (WA)** | | | | | |
| Unknown | 12 (21.4) | 5 (8.5) | 17 (14.8) | 2.94 (0.96-8.99) | 0.058 |
| <9 | 13 (29.5) | 10 (18.5) | 23 (23.5) | 1.48 (0.59-3.72) | 0.403 |
| [9-13[ | 18 (40.9) | 25 (46.3) | 43 (43.9) | 0.59 (0.26-1.34) | 0.208 |
| ≥14 | 14 (25.0) | 24 (40.7) | 38 (33.0) | 0.48 (0.22-1.08) | 0.076 |

WA: Weeks of Amenorrhea

**- Participant Pathways and Clinical Profile**

Forty-three point five percent of the study population was referred. Participants in the induced abortion group preferentially sought first referral to peripheral level health facilities (induced: 39.3%; spontaneous: 16.9%; OR: 3.17; p=0.009). Among the most frequent symptoms, fever was present in 28.6% of induced abortion participants and only 6.8% of spontaneous abortion participants. This observed difference was statistically significant (p=0.004). However, there was no significant difference between the two groups for all other symptoms sought (Table III).

**Table III: distribution of participants according to where they came from and the admission/reference reasons**

| Variables | Abortion | | Total (N=115) | OR (95% CI) | p-value |
|---|---|---|---|---|---|
| | Induced (N=56) n (%) | Spontaneous (N=59) n (%) | | | |
| **Home** | 30 (53.6) | 35 (59.3) | 65 (56.5) | 0.79 (0.37-1.66) | 0.534 |
| **Other health centres** | 26 (46.4) | 24 (40.7) | 50 (43.5) | | |
| Peripheral level* | 22 (39.3) | 10 (16.9) | 32 (27.8) | 3.17 (1.33-7.54) | 0.009 |
| intermediate level** | 4 (7.1) | 14 (23.7) | 18 (15.6) | 0.25 (0.07-0.80) | 0 .020 |
| **Admission/reference reasons** | | | | | |
| Bleeding | 43 (76.8) | 49 (83.1) | 92 (80.0) | 0.67 (0.27-1.69) | 0.403 |
| Abdomino-pelvic pain | 32 (57.1) | 31 (52.5) | 63 (54.8) | 1.20 (0.58-2.51) | 0.620 |
| Fever | 16 (28.6) | 4 (6.8) | 15 (13.0) | 5.50 (1.71-17.70) | 0.004 |
| Purulent vaginal discharge | 8 (14.3) | 4 (6.8) | 12 (10.4) | 2.29 (0.64-8.09) | 0.197 |

* District Medical Centres; Integrated Health Centres; District Hospitals; **Regional Hospitals

**- Qualifications of the authors of unsafe abortion**

As for the authors of induced abortions, Medical Doctors were the most involved at 44.4%. In 40.7% of cases the identity of the perpetrator was not revealed and in two cases (4.2%), the partner was the author (Figure 1).

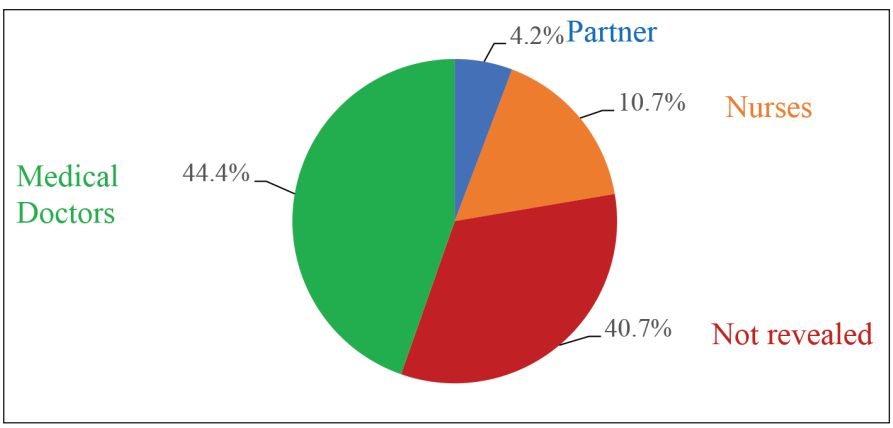


**Figure 1: qualification of those involved in unsafe abortion (N=47)**

**- Abortion complications**

The complication rate was higher in the induced abortion group. However, hemorrhage and anemia were observed in both groups without significant difference. Multiple induced abortions increased the risk of sepsis by 4.48 times. Some complications were observed only in cases with induced abortion (Table IV).

**Table IV: distribution of Complications by Type of Abortion**

| Variables | Abortion | | Total (N=115) | OR (95% CI) | p-value |
|---|---|---|---|---|---|
| | Induced (N=56) n (%) | Spontaneous (N=59) n (%) | | | |
| **Immédiates complications** | 33 (58.9) | 26 (41.1) | 59 (51.3) | 1.34 (0.93-1.91) | 0.112 |
| Genital Haemorrhage | 24 (42.9) | 19 (32.2) | 43 (37.4) | 1.33 (0.82-2.15) | 0.239 |
| Anemia | 29 (55.8) | 23 (44.2) | 52 (45.2) | 1.32 (0.88-1.99) | 0.169 |
| Hypovolemic choc | 8 (14.3) | 3 (5.1) | 11 (9.6) | 2.81 (0.78-10.06) | 0.107 |
| Septic abortion | 17 (30.4) | 4 (6.8) | 21 (18.3) | 4.48 (1.60-12.49) | 0.003 |
| Placental retention | 2 (3.6) | 1 (1.7) | 3 (2.6) | 2.11 (0.20-22.60) | 0.612 |
| Pelviperitonitis | 4 (7.1) | 0 (0.0) | 4 (3.5) | - | 0.053 |
| Uterine perforation | 5 (8.9) | 0 (0.0) | 5 (4.3) | - | 0.025 |
| Septic choc | 2 (3.6) | 0 (0.0) | 2 (1.7) | - | 0.235 |
| Bowel lesions | 1 (1.8) | 0 (0.0) | 1 (0.9) | - | 0.478 |
| Peritonitis | 1 (1.8) | 0 (0.0) | 1 (0.9) | - | 0.478 |

**- Management**

Cases with induced abortion required significantly blood transfusion compared with spontaneous abortion cases. Overall, only 40.9% of patients have chosen a contraceptive method (Table V).

**Table V: distribution of participants by the means of management**

| Variables | Abortion | | Total (N=115) | OR (95% CI) | p-value |
|---|---|---|---|---|---|
| | Induced (N=56) n (%) | Spontaneous (N=59) n (%) | | | |
| **Resuscitation means** | | | | | |
| Blood transfusion | 23 (41.1) | 13 (22.0) | 36 (31.3) | 2.47 (1.09-5.56) | 0.030 |
| Hydroelectrolytic resuscitation | 8 (14.3) | 3 (5.1) | 11 (9.6) | 3.11 (0.78-12.39) | 0.107 |
| Adrenaline/Noradrenaline | 2 (3.6) | 1 (1.7) | 3 (2.6) | 2.15 (0.19-24.37) | 0.537 |
| **Others PAC** | | | | | |
| Counseling on unsafe abortion | 28 (50.0) | 22 (37.3) | 50 (43.5) | 1.68 (0.80-3.57) | 0.171 |
| Counseling on the FP | 39 (69.6) | 47 (79.7) | 86 (74.8) | 0.59 (0.25-1.37) | 0.219 |
| Choice of a contraceptive method | 27 (48.2) | 20 (33.9) | 47 (40.9) | 1.81 (0.86-3.85) | 0.120 |
| Link others health services | 17 (30.4) | 15 (25.4) | 32 (27.8) | 1.28 (0.56-2.89) | 0.556 |
| Community involvement | 23 (41.1) | 18 (30.5) | 41 (35.7) | 1.59 (0.74-3.42) | 0.238 |

PAC: Post Abortion Care; FP: Family Planning

**- Outcome of cases from day 1 to day 7**

The outcome seven days following initial treatment was marked by the occurrence of two maternal deaths in the induced abortion group corresponding to the letality rate of 3.6%. (Table VI).

**Table VI: distribution of Participants by Changes in Clinical Status Between Day 1 and Day 7**

| Variables | Abortion | | Total (N=115) | OR (95% CI) | p-value |
|---|---|---|---|---|---|
| | Induced (N=56) n (%) | Spontaneous (N=59) n (%) | | | |
| Favorable | 49 (87.5) | 51 (86.4) | 100 (86.9) | 1.01 (0.88-1.17) | 0.866 |
| Anemia | 4 (7.1) | 1 (1.7) | 5 (4.3) | 4.21 (0.49-36.56) | 0.187 |
| Placental retention | 2 (3.6) | 3 (5.1) | 5 (4.3) | 0.70 (0.12-4.05) | 0.692 |
| Endometritis | 1 (1.8) | 2 (3.4) | 3 (2.6) | 0.53 (0.05-5.65) | 0.596 |
| Death | 2 (3.6) | 0 (0.0) | 2 (1.7) | - | 0.235 |
| Hypovolemic choc | 1 (1.8) | 0 (0.0) | 1 (0.9) | - | 0.478 |
| Sepsis | 2 (3.6) | 0 (0.0) | 2 (1.7) | - | 0.280 |

## DISCUSSION

### Socio-demographic profile

Analysis of the socio-demographic characteristics of this study population shows that participants who had induced abortions were significantly younger than those who had spontaneous abortions (with a median age of 24 years[20-30] vs. 28 years[24-32]; p = 0.013). Schwandt et al.[10] in 2011 in Ghana found similar results to with mean ages of 25.2 ± 6 years in the induced group and 28.7 ± 6.3 years in the spontaneous group. These results could be explained by the fact that most adolescent girls and young women are single, pursuing education and feel unable to care for a child, hence the use of Voluntary Interruption of Pregnancy (VIP). Similarly, participants under 20 years of age were significantly more likely to have an induced abortion than a spontaneous one (p=0.030). Several authors have also found that women 20 years of age and younger were heavily involved in abortion[8,11]. In contrast to theses results, Banerjee et al[7] in India in 2012 reported that women who had spontaneous abortions were significantly younger than those who had induced abortions (mean age: 24.9 vs 26.5).

Marital status did not have a significant influence on the type of abortion, as it was found that 89.3% of participants who had had an abortion were single, compared with 72.9% of those who had had a spontaneous abortion. These results are different from those of Schwandt et al.[10] in 2011 in Ghana, who reported that married women were significantly less involved in induced abortion compared to those who had spontaneous abortion (induced: 27.0%; spontaneous: 67.0%; p < 0.001). This difference could be explained by the fact that their patients were recruited from a family planning service, whereas the latter is more frequently attended by married women.

### Participant Pathways and Clinical Profile

Participants with induced abortion were significantly more likely to use peripheral-level health facilities compared with those with spontaneous abortion (induced: 39.3%; spontaneous: 16.9%; OR: 3.17; p=0.009). These results corroborate those of Banerjee et al. who report that patients in the induced group have a more complex and complication-prone treatment regimen[7]. These findings may be explained by the restrictive nature of the country's law on induced abortion, which leads women to seek services and unqualified or unskilled individuals to provide them with quality care.

Among the most frequent symptoms, fever was present in 28.6% of induced abortion cases and only 6.8% in the spontaneous abortion group (p=0.004). These results are similar to those of

Sangani et al[12] in 2018 in Kisangani (D.R. Congo), who found the most frequent infectious signs among abortion patients (14.3%), with a significant difference compared to spontaneous abortion patients. Banerjee et al. also reported that abortion patients had significantly more infectious signs than spontaneous abortion patients, notably fever, fetid leukorrhea (P<0.05) and vomiting (P<0.01). These results would reflect the fact that most of these induced abortions are performed clandestinely where aseptic measures are often not respected.

Participants who had induced abortions most often cited unwanted pregnancy and/or concern about birth spacing as the reason (62.5%). Unwanted pregnancy was also the reason given by the majority of patients (44.4%) in the study conducted by Sangani et al[12] in 2018 in Kisangani, Congo. These results further highlight the unmet need for contraception in our society.

**Profile of immediate complications**

The frequency of complications was higher in this study compared to that found in the literature. In fact, complications occurred in 58.9% of participants who had an induced abortion and 41.1% of those who had a spontaneous abortion. On the other hand, Carlsson et al[13] in 2018 found a complication rate of only 6.7% in a group of patients treated for induced abortion in Sweden. Participants in the abortion group were 4 times more likely to have a septic abortion compared to those in the spontaneous group (induced: 30.4%; spontaneous: 6.8%; p=0.003). In Finland in 2011, Niinimaki et al[9] found results that were also different from ours, since in their study, septic abortion only concerned 2% of abortions and no cases of spontaneous abortion. This difference could be explained by the fact that the law on induced abortion in these two Northern European countries is much more liberal compared to ours. This encourages women to freely go to health facilities with a high technical level and qualified personnel able to offer them a safe abortion. The high complication rates in this study could also be explained by the fact that the two recruitment sites were referral hospitals, which generally receive the most serious cases from lower level health facilities, lacking sufficient human and material resources.

Some complications were observed only in the induced abortion group. Indeed, among the latter 7.1% developed pelviperitonitis complicating uterine perforation. These results are close to those found in the literature. In 2017 in Yaoundé, Kamga et al[8] found significantly more infectious complications (septic shock, peritonitis and post-abortal pelviperitonitis) in patients who had undergone abortion compared with those who had had spontaneous abortion (p < 0.001). Ishoso et al[14] in 2018 in Kinshasa reported that 6.5% of women who had induced abortion had developed post-abortal pelviperitonitis complicating uterine perforation. These results would reflect the risky practices that are used by the perpetrators of these abortions to manage unplanned pregnancies. The fact that the difference between the induced and spontaneous groups regarding these infectious and traumatic complications was not statistically significant in this study could be explained by the size of the sample and the study period, which were shorter compared to those in the literature.

**Therapeutic profile**

Induced abortion was twice as likely to require an urgent blood transfusion compared with spontaneous abortion (p = 0.030). Several authors found similar results to ours[7,11]. This could be explained by the fact that abortions induced by unskilled professionals are often complicated by placental retention or trophoblastic debris [8], and patients referred with a clinical picture of severe anemia, or even hypovolemic shock, requiring emergency blood transfusion.

The results of the study are consistent with those of the literature that many women, mostly young girls, use induced abortion as a “method of contraception” (birth control). The findings suggest that this phenomenon is perpetuated largely because of the neglect of Postabortion Care (PAC) by some health care providers and by women themselves. Indeed, among the participants

who had had an induced abortion, nearly one-third had not received family planning counseling and more than half (51.8%) had left the hospital without even choosing a contraceptive method. These results differ from those found by Madziyire et al[15] in Zimbabwe in 2016, who reported that 92% of their study participants had received family planning counseling and 43% of them had been put on modern contraceptives upon discharge from hospital. This difference could be explained by the fact that the majority (80%) of their patients were married compared to only 19.1% of married women in this study. Indeed, married women are generally more responsible and adhere better to family planning methods.

**Prognosis of abortion cases**

Although the majority of participants (86.9%) had a favorable clinical outcome within seven days of admission, there were two deaths among those who had induced abortions, with a case-fatality rate of 3.6% and no deaths in the spontaneous group. This difference was not statistically significant. Gayaux et al[11] found a significantly higher case fatality rate among abortion patients than among spontaneous abortion patients (abortion: 2.3%; spontaneous abortion: 0.4%; RR: 5.61; p = 0.001). This difference with our results could be explained by the relatively short duration of the study. Ymele et al[16] in 2018 in Yaoundé found similar results, with 2.6% of deaths among patients who have had an induced abortion. These relatively low death rates would only reflect the tip of the iceberg, given that four out of five women in need of abortion care do not go to formal health facilities[17]; and as a result, the proportions would be much higher, given the unsafe and insecure nature of the situation.

## CONCLUSION

Induced abortion, compared to spontaneous abortion, is the prerogative of adolescents. Abortion remains a major provider of maternal morbidity and mortality in the poor settings, where the unmet needs of contraception are high. We recommend a full implementation of post abortion care.

## COMPETING INTERESTS

The authors have no conflicts of interest to declare for this study.

## CORRESPONDING AUTHOR

Fouedjio Jeanne Hortence, MD, MPH
Faculty of Medicine and Biomedical Sciences, University of Yaounde
Email: fouedjiojeanne@yahoo.fr

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# IDENTIFYING THE PREDICTORS ASSOCIATED WITH TIME TO DISCONTINUATION OF INTRAUTERINE DEVICE AMONG WOMEN OF REPRODUCTIVE AGE AT ARBA MINCH TOWN AND ZURIA WOREDA, GAMO ZONE, SOUTHERN ETHIOPIA

Teshale Petros Kasika, MSc.[1], Markos Abiso Erango, Ph.D.,[1], Belay Belete Anjullo, MSc.[1], and Kabtamu Tolosie Gergiso, MSc.[1]

## ABSTRACT

**BACKGROUND:** Intrauterine device (IUD) is the world's most widely used long acting reversible birth control method. But, premature discontinuation of family planning remains common in many developing countries including Ethiopia. This study was aimed to assess predictors that influence the time to discontinuation of Intrauterine device among women who ever used IUD in Arba Minch Town and Zuria Woreda, Southern part of Ethiopia.

**METHODS:** A retrospective cohort study design was carried and stratified random sampling technique was used to determine sample of size 230 from a total population of 25,658 Women. The Kaplan-Meier estimation method was used to compare the survival experience of IUD discontinuation with respect to different covariates. Three parametric accelerated failure time models were compared by using Akaike information criterion (AIC) and Bayesian information criterion (BIC).

**RESULT:** Accelerated failure time model with Weibull distribution was found to be appropriate model to fit the data set. The results indicated that the baseline age group of the women's (25-35: HR= 1.266, P-value=0.0287; 36-49: HR= 1.770, P-value=0.0031), place of insertion (HR=0.192, P-value=0.006), HIV test (HR=0.731, P-value=0.004), income (HR=0.783, P-value=0.046) and educational level of women (HR=1.352, P-value=0.004) were significantly associated with time to discontinuation of IUD. Hence, illiterate women with low income and refused to test for HIV had higher hazard rate for time to discontinuation of IUD.

**CONCLUSION:** From these analyses we conclude that the covariates such as age, place of insertion, HIV test, income and education are associated with time to discontinuation of IUD in classical approach. So, we recommended that for all health care providers and responsible bodies these factors should be considered when planning and implementing IUD use to increase survival time of utilization. IUD insertion at health posts is not preferable and the performance of HIV test before the insertion of the device is recommended.

**KEYWORDS:** Intrauterine Device, Time to discontinuation, Accelerated failure time, Weibull distribution.

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1 Arba Minch University, College of Natural Sciences, Department of Statistics, Arba Minch, Ethiopia

## INTRODUCTION

Intrauterine device (IUD) is the world's most widely used method of reversible birth control. It is currently used by nearly 163 million women worldwide[1]. It is a flexible frame that fits inside the uterus to prevent pregnancy and the most frequently used reversible family planning method[2]. Copper IUD (TCU380A) is that the first sort of IUD that's claimed to be highly effective in preventing pregnancy, with protection lasting up to 12 years. It represents the most cost-effective reversible method[3].

Globally, approximately 13% of all women of reproductive age use the IUD, making it the second popular contraceptive. However, fears about side effects, concerns about infection and infertility, lack of technical training for providers, and therefore the time and costs involved in providing services combine to discourage use of IUDs in many countries. Some studies revealed that up to 80 percent of IUD users complain of increased menstrual bleeding and pain[4]. Beside its popularity usage is low in many developing countries with a majority of women choosing other method for birth control. Even though it's ideal in numerous ways, the history of its development reflects continual adaptations to attenuate the side effects that cause discontinuations, and to maximize both contraceptive and non-contraceptive health benefits. The IUD should play a greater role than it does today in parts of the world, and especially in sub-Saharan Africa, where fertility rates, unintended pregnancies, and unmet need for contraception are high[5]. Improving the quality of the use of contraceptives is one of the main objectives of family planning programs and the discontinuation rates of their use is one among the foremost important indicators of their quality.

The low rate of IUD usage in Africa 1% was a function of a number of factors. Lack of knowledge of IUD and pelvic inflammatory diseases were noted as major barriers to the use of this contraceptive among women in the southern African region[6]. In the African region utilization of long- acting family planning methods such as IUD and implants are very low as compared to the global figure. In sub-Saharan African countries the proportion of girl's currently using long acting is significantly less than the proportion of using short-acting methods. In many countries in the region, fewer than 5 percent of women who are using contraception are using long- acting methods i.e., 0.7% IUD and 1.1% Implant[7].

Maternal mortality is one of the major health problems in many less developed countries including Ethiopia. The majority of maternal deaths are the direct result of complications encountered during pregnancy and arising from unsafe terminations of pregnancies[8]. Worldwide, every day, approximately 830 women die from preventable causes related to pregnancy and childbirth. Nearly all these deaths occur in developing countries, due to unsafe abortions[9]. In different countries, a significant number of women become exposed to the risk of conception after discontinuation of IUD. Consequently, the majority of unintended pregnancies ended with abortion or miscarriage [10]. Despite the improvement in availability and utilization of IUD, discontinuation is becoming a major problem. From the available limited research, it was indicated that side effects and health concerns like irregular bleeding, lower abdominal pain, and vaginal discharge play an important role in discontinuation[11].

Premature discontinuation of family planning remains common in many developing countries including Ethiopia. Contraceptive discontinuation is common, occurring most often during the first 12 months of adoption of a method. Actual levels of discontinuation vary according to country. In Ethiopia, according to Ethiopian Demographic Health survey (EDHS) in 2016, all modern contraceptive methods discontinuation rate was 35% and among them IUD discontinuation rate within 12 months was just 13%[12,13]. Therefore, this study intended to assess the factors that are associated with time to discontinuation of IUD

among women of reproductive age group at Gamo Zone, in the case of Arba Minch Town and Zuria Woreda, Southern part of Ethiopia.

## METHODOLOGY

### Study Setting and Design

A retrospective cohort study design was carried by record review of mothers who have used IUD between September 2014 to December 2019 at Arba MinchTown and Zuria Woreda Public Health facilities, Gamo Zone, Southern part of Ethiopia. Health facility-based cohort study design using secondary data from the retrospective records of mother's who had used IUD was conducted based on data from the family planning registration books.

### Study Population

From the family planning unit, IUD removal records were retrieved and reviewed during the period of study. All women who had used their IUD between September 2014 to December 2019 were included while women those whose insertion date before September 2014, and after December 2019 was excluded.

### Sample Size Determination

In this study all mothers that follow-up their IUD was considered and stratified sampling technique was used to select the sample. During this method, stratification was based on the place of residence. So, that the whole heterogeneous population is spilt in to varity of homogeneous groups, usually referred to as strata, each of those groups is homogeneous within itself, then stratum or subgroup are chosen using simple random sampling because evidence is out there that they're associated with outcome. Sample size was computed by using formula for stratified sampling technique. A sample of size 230 women was used from a total of 25658 women's who were utilized IUD between a specified time.

### Variables in the Study

The outcome variable of this study was the survival time to discontinuation of IUD from September 2014 to December 2019.For Women who were using IUD at the cut-off date i.e., at December 2019 or removal of IUD at recommended time in the study period, the outcome was censored otherwise the outcome was an event. By event, we mean that discontinuation of IUD in the study period and censoring mean removal of IUD at recommended time in the study period or using IUD at the cut-off date i.e., at December 2019. Predictors variables that are considered in this study are: age group of women, place of insertion, status of HIV test, HIV test result, place of residence, experience of utilization of IUD, income level of women and educational status of women.

### Data Collection Methods

Data relating to the most important variables was collected from selected records of mothers who have used IUD from family planning removal registration books in Public Health facilities in Gamo Zone Arba Minch Town and Zuria woreda between September 2014 to December 2019.

### Data Quality Control

The data was collected and checked for completeness and consistency. The validity of data relating to the most important variables collected from all selected records of mothers who have used IUD from family planning registration book was checked and also mothers who would have incomplete records and who was used IUD but whose record lack the insertion and/or removal data was checked. Arrangement made to enter data after each day field work was complete.

### Data Processing and Analysis

Survival analysis is the analysis of time-to-event data. Such data describe the length of time from a time origin to an endpoint of interest. Survival analysis methods are usually used to analyze data when major interest is time to occurrence of an event. Such event may be death, recovery, employment, marriage and so on. However, not all individuals could have experienced the event of interest before end of study, implying that real time of event is not available for some individuals, this is called censoring. Survival models fall into parametric, non-parametric and semi-parametric schools of thought[14,15]. The differences in the classes of models lie mainly in assumptions made regarding

the distribution of the survival time[16]. Hence, in this study descriptive analysis, Kaplan Meier estimator which readily comes to mind when discussing nonparametric approach and accelerated failure time parametric survival models under Weibull, lognormal and log-logistic statistical distributions were used to identify the factors associated with time to discontinuation of intrauterine device among women of reproductive age at Gamo Zone, Arbaminch town and zuria Woreda, Southern part of Ethiopia. To select the appropriate parametric family of model for time to discontinuation of IUD, Akaike information criterion (AIC) and Bayesian information criterion (BIC) are employed as model comparison criterion[17,18].

**Ethical Consideration**

After thorough revision of the thesis by Arba Minch University Ethical review board, Ethical clearance was obtained. Official letter was written to Arba Minch Town Administration and Zuria district health office and respective Keble public health services administration. Public health is going to be informed the advantage of the study and therefore the time it will deem obtaining data and the information was kept anonymously and confidentially.

## RESULTS

**Descriptive Analysis**

From a total 230 sample of women considered, 84(36.5%) were in the age group 15-25 years who experienced events of interest, i.e., discontinued using IUD in a study period, i.e., between September 2014 to December 2019while the remaining 6(2.6%) were censored. The majority of the discontinuation were observed at the age group of 26-35 years,i.e., 97(42.2%) were discontinued using IUD in a study period whereas 16(7%) were censored. Regarding place of insertion 38(16.5%) were inserted IUD at Hospital who are discontinued using IUD in a study period and 8(3.5%) women were censored, i.e., removed IUD at recommended time within the study period or found using IUD at the cut-off date i.e., at December 2019. The majority of discontinuation, 136(59.12%) were observed among those who were inserted at health center, 20(8.7%) were censored, i.e., were removed IUD at recommended time within the study period or found using IUD at the cut-off date i.e., at December 2019.

**Table 1: Descriptive summary of different categories of predictors by time to discontinuation of IUD IUD among women of reproductive age group at Gamo Zone, in the case of Arba Minch Town and Zuria Woreda, Southern part of Ethiopia during study time.**

| Predictors | Category | Survival status | |
|---|---|---|---|
| | | Event (%) | Censored (%) |
| **Age group** | 15-25 | 84(36.5%) | 6(2.6%) |
| | 25-35 | 97(42.2%) | 16(7%) |
| | 36-49 | 20(8.6%) | 7(3.03%) |
| **Place of insertion** | Hospital | 38(16.5%) | 8(3.5%) |
| | Health center | 136(59.12%) | 20(8.7%) |
| | Health post | 27(11.74%) | 1(0.43%) |
| **Status of HIV test** | Performed | 77(33.5%) | 13(5.7%) |
| | Refused | 124(53.92%) | 16(7%) |
| **Place of residence** | Rural | 112(48.7%) | 9(3.9%) |
| | Urban | 89(38.7%) | 20(8.7%) |
| **Experience of utilization of IUD** | Yes | 26(11.33%) | 2(0.9%) |
| | No | 175(76.1%) | 27(11.7%) |
| **Income of women** | Low | 136(59.14%) | 25(10.9%) |
| | Medium | 46(20.01%) | 3(1.3%) |
| | High | 19(8.3%) | 1(0.4%) |
| **Educational level of women** | Literate | 106(46.1%) | 9(3.9%) |
| | Illiterate | 95(41.3%) | 20(8.7%) |

Regarding to place of residence, 112(48.7%) women were from rural who were experienced event, i.e., discontinued using IUD in a study period, i.e., between September 2014 to December 2019 while 9(3.9%) were censored. 89(38.7%) of women were from urban area who were discontinued using IUD in a study period, i.e., between September 2014 to December 2019while 20(8.7%) were censored. Hence, it appeared that proportion of discontinuation of IUD was higher in a rural than the urban (see Table 1).

Among 230 women, 201(87.4%) were discontinued using IUD in a study period, i.e., between September 2014 to December 2019 while the remaining 29(12.6%) were censored i.e., removed IUD at recommended time within the study period or found using IUD at the cut-off date i.e., at December 2019.

Furthermore, K-M estimator survival curve which gives the estimate of survivor function among different groups of covariates was used to describe time to discontinuation of IUD as depicted below:

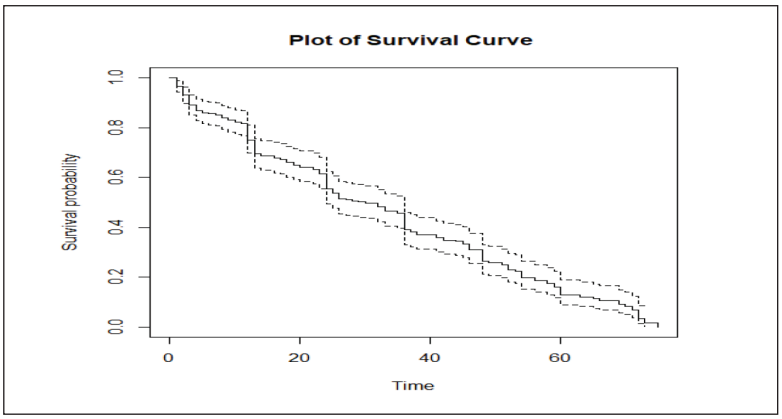


**Figure 1:Kaplan Meir survival curve for time to discontinuation of IUD**

In general survival probability of time to discontinuation of IUD appeared decrease with increase in follow up time (see Figure 1).When comparing survival probability of time to discontinuation of IUD by subgroups of covariates, women's who reside in rural area seems to have low survival probability of time to discontinuation of IUD than the women who reside in urban area (see Figure 2). Moreover, it appeared that illiterate women had higher survival probability of time to discontinuation of IUD than women with literate educational status (see Figure 3).

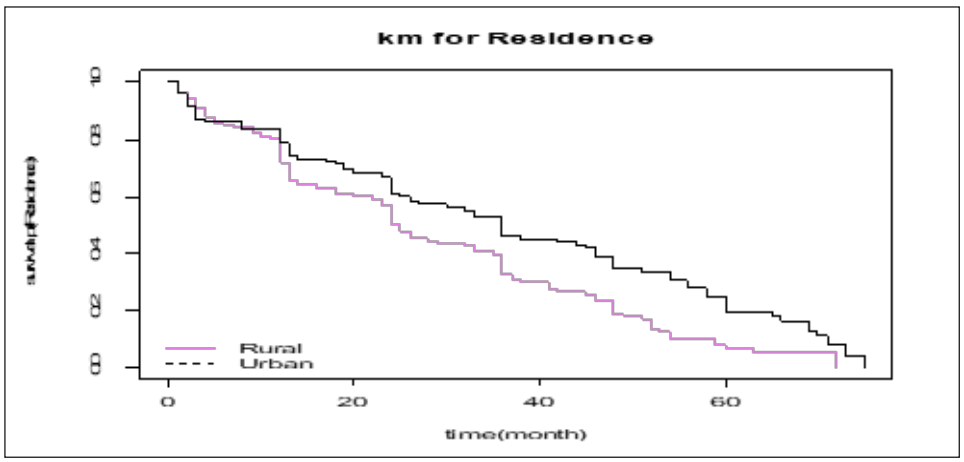


**Figure 2:Kaplan Meir survival curve for time to discontinuation of IUD by place of residence**

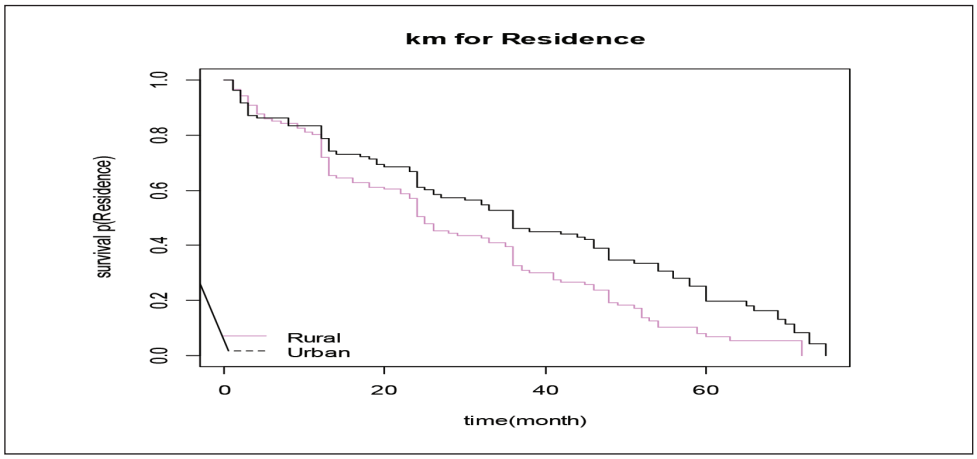


**Figure 3: Kaplan Meir survival curve for time to discontinuation of IUD by educational level of women.**

### Accelerated Failure Time Analysis

Multivariable analysis of several key covariates that affect the survival time to discontinuation of IUD is vital to ascertain cumulative effect on survival of the women. Accelerated failure time models are parametric models that the basis to avoid having to specify the hazard function completely. However, there may be settings in which the distribution of the survival time is in specific parametric distribution that justifies the use of a fully parametric model to better address the goal of the analysis.

We applied three parametric models namely Weibull, Lognormal and Log-logistic models as a parametric distribution model of survival time. That is, we assume that the survival time for the ith subject follows either the Weibull, lognormal or log-logistic distribution.

**Table 2: The values AIC and BIC for model comparison of time to discontinuation of IUD IUD among women of reproductive age group at Gamo Zone, in the case of Arba Minch Town and Zuria Woreda, Southern part of Ethiopia during study time**

| Comparison criterion | Models | | |
|---|---|---|---|
| | AFT under Weibull | AFT under Loglogistic | AFT under Lognormal |
| AIC | 1710.6 | 1750.8 | 1761 |
| BIC | 1715.3 | 1755.5 | 1765.7 |

Accelerated failure time models under three parametric distributions namely Weibull, Lognormal and Log-logistic were fitted and compared by using Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC). Hence, accelerated failure time(AFT) model under Weibull distribution has smaller AIC and BIC indicating Weibull AFT model is a better model fit data on time to discontinuation IUD (see Table 2).

**Table 3: Accelerated failure time Weibull regression model parameter estimates of time to discontinuation of IUD IUD among women of reproductive age group at Gamo Zone, in the case of Arba Minch Town and Zuria Woreda, Southern part of Ethiopia during study time**

| Predictors | Categories | β | S.E(β) | HR=exp(β) | p-values |
|---|---|---|---|---|---|
| **Age group** | 15-25(ref) | | | | |
| | 25-35 | 0.236 | 0.1080 | 1.266 | 0.0287* |
| | 36-49 | 0.571 | 0.1930 | 1.770 | 0.0031* |
| **Place of insertion** | Hospital(ref) | | | | |
| | Health center | -0.229 | 0.135 | 0.795 | 0.090 |
| | Health post | -0.521 | 0.1920 | 0.593 | 0.006* |
| **Reason for removal** | Recommended time(ref) | | | | |
| | Side effect | -13.941 | 2211.0933 | 8.821 | 0.995 |
| | Want to pregnant | -13.764 | 2211.0933 | 1.052 | 0.995 |
| | Misconception | -15.021 | 2211.0933 | 2.995 | 0.994 |
| | Yes(ref) | | | | |
| **Status of HIV test** | No | -0.312 | 0.1084 | 0.731 | 0.004* |
| **Income level of women** | Low(ref) | | | | |
| | Medium | -0.244 | 0.1230 | 0.783 | 0.046* |
| | High | -0.178 | 0.1832 | 0.836 | 0.329 |
| **Educational level** | Literate(ref) | | | | |
| **of women** | Illiterate | 0.302 | 0.1035 | 1.352 | 0.004* |

Note:β is estimated parameters, S.E(β) represent standard error of estimated parameters, HR=exp(β) represent hazard rate, * represent significant p-values at 5% and ref denotes reference category.

Table 3 presents the estimates (estimated parameters, standard error of estimated parameters, hazard rate (HR) and p-values) from accelerated failure time Weibull regression model. Among the potential independent variables explored, educational status of mothers, age of women, income status of women, place of insertion and status of HIV test were statistically significant factors that are associated with time to discontinuation of IUD at 5% level of significance. Thus, when all the other predictor variables are controlled, the hazard rate of the women's whose age group is 36-49 years was higher discontinuation of IUD (HR=1.770) than women's whose age group is 15-25 years. The hazard rate of women's whose place of insertion is at health post was higher discontinuation of IUD(HR=0.593) than women's whose place of insertion place is Hospital, this implies that those women whose place of insertion was at hospital had better probability of utilization of IUD than those inserted at health post.

Likewise, Women's who had not tested for HIV had higher discontinuation of IUD (HR=0.731) than women's who had tested for HIV. Regarding income level of women, the hazard rate of women's whose income level was medium was higher discontinuation of IUD (HR=0.783) than women's whose income level was low. Regarding educational level, women's who were illiterate had higher discontinuation of IUD (HR =1.352) than women's who were literate, this showed that literate women had less discontinuation rate than that of illiterate (Table 3).

## DISCUSSION

The aim of this study was to assess the factors that associated with time to discontinuation of IUD among women of reproductive age the case of Arba Minch Town and Arba Minch Zuria Woreda, Gamo Zone Southern part of Ethiopia. The factors where age, place of insertion, HIV test, income and educational status were significantly associated with discontinuation.

The findings in our study are close to the earlier findings of reasons for discontinuation of intrauterine device in three provinces of Pakistan: a result of a 24-month prospective client follow-up regards to the association between age 36-49 years and education (illiterate) has significant effect on discontinuation of IUD. But it contradicts with findings on factors associated with IUD use among reproductive age women in Addis Ababa[20]. This study result was similar with findings conducted in Pakistan[4] that revealed age of the women had significant association with discontinued of IUD. But contradict with level of income that it revealed low level of income has statistically significant while in this finding medium level of income has statistically significant[19].

This study result was similar with findings conducted in Indian regarding of educational level of the women's discontinuation rate highest found in illiterate women and therefore the lowest among literate[1]. There were statistically significant difference regards to level of education and specific counseling with earlier studies of IUD Survival and its Determinants; a Historical Cohort Study in Iran. But it had similar with this finding regards to age[21]. As regards reasons for removal, age and level of education there was no statistically significant difference with found in Bahir Dar, Ethiopia[22]. But contradict with this finding in level of income and place of residence was statistically significant. The finding of Contraceptive use and discontinuation among women in rural North-West Tanzania were agree with this finding in HIV test results and age of the client which revealed that there is no significant difference in the use of contraception method[23].

Hence, from empirical results it can be concluded the age of women, place of insertion, status of HIV test, place of residence, income level of women and educational level of women are statistically significant factors that are associated with time to discontinuation of IUD in the study area. From these analyses we conclude that the covariates such as age, place of insertion, HIV test, income and education are associated with time to discontinuation of IUD in classical approach. So, we recommended that for all health care providers and the responsible bodies should be considered when planning and implementing against women's who utilize IUD to increase survival time of utilization, awareness creation for long-acting contraception method especially IUD should not preferable for health post and the performance of HIV test before the insertion of the device should be important.

## DECLARATIONS

### Limitation of the study

This is an examined factor that influence the utilization of IUD among women of reproductive age the case of Arbaminch Town and Arbaminch Zuria Woreda Gamo Zone users. Taking into account its results cannot be generalized to all health facilities in the mentioned zone that offer IUD services. However, they provided insight into factors that could influence the use of IUD.

The study faced a number of limitations regarding to explanatory variables as it intended on secondary data some potential variables with no record data had ignored from the study. And it does not include primary data related effect on discontinuation of IUD.

### Acknowledgements

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**Availability of data and materials**

The dataset supporting conclusions of this article is available by contacting authors.

**Disclaimers**

The authors are solely responsible for the research and the findings do not represent the opinions or endorsement of any of the funders.

**Authors' Contributions**

TPK designed the study and analyzed the data. BBA KTG and MAE drafted the manuscript and critically reviewed the article. All authors read and approved the final manuscript.

**Ethical Considerations**

The study was carried out after getting permission from the ethical clearance committee of College of Natural Sciences, Arba Minch University. After Ethical clearance and approval of the University Ethical Committee and up on the permission of local government administration bodies of the town, the actual research activities was undertaken in the study area.

**Competing Interests**

The authors declare that they have no competing interests.

**Consent for publication**

Not applicable

**CORRESPONDING AUTHOR**

Kabtamu Tolosie Gergiso
Arba Minch University, College of Natural Sciences,
Department of Statistics, Arba Minch,
Ethiopia
E-mail: kabtamuto@gmail.com

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# PERCEPTION AND EXPERIENCE OF POST-PARTUM WOMEN TOWARDS BIRTH COMPANIONS: FACILITY-BASED STUDY IN A TERTIARY HOSPITAL AND ITS CATCHMENT HEALTH CENTERS IN ADDIS ABABA, ETHIOPIA

Kidist Gizachew, MD, MPH[1], Tewodros Getinet, BSc, MSc.[2], Delayehu Bekele, MD, MPH[1]

## ABSTRACT

**INTRODUCTION:** Birth companion refers to a person who provides support to laboring women during childbirth. Various studies have shown the benefits of birth companions. The objective of this study was to assess the attitude of mothers towards the involvement of birth companions during childbirth at St. Paul's Hospital Millennium Medical College (SPHMMC) and its selected catchment health centers.

**METHODOLOGY:** The study used a cross-sectional study to determine the perception of postpartum mothers on the involvement of birth companions during childbirth.

**RESULT:** The study included a total of 393 postpartum women. The finding from the study showed that although the majority (72.3 %) women has a positive attitude towards birth companions almost all (98.7%) were not allowed to have companions during labor. Among postpartum women, 27.7% have a negative attitude towards the involvement of birth companions. The commonest reasons mentioned by post-partum women for having a negative attitude toward this included need for privacy, religious values, and fear of overburdening family members with stress.

**CONCLUSION:** The findings from this study showed that most women were declined the option of having a birth companion despite their desire to have one. There could be several reasons for this low practice of birth companionship, hence barrier analysis and a mitigation plan based on that is recommended. The study has also shown the desire to have a birth companion isn't universal among laboring women in our setup. There is a need to understand the socio-cultural values of the individual woman before embarking on complete implementation of the involvement of birth companions.

**KEYWORDS:** Birth companions, post-partum women, Ethiopia

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1 Department of Obstetrics and Gynecology, School of medicine, St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia

2 Department of Biostatistics, School of Public health, St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia

## INTRODUCTION

The commitment to decrease maternal mortality and morbidity has initially focused on increasing the availability of, and access to, facility-based childbirth. And with the increasing access to health care facilities, there has been a shift towards increasing quality of care.

Quality of care is defined by WHO as both provision of technically competent care (use of evidence-based practices for the routine care and management of complications, as well as actionable health management information systems and functional referral systems) and enhancement of women's experience of care (informative and comprehensible communications, care delivered with respect for women's dignity, choices and their autonomy in decision-making, and the availability of social, emotional and practical support)[1].

In line with WHOs recommendations the Ethiopian Growth and Transformation Plan, a national five-year development plan, has put expanding access and ensuring the quality of health services as one of its objectives[2]. Birth companion has been mentioned by WHO as one of the most cost-effective methods to ensure the quality of care and increase a positive childbirth experience[3].

A positive childbirth experience is one that fulfills or exceeds a woman's prior personal and socio-cultural beliefs and expectations. This positive childbirth experience principally constitutes giving birth to a healthy baby in a clinically and psychologically safe environment with continuity of practical and emotional support from a birth companion(s) and kind, technically competent clinical staff[3].

A birth companion refers to a person who provides support to laboring women during childbirth. This support system was an integral part of the traditional delivery process. It is neglected with the medicalization of the labor process since its importance was not appreciated, hence laboring women's access to such a traditional support system was restricted. But evidence show that the involvement of birth companions has multifaceted benefits.

Various randomized controlled trials have shown that the involvement of a birth companion is associated with better maternal and neonatal outcomes. A Cochrane qualitative synthesis has shown birth companions provide informational support, emotional support, and practical support, and companions act as advocates to laboring women[4].

Implementation of the practice of involving birth companions is affected by the allocation of resources, organization of care, facility-related constraints, and cultural inclinations[5]. The trend of routine involvement of birth companions should be preceded by studies that assess women's perception of this practice.

Though there are studies done in our setup to assess the level of respectful and compassionate care in health facilities, most of these studies didn't assess the extent of involvement of birth companions. They also didn't mention the mother's preference with regard to this practice[6,7].This study was done to bridge this gap.

Therefore, our objectives for this study were to find out the attitude of postpartum women who delivered at SPHMMC and its selected catchment health on the involvement of birth companions. The study also sought to determine the prevailing practice regarding birth companions' involvement in labor wards of SPHMMC and its selected catchment health centers.

### Methods

#### Study area and period

The study was conducted at SPHMMC and its catchment health centers in Addis Ababa. The hospital, which serves as a reference health establishment provides delivery service to over 10,000 mothers in a year. On average, the number of monthly deliveries stands at about 1000. This figure does not include deliveries in the 16 catchment health centers. These centers have a well-organized referral and feedback system with the hospital.

This study targeted postpartum women who delivered in these facilities. The study was conducted from September to December 2019.

**Study design**

The study used a cross-sectional study design to assess the perception of the women towards the involvement of birth companions.

**Study population**

The study population of this study is post-partum women, who delivered in the selected health facilities from September to November 2019.

**Sample size and sampling method**

The study included a sample size of 393 post-partum women who delivered in the selected health care establishments. The sample size is determined using the formula for cross-sectional study design.

The study subjects were sub-divided between the referral hospital i.e. SPHMMC, and its selected catchment health centers proportionally based on the number of patients the facilities serve.

Where: N= the desired sample size

Z= standard deviation at the required confidence level

p = proportion of post-partum women who accept the involvement of birth companions

q = 1-p

d = desired level of precision i.e., margin of error

g = design effect

A proportion of 58 % is taken from a similar study that was conducted in Ghana which showed that 58 % of the women preferred to have a lay companion during facility-based labor and delivery[8].

Thus $N = \frac{1.96^2 * 0.58 * 0.42}{0.05^2}$

Working out of the above equation and adding a 5 % non-response rate, set the sample size to 393 respondents.

The study was conducted in SPHMMC and three of its catchment health centers. There are 16 catchment health centers that have linkage to SPHMMC. Among this three were chosen randomly. The selected health centers are Kolfe, Lukanda, and Mikililand health centers. The number of post-partum women selected from each center was assigned proportionally to the number of deliveries per month these institutions have. All women who delivered in these facilities were included until the allocated sample size was reached.

Those women who are clinically unstable during the data collection and those that delivered via cesarean section were excluded from the study.

The pretest was conducted on 10 % of the above sample, i.e. 39 mothers who gave birth at Ras Desta hospital and health professionals on duty in the same hospital from 1-15 October 2019.

**Data collection**

Data on the ongoing practice and on the preference of women with regard to the involvement of birth companions at the facilities was collected using exit interviews with women who delivered at the selected health facilities. Trained enumerators who are not involved in labor ward activities collected the desired data and information.

**Data quality control**

To ensure the quality of the collected data prior orientation or training on data collection methodologies and close supervision throughout data collection was carried out by the principal investigator. Data was also assessed for completeness and accuracy before entry into Epidata.

**Data analysis**

Once the data gathering is completed, it was then entered into Epidata and cleaned and analyzed using SPSS Version 20.0. Determination of the frequency of the socio-demographic factors and practice with regard to the involvement of birth companions was conducted.

**Ethical consideration**

Ethical approval was secured from the ethical review board of SPHMMC before the start of the study. A support letter was prepared and submitted to heads of selected health centers. Prior to the collection of the study data, consent was obtained from study participants. Study participants were not required to mention their names and participation in the study is on a volunteer basis.

**Operational definition**

Birth companion is an adult male or female, selected by a pregnant woman, who provides her

with continuous physical and emotional support throughout labour and birth.

**Results**

**Socio-demographic characteristics of study participants**

This study was undertaken in SPHMMC and selected three catchment health centers and the data were collected from November to December 2019 GC. SPHMMC had a total of 982 deliveries in the study period. Of these deliveries, 71% were in the labor ward and the rest were at the emergency obstetrics out patient department. And 95.2 % of the deliveries were singleton deliveries.

During the study period, the labor ward team included obstetrics and gynecology consultants, seven residents, six midwives, and three interns. There was also a duty team with a comparable number of residents, midwives, and interns.

Among the health centers, Kolfe health center has the largest number of deliveries in the study period. At this health center, the total number of deliveries was 170.

To give a brief overview of the health facilities that were included in the study SPHMMC had the largest space. During the study period, the hospital had a total of 4 active labor beds and 8 second-stage couches which are classified among 12 rooms. But due to lack of space, the laboring mothers were placed randomly on the available bed i.e those in the active first stage of labor can be kept in second stage couches and vice versa. Postpartum mothers were also left in the place they delivered for hours. The labor ward has curtains on one of the rooms but the other rooms had broken hangers and bent screens which exposes the rooms to passersby. (Currently, the labor ward is moved to a new building that accommodates a similar number of patients with two patients in each room and absent screens).

The health centers have two separate rooms that separately accommodate women in the first stage of labor and those in the second stage. They have semi-functional screens that can be used for women in either room.

The study included a total of 393 post-partum women. Of these, the majority 305 (77.6%) were from SPHMMC. The rest were from three health centers namely Kolfe, Lukanda, and Mikililand health centers. These were selected using random sampling from 16 assigned under SPHMMC.

The mean age in years of post-partum women is 27 years. The majority of the post-partum women i.e. 92.4% are married and the majority of study participants have primary school-level education. (Table 1)

**Table 1: Socio-demographic characteristics of post-partum women included in the study**

| | | Total number | Percentage |
|---|---|---|---|
| **Marital Status of women** | Married | 363 | 92.4 |
| | Single | 25 | 6.4 |
| | Widowed | 3 | 0.8 |
| | Divorced | 2 | 0.5 |
| **Religion** | Orthodox Christian | 171 | 43.5 |
| | Islam | 120 | 30.5 |
| | Protestant | 100 | 25.4 |
| | Catholic | 2 | 0.5 |
| **Level of education** | No formal education | 45 | 11.5 |
| | Primary school | 247 | 62.8 |
| | Secondary school | 58 | 14.8 |
| | Tertiary school | 31 | 7.9 |
| | Advanced degree | 8 | 2 |
| | Missing | 4 | 0.01 |

With regards to the income of the post-partum women included in the study, the maximum yearly income was 600,000 Ethiopian birr per year with a mean of 36,752 birr. The missing values on this variable were 29.

**Knowledge, Attitude, and Prevailing practice with regards to birth companions**

Among the post-partum women included in the study 72.3 % has a positive attitude towards birth companions while 27.7 % have a negative attitude. (Table 2)

**Table 2: Post-partum women's opinion on routine involvement of birth companions**

| Attitude on routine involvement of birth companions | | Positive attitude | | Negative attitude | |
|---|---|---|---|---|---|
| **Age** | under 18 | 5 | 1.2% | 2 | 0.5% |
| | 18 to 24 | 72 | 25.4% | 22 | 5.5% |
| | 25 to 30 | 158 | 55.6% | 50 | 12.7% |
| | 31 to 35 | 39 | 13.7% | 25 | 6.4% |
| | 36 to 40 | 8 | 2.8% | 8 | 2.8% |
| | above 40 | 2 | 0.7% | 2 | 0.7% |
| | Total | 284 | 72.3% | 109 | 27.7% |
| Religion | Orthodox Christian | 118 | 30 % | 53 | 13.5% |
| | Protestant | 80 | 20.4 % | 20 | 0.5% |
| | Catholic | 1 | 0.3% | 1 | 0.3%. |
| | Islam | 85 | 21.6% | 35 | 8.9% |
| | Total | 284 | 72.3% | 109 | 27.7% |
| Marital Status | Married | 270 | 68.7% | 93 | 23.7% |
| | Single | 9 | 9.7% | 16 | 4% |
| | Widowed | 3 | 0.8% | 0 | - |
| | Divorced | 2 | 0.5% | 0 | - |
| | Total | 284 | 72.3% | 109 | 27.7% |
| Level of education | No formal education | 30 | 7.6% | 15 | 3.8% |
| | Primary school | 172 | 43.8% | 75 | 19% |
| | Secondary school | 49 | 12.5% | 9 | 2.3% |
| | Tertiary school | 23 | 5.8% | 8 | 2% |
| | Advanced degree | 7 | 1.9% | 1 | 0.2% |
| | Total | 281 | 71.5% | 108 | 27.5% |
| Number of children | < 2 204 | 51.9% | 67 | 17% | |
| | 3-6 79 | 20.1% | 42 | 10.7% | |
| | >6 1 | 0.3% | 0 | - | |
| | Total | 284 | 72.3% | 109 | 27.7% |

Although most of the women were in favor of having a birth companion almost all of the post-partum women (98.7%) were not allowed to have companions during labor and during their stay at labor wards. There were only five women who were allowed to have a birth companion accompany them during labor. Among these women, three were accompanied by their husbands, one by her mother and the other by her friend. Three of these women were staff of the hospital, and it was mentioned as the reason they were allowed to have companions.

Though less than 2 % of post-partum women were allowed to have companions, open-ended questions asked to post-partum women showed that the majority of the women, 39.7 %, would have preferred their husbands to accompany them during labor. (Table 3) The majority of the women who preferred their husbands to accompany them during labor said they want him to share the pain. One of the women explained that "he should know

and understand the pain and suffering I am going through, and he should understand what it takes to get a child''. The other explanation given by post-partum women for preferring their husbands is that he is the only person with them, they love him so much and he is the only person who can see them exposed. One post-partum mother explained by saying "I am a Muslim and according to my religion he is the only person who is allowed to see me exposed".

**Table 3: Preferred labor companion by post-partum women involved in the study**

| Preferred companion | Frequency | Percent |
|---|---|---|
| **Husband** | 156 | 39.7 |
| **Mother** | 55 | 14 |
| **Sister** | 35 | 8.9 |
| **Mother-in-law** | 9 | 2.3 |
| **Friend** | 7 | 1.8 |
| **A lay woman who provides support throughout labor** | 17 | 4.3 |
| **Other** | 7 | 1.8 |
| **Total** | 286 | 72.8 |

Those post-partum women who preferred their mothers or mothers-in-laws to accompany them during labor mentioned reasons such as they have been through labor already and that they will understand and help them better than others. Among those women who preferred their sisters, sisters-in-laws, or friends to accompany them they explained that they are comfortable around them and they could ask them what they want.

There were also women who preferred lay women to accompany them and the reason was they didn't want to stress their family members and these women might be able to help them similarly to health professionals.

Post-partum women who didn't want birth companions mentioned reasons such as the need for privacy, religious restrictions, worry about overburdening their family with stress, worsening the already crowded environment, and desire to go through the pain alone. According to one woman "The place is filled with people, I don't want to add my family into this besides, I don't think other than health professionals' others will help me."

## DISCUSSION

A Cochrane systematic review has clearly showed that women who had continuous intrapartum support were less likely to have intrapartum analgesia, operative birth, or have dissatisfaction with their childbirth experiences[4]. The benefit of birth companions was also emphasized by WHO[9]. Bowser and Hill have identified seven categories of disrespect and abuse during childbirth which includes abandonment of care and women being left alone during labor and birth[10].

Despite these findings which strongly support birth companionship our study showed that almost all women were denied the opportunity of being accompanied by a companion of their choice. This constitutes one aspect of abusive care during childbirth. The fact that, of the few women who were given this service, majority were working in the institution shows there is discrimination based on specific patient attributes[6, 10].

There could be many reasons mentioned as barriers to the provision of birth companion ship which might have also contributed to the very low practice in our study[12, 13]. These include health care providers concern about the role of the companion and possible interference with activities in the labor

ward, allocation of resources, organization of care, facility-related constraints and cultural inclinations. Further detailed exploration of the specific reasons for the low utilization of birth companion ship in the set up should be done and plans to mitigate the barriers should be implemented.

Though our finding show that majority of our women want a birth companion, studies done in developing countries show that there is a need to anticipate difficulties with its implementation. A study done in Malawi has shown uneducated birth attendants weren't able to provide proper care. The study has also shown the need to enlighten women on purpose of birth companions unlike the midwives[11].

Our study has showed that 27.3 % of the post-partum women has negative attitude towards birth companions. The reasons mentioned includes need for privacy, religious restrictions, stress about overburdening their family with stress, worsening the already crowded environment and desire to go through the pain alone. A mixed method study done among pregnant women attending ANC in Ghana on preference of women on the involvement of birth companions has also shown that the general belief all women want companions is disputable[8]. In another study done in Debre Markos Ethiopia it was only 57.45% of the pregnant women who expressed desire to have birth companion in labor[14]. The finding from our and these additional studies signify the importance of having an individualized assessment to understand the underlying cultural and religious belief of the woman before embarking upon universal implementation of birth companions.

**Conclusion and Recommendation**

The findings from our study showed that labor companions are not part of the routine practice in SPHMMC and its catchment health centers. Contrary to the existing practice majority of the women want their partners or family members of their choice to accompany them. There could be several reasons for this low practice of birth companionship, hence barrier analysis and a mitigation plan based on that is recommended. The reason mentioned by the few postpartum woman who had negative attitudes towards birth companions is the fear of exposure in front of others. The presence of women who disapprove of this practice points to the necessity of closer look of the underlying cultural and religious belief of the society before embarking upon universal implementation of the routine involvement of birth companions.

**List of Abbreviations**

ANC- Antenatal care
ETB- Ethiopian Birr
SPHMMC- St. Paul's Hospital Millennium Medical College
WHO- World Health Organization

**Conflict of interest**

The authors have no declaration of conflict of interest.

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**CORRESPONDING AUTHOR**

Kidist Gizachew- MD, MPH
Department of Obstetrics and Gynecology, School of medicine, St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia
Email: tadelemmakidist@gmail.com

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# POSTPARTUM MODERN CONTRACEPTIVE UTILIZATION IN ADDIS ABABA: ANTEPARTUM DECIDEDNESS FOR POSTPARTUM UPTAKE

Abdu Mengesha, MD[1], Eskinder Kebede, MD[1]

## ABSTRACT

**INTRODUCTION:** Family planning (FP) slows population growth and helps achieve national and international development goals. Family Planning counseling is the first intervention in family planning programs and can be done during late pregnancy. Antepartum FP counseling is not practiced adequately during the antenatal care (ANC) service delivery at which time women can decide to use Post-Partum Modern Contraceptive (PPMC). Women's antenatal decidedness rate to use PPMC is not known.

**OBJECTIVE:** To assess the prevalence of antenatal decidedness to use PPMC among pregnant women in Addis Ababa city.

**METHODS:** A cross-sectional study was conducted from January 10, 2020 to February 8, 2020 GC on a population of women who had their fourth ANC visits in 98 health centers in Addis Ababa. The calculated sample size was 422 and the sampling procedure was made in 2 stages: Cluster Sampling and Simple Random Sampling. Study subjects were enrolled in a continuous all-inclusive manner starting from the first woman who came on her scheduled 4th ANC visit on day one of the study period until the total number of study subjects was obtained. A semi-structured, anonymous, self-prepared and pre-tested questionnaire was used to collect data; and data collection was as an exit interview. Data was entered and analyzed using SPSS version 25 software.

**RESULTS:** During the routine ANC follow up only 153 (36.9%) women received FP counseling, while 262 (63.1%) women received the antenatal FP counseling from the study team. Three hundred eighteen (76.6%) have antenatally decided to use PPMC. The rate of antenatal decidedness to use PPMC was higher for those who had FP counseling by the study team compared to those counseled during the routine ANC follow up (77.9% Vs 74.5%). Religion, the round of ANC visit the FP counseling was given, and the number of topics covered during the FP counseling were found to be determining factors for women's antenatal decidedness to use PPMC.

**CONCLUSION:** The FP counseling service delivery rate during the routine ANC service is low. Women will decide to use PPMC antenatally if they get a FP planning counseling conducted during the ANC follow up. The FP counseling should include 4 major topics (available types, efficacy, advantages and disadvantages, and side effects of each method), and an adequate duration should be allocated for it. Further study to find out why ANC care providers at health centers are not providing FP counseling service to all of their clients is recommended.

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1 Department of Obstetrics and Gynecology, School of Medicine, CHS, Addis Ababa University, Addis Ababa

## INTRODUCTION

Family Planning is a way of deciding how many children a woman chooses to have and when to have them. It is worth investing on family planning for it has the potential to reduce 32% of maternal deaths and 10% of newborn, infant & child deaths. Family Planning slows population growth contributing towards significantly reducing poverty and hunger; and helps to achieve national and international development goals[1].

Components of intervention in FP program consists of having an enabling policy to increase access to contraceptive methods including expanding method choice; ensuring availability of and access to contraceptive supplies, defining and implementing strategies to eliminate unmet need for family planning, health systems strengthening, and education and counseling for informed contraception decision making[1].

Family Planning counseling is the first intervention in FP programs aimed at supporting a woman and her partner in choosing the method of family planning that best suits them. It can be done during late pregnancy, after delivery and after an abortion. The Ethiopian national guideline of family planning has noted that FP counseling should be part of focused ANC services[2, 3].

Antenatal FP counseling is not practiced adequately which definitely contributes to a low PPMC uptake. In Ethiopia, there are no sufficient studies conducted to see the effect of routine antepartum FP counseling on women's antepartum decidedness to use PPMC[4].

According to the 2016 Ethiopian Demographic and Health Survey (EDHS), the decision making to use a FP method by women is made by the wife, the husband and jointly in 22%, 5% and 73% respectively[5].

In a study done in Durame town of Southern Ethiopia, the prevalence of Long Acting Reversible Contraceptive (LARC) method use among mothers during their extended postpartum period was 36.7% (95%CI: 32.2, 41.0) and the unmet FP need was 27.9%[6]. A study done in Shone town of Hadiya zone of Southern Ethiopia showed an overall LARC method use of 29.2%[7] again showing the low uptake of FP methods.

In a study done in Axum, Tigray showed that FP coun¬seling during pregnancy is one of the independent variables among the most important determinants of PPMC use,[8]. This determinant factor was also identified in another study done in Ethiopia[3, 7] as well as studies done in a county hospital in rural Kenya and in Malawi[9, 10].

A study done in Masindi and Kiryandongo districts in Uganda concluded that, antenatal FP counseling didn't affect postpartum contraceptive use among immediate postpartum mothers[11]. But in a study done in Bahir Dar city, Northwest Ethiopia, 22.7% of pregnant women were counseled about postpartum family planning at least once during their four ANC visits, and 38.5% of them used postpartum modern family planning compared to 13.4% who were not counseled at all during their four ANC visits ($p < 0.001$)[3] . One can see from this study that routine antenatal FP counseling was very low in spite of its positive impact on PPMC uptake. The aim of the study was to assess the prevalence of antenatal decidedness to use PPMC among pregnant women in Addis Ababa city.

## METHODS

### Study Design

This cross-sectional descriptive study was conducted in Addis Ababa, the capital city of the Federal Democratic Republic of Ethiopia (FDRE). The projected population of the city was 3,273,000 in 2015. The Addis Ababa City Administration Health Bureau (AACAHB) delivers maternal health care services through 6 hospitals and 98 (ninety-eight) health centers for the city's population. The health centers are distributed in 10 subcities. Most of the maternal & child health services including FP services are delivered by the health centers as the hospitals are to care for complicated pregnancies & deliveries. The bureau had 6,058 women who had their 4$^{th}$ ANC visit monthly (calculated from the

reports of each subcity submitted to and compiled by the bureau in the 6 months prior to the study period). The study was conducted from January 10, 2020 to February 8, 2020 GC.

The source population consisted of all women who had ANC follow up in all health centers in the city, and the study population consisted of all pregnant mothers who came for their scheduled 4th ANC visit to these health centers during the study period. Willingness to participate in the study was the inclusion criteria. Those who were not willing to participate were excluded.

**Sample size**

The sample size was determined using a single population proportion formula with a level of significance of 5%, Z = 1.96 (confidence level at 95%), and the margin of error d=0.05. The sample size calculated was 422.

The sampling procedure was a two-stage sampling: based on the average number of monthly 4th ANC visitors load of each subcity; the study population were clustered in 10 subcities, and the number of participants from each subcity were allocated proportionately to the 10 subcities – a cluster sampling. Then, among the health centers distributed in each subcity, one health center was selected by a lottery method – a simple random sampling (SRS). The study subjects in each health center were enrolled in a continuous all-inclusive manner starting from the first woman who came on her scheduled 4th ANC visit on day one of the study period until the total number of study subjects was obtained.

**Operational definition:**

**Routine FP Counseling**: was defined as a FP counseling given during any of the ANC follow up visits by the health professional who was providing the routine ANC service to clients.

FP Counseling by the study: was defined as a FP counseling given by the study team professionals to those study subjects who didn't get the service during the routine ANC follow up visits and are picked during the data collection process of the study.

A semi-structured anonymous, self-prepared and pre-tested questionnaire with both closed and open-ended questions was used. The data collection was conducted as an exit interview. For ethical reasons, those pregnant mothers who didn't get routine FP counseling were counseled by the study team on spot and their decidedness to use a PPMC was inquired and recorded in the questionnaire.

Data was entered, processed and analyzed using SPSS version 25 software. Data are presented as frequency distribution tables, and a Chi-square test was used to test for association between independent and dependent variables. Bivariate and multivariate logistic regressions were done to see associations between explanatory variables and antenatal decidedness to use PPMC. Associations were considered statistically significant when the P value is less than 0.05 with 95% confidence interval (CI).

**Ethical consideration**

Ethical clearance was obtained from the Research and Publication Committee (RPC) of the Department of Gynecology and Obstetrics, and IRB of College of Health Sciences, Addis Ababa University. Permission was also obtained from the study facilities to collect data. Participation was on voluntary basis and informed consent was acquired from every participant. The study did not involve vulnerable populations. Anonymity and confidentiality of patient personal information were protected through several mechanisms.

## RESULT

The response rate was 98.3% and all of them were included in the analysis. The mean age was 26 years with a standard deviation of 4.1 and a median of 25 years. One hundred thirty-two (31.8%) were Muslim and 119 (28.7%) were either secondary school complete or college/university graduates. Among the employed professionals, only 2 (4.1%) had a managerial position (table 1).

**Table 1: Sociodemographic characteristics and their association with antenatal decidedness to use PPMC among ANC attendants in Addis Ababa city health centers, Addis Ababa. January 2020 (n=415)**

| Characteristics | Category | Frequency (Percentage) | Chi Square | P – value |
|---|---|---|---|---|
| **Age** | | | 1.543 | 0.819 |
| | Less than 20 | 12 (2.9) | | |
| | 20-24 | 133 (32.0) | | |
| | 25-29 | 186 (44.8) | | |
| | 30-34 | 68 (16.4) | | |
| | 35 and above | 16 (3.9) | | |
| **Religion** | | | 38.113 | 0.000 |
| | Orthodox | 259 (62.4) | | |
| | Protestant | 24 (5.8) | | |
| | Muslim | 132 (31.8) | | |
| **Marital Status** | | | 0.509 | 0.775 |
| | Married | 398 (95.9) | | |
| | Single | 16 (3.9) | | |
| | Divorced | 1 (0.2) | | |
| | Separated | 0 (0.0) | | |
| | Widowed | 0 (0.0) | | |
| **Education** | | | 12.256 | 0.016 |
| | Can't read & write | 70 (16.9) | | |
| | Can only read & write | 72 (17.3) | | |
| | Completed primary education | 154 (37.1) | | |
| | Completed secondary education | 75 (18.1) | | |
| | College/university graduate | 44 (10.6) | | |
| **Occupation** | | | 4.061 | 0.255 |
| | House wife | 296 (71.3) | | |
| | Daily laborer | 5 (1.2) | | |
| | Employed as unskilled, semi-skilled or skilled laborer | 65 (15.7) | | |
| | Employed professional (specify) | 49 (11.8) | | |
| **Employed professionals[a]** | | | 1.334 | 0.513 |
| | Sales & Services | 41 (83.7) | | |
| | Clerical | 6 (12.2) | | |
| | Managerial | 2 (4.1) | | |
| **Family monthly income** | | | 6.674 | 0.083 |
| | Lowest quartile | 69 (16.6) | | |
| | Second quartile | 102 (24.6) | | |
| | Third quartile | 165 (39.8) | | |
| | Highest quartile | 79 (19.0) | | |

**a = Calculated for the total number of employed professional women (49 respondents).**

Nearly half (49.4%) of the respondents had a preterm pregnancy at their 4th ANC visit and 194 (46.7%) were nulliparous (table 2).

Three hundred ninety-nine (96.1%) of the respondents had their antenatal FP counseling in one of their ANC visits, majority (75.9%) of which had it at their 4th ANC visit. The average duration of a single FP counseling session was 5 minutes or more for 300 (72.3%) and all the four FP counseling related topics were covered for 267 (64.3%) (table 2).

**Table 2: Obstetric & FP counseling related variables & association with antenatal decidedness to use PPMC among ANC attendants in Addis Ababa city health centers, Addis Ababa. January 2020 (n=415)**

| Characteristics | Category | Frequency (%) | Chi square | P -value |
|---|---|---|---|---|
| **GA in weeks at 4th ANC visit** | | 20.824 | 0.000 | |
| | Less than 37 weeks | 205 (49.4) | | |
| | 37w to 38 weeks | 113 (27.2) | | |
| | 39w to 40 weeks | 75 (18.1) | | |
| | 41w to 42 weeks | 22 (5.3) | | |
| **Gravidity** | | | 0.808 | 0.668 |
| | Primigravida | 179 (43.1) | | |
| | Gravida II to V | 232 (55.9) | | |
| | Gravida VI to X | 4 (1.0) | | |
| | Gravida XI and above | 0 (0.0) | | |
| **Parity** | | | 0.84 | 0.657 |
| | Nulliparous | 194 (46.7) | | |
| | Para I to Para IV | 219 (52.8) | | |
| | Para V to Para IX | 2 (0.5) | | |
| | Para X and above | 0 (0.0) | | |
| **Number of alive children among parous women** | | | 7.853 | 0.049 |
| | 0 | 4 (1.8) | | |
| | 1 and 2 | 181 (81.9) | | |
| | 3 and 4 | 33 (14.9) | | |
| | 5 and above | 3 (1.4) | | |
| **Number of counseling sessions** | | | 1.716 | 0.424 |
| | In one visit only | 399 (96.2) | | |
| | In Two Visits | 10 (2.4) | | |
| | In Three Visits | 0 (0.0) | | |
| | In all of their four visits | 6 (1.4) | | |
| **Round of ANC visit the FP counseling was delivered**[b] | 8.983 | 0.030 | | |
| | At 1st visit | 75 (19.0) | | |
| | At 2nd visit | 11 (2.8) | | |
| | At 3rd visit | 9 (2.3) | | |
| | At 4th visit | 304 (75.9) | | |
| **Duration of one FP counseling session** | | | 3.963 | 0.138 |
| | Up to 3 min | 82 (19.8) | | |
| | > 3 but less than 5 minutes | | 33 (7.9) | |
| | 5 minutes and above | 300 (72.3) | | |
| **Number of topics covered at FP counseling session** | | | 14.352 | 0.002 |
| | Only one topic | 101 (24.3) | | |
| | Two topics | 39 (9.5) | | |
| | Three topics | 8 (1.9) | | |
| | All four topics | 267 (64.3) | | |

a = Calculated for parous women only (221 respondents).

b = Calculated for women who had a single antenatal FP counseling session (399 respondents).

Routine FP counseling was given to 153 (36.9%) and the study team had delivered the service for the remaining 262 (63.1%). FP counseling by the study team was carried out on the day of interview for a duration of five or more minutes and four topics were covered for each participant. The topics covered at the counseling session were the available types, efficacy, advantages and disadvantages, and side effects of each method.

Among those who had routine FP counseling, 137 (89.5%) had it during one of their ANC visits and the average duration of the counseling session was 3 minutes or less for the majority (65.4%). Besides, only one topic was covered for 100 (65.4%) of them and the majority (55.5%) had it at their first ANC visit.

Three hundred eighteen (76.6%) have decided to use PPMC of which 114 (74.5%) are among those who had routine FP counseling and 204 (77.9%) are among those who were counseled by the study team.

A Chi square test was done to look for a correlation between the independent variables and antenatal decidedness to use PPMC. An association was seen for religion, educational status, GA at the 4th ANC visit, number of alive children, the round of ANC visit the FP counseling was given, and the number of FP related topics covered during the FP counseling (tables 1 & 2). Bivariate and multivariate logistic regression analysis was carried out to see an association between these explanatory variables and antenatal decidedness to use PPMC, and only religion, the round of ANC visit the FP counseling was given, and the number of FP related topics covered during the FP counseling session maintained the association (table 3).

**Table3: Bivariate and multivariate logistic regression test between selected explanatory variables and antenatal decidedness to use PPMC among ANC attendants in Addis Ababa city health centers, Addis Ababa. January 2020 (n = 415).**

| Explanatory Variables | Category | COR | CI | P - value | AOR | CI | P - value |
|---|---|---|---|---|---|---|---|
| **Religion** | Orthodox | 4.157 | 2.559 – 6.750 | 0.000 | 3.062 | 1.792 – 5.230 | 0.000 |
| | Protestant | 8.105 | 1.830 – 35.896 | 0.006 | 6.905 | 1.510 – 31.573 | 0.013 |
| | Muslim | 1 | | | | | |
| **Educational level** | Can't read & write | 0.639 | 0.239 – 1.704 | 0.370 | | | |
| | Can only read & write | 1.514 | 0.508 – 4.511 | 0.457 | | | |
| | Completed primary school | 0.458 | 0.190 – 1.104 | 0.082 | | | |
| | Completed secondary school | 0.486 | 0.188 – 1.261 | 0.138 | | | |
| | College/university graduate | 1 | | | | | |
| **GA at the date of interview** | Less than 37 weeks | 0.206 | 0.047 – 0.907 | 0.037 | | | |
| | 37 – 38 weeks | 0.528 | 0.113 – 2.458 | 0.416 | | | |
| | 39 – 40 weeks | 0.650 | 0.131 – 3.215 | 0.597 | | | |
| | 41 – 42 weeks | 1 | | | | | |
| **Number of alive children[a]** | None | 0.167 | 0.006 – 4.515 | 0.287 | | | |
| | 1 and 2 | 2.014 | 0.178 – 22.831 | 0.572 | | | |
| | 3 and 4 | 1.000 | 0.081 – 12.270 | 1.000 | | | |
| | 5 and above | 1 | | | | | |
| **In which round of ANC visit was the FP counseling delivered[b]** | At 1st visit | 0.437 | 0.252 – 0.757 | 0.003 | 0.136 | 0.025 – 0.729 | 0.020 |
| | At 2nd visit | 1.107 | 0.233 – 5.255 | 0.899 | 0.312 | 0.032 – 3.062 | 0.318 |
| | At 3rd visit | 0.492 | 0.120 – 2.023 | 0.325 | 0.172 | 0.022 – 1.311 | 0.089 |
| | At 4th visit | 1 | | | | | |
| **Number of topics covered during the FP counseling** | Only one topic | 1.402 | 0.772 – 2.544 | 0.267 | 5.074 | 1.016 – 25.343 | 0.048 |
| | Two topics | 0.408 | 0.202 – 0.822 | 0.012 | 4.276 | 0.706 – 25.884 | 0.114 |
| | Three topics | 0.170 | 0.040 – 0.733 | 0.017 | 1.631 | 0.130 – 20.420 | 0.704 |
| | Four topics | 1 | | | | | |

a = Calculated for parous women only (221 respondents).

b = Calculated only for women who had a single antenatal FP counseling session (399 respondents).

## DISCUSSION

In this study, the FP counseling rate during the routine ANC service delivery was low (36.9%). Though it is low compared to the rates in western countries[12] , this finding is comparable with other studies conducted in Ethiopia as well as other least developed countries[8, 13]. This implies that health care providers are missing this golden opportunity for FP counseling and help women to decide to use PPMC antenatally. The antenatal FP counseling was delivered by the study team for the majority (63.1%) of the participants and among all of the study participants, 76.6% have decided to use PPMC.

Though it was not statistically significant, the rate of antenatal decidedness to use PPMC was higher for those who were counseled by the study team than those counseled during the routine ANC follow up (77.9% Vs 74.5%). This is explained by the longer duration of the counseling session and coverage of all the four FP related topics by the study team. The lack of a statistical significance difference can be explained by the role of bias due to differential misclassification of exposure of study subjects and the nature of the study design (not being a case control study).

Religion, the round of ANC visit the FP counseling was given and the number of topics covered during the FP counseling are associated with antenatal decidedness to use PPMC. Orthodox and protestant Christians were 3 and 7 times more likely to decide to use PPMC than Muslims (AOR = 3.062, 95% CI; 2.559-6.750, P=0.000 and 6.905, 95% CI; 1.742-34.360, P=0.007). The reason for the Muslims' low decidedness rate could be related to their religious belief, and the finding is similar to a study done in Bale, Ethiopia[2]. The odds of antenatal decidedness to use PPMC for respondents to whom the FP counseling was provided at the 1st round of ANC visit was 0.1 times the odds for those respondents who had the FP provided at the 4th visit (AOR = 0.136, 95% CI; 0.025-0.729, P=0.020), whereas there was no evidence to suggest that respondents' antenatal decidedness to use PPMC is associated with the FP counseling provided at the 2nd or 3rd round of the ANC visit. This may be due to the higher positive experience of pregnancy by the study participants in the early periods of gestation that could have influenced them to decide not to use PPMC. The odds of decidedness to use PPMC for respondents to whom one topic was covered during the FP counseling session was 5 times the odds for those respondents who had four topics covered (AOR = 5.074, 95% CI; 1.016-25.343, P=0.048). However, there was no enough evidence to suggest that a relationship exists between antenatal decidedness to use PPMC and a FP counseling provided with a coverage of two and three topics. This finding is in contradiction with the general belief that says the chance of being decided is more likely when more topics are covered during FP counseling[14]. This may be explained by the likelihood that the length of time spent to each participant for the counseling was short resulting in respondents' having difficulty to make a decision when more than one topic is covered in a short duration allocated for the FP counseling. This explanation is supported by the finding of a short duration of counseling for the majority (75.2% participants counseled during the routine ANC had their counselling session for a maximum period of 3 minutes or less).

## CONCLUSION

The FP counseling service coverage rate during the routine ANC service delivery is low. The topics covered during a FP counseling session at the routine ANC service did not include all the 4 major issues that must have been discussed. The FP counseling session was conducted mainly during the 1st ANC visit which made the respondents decision to use PPMC lower than those who were counseled by the study team at the 4th ANC visit. Significant number of respondents (23.4%) didn't decide to use PPMC. Further study to find out why ANC care providers at health centers are not providing FP counseling service to all of their clients is recommended. Allocating adequate length of time and including all the 4 major topics in the

discussion during the routine ANC FP counseling. Conducting the FP counseling at the late ANC period is recommended. A study to identify why significant number of women didn't decide to use PPMC antenatally is recommended.

## DECLARATION

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

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## CORRESPONDING AUTHOR

Abdu Mengesha, MD
Department of Obstetrics and Gynecology, School of Medicine, CHS, Addis Ababa University, Addis Ababa, Ethiopia
Email: abdu.mengesha@aau.edu.et

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# KNOWLEDGE, INTENTIONS, AND BARRIERS TO USE VASECTOMY AMONG MARRIED MEN IN ETHIOPIA

Kaleab A. Betru, MD1, Tesfaye Hurisa, MD, MPH[1], Ferid A. Abubeker, MD, MPH[1]

## ABSTRACT

**BACKGROUND:** Among the arrays of permanent contraceptive methods, vasectomy is the least known method of contraception. Even when men are aware of vasectomy, their understanding is often incomplete or incorrect. So, the aim of the study was to assess knowledge, intention, and barriers to using vasectomy among married men living in Addis Ababa, Ethiopia.

**METHOD:** A community-based cross-sectional study was conducted on 264 participants in the Arada sub-city, Addis Ababa, Ethiopia. Data were collected via face-to-face interviews using a pretested structured questionnaire. Then the data were checked for completeness and entered into SPSS version 26 for analysis. A descriptive analysis was performed to describe the socio-demographic status, intention, and barriers to using vasectomy. A bivariable and multivariable logistic regression model was used to analyze the association between variables.

**RESULTS:** Two hundred sixty-four married men were included in this study. The mean age of the study participants was 38.7 with an age range between 21 and 70 years. About 51.7% of the participants had good knowledge, and 59.4% had a positive attitude toward using vasectomy. Intention to use vasectomy as a method of contraception was reported in 18% of married men. In multivariate analysis, participants with a positive attitude towards vasectomy were 2.1 times more likely to use it than their counterparts.

**CONCLUSION:** The intention to use vasectomy as a method of contraception among married men in our study was comparable to studies in similar settings. A positive attitude towards vasectomy was significantly associated with the use of vasectomy in future life. So, engaging in better education that improves the attitude of couples towards vasectomy is essential to enhance the intention of men to use vasectomy.

**KEY WORDS:** Vasectomy, Family Planning, Intention, Barrier, Ethiopia.

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1 Department of Obstetrics and Gynecology, St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia.

## INTRODUCTION

In the rugged, landlocked state of Ethiopia, around 117 million people settle, making the state the second most populous in Africa[1]. Ethiopia is categorized under countries with high maternal mortality, with 412 deaths per 100,000 live births, according to Ethiopian Demographic and Health Survey (EDHS)[2]. Family planning, including vasectomy, positively affects socioeconomic development and reduces maternal deaths[3].

Over the last several decades, national family planning initiatives have led to significant gains in many developing countries, exemplified by improvements in key Family Planning 2020 (FP2020) indicators. These initiatives are believed to expand access and quality of family planning services, mainly for women. More recently, research and programs that engage men in family planning and combat inequitable gender norms have also increased in effectiveness and scope[4].

For couples who want to stop childbearing, vasectomy is a safe and highly effective contraception option. Compared to female sterilization, vasectomy has few side effects and provides a quicker recovery with much less cost. Even though all men who are satisfied with the size of their families are eligible for vasectomy, it remains a rejected family planning (FP) option among men[5].

Despite its acceptability in developed countries, in most African countries, including Ethiopia, there are still prevailing barriers to its acceptance by married men[3].

The 1994 International Conference on Population and Development (ICPD) set clear directions for improving men's involvement in family planning. Regardless, male participation is still meager in Africa[6].

Despite growing evidence on the benefits of engaging men in reproductive health decision-making, fertility rates and unmet need for family planning remain high in many Sub-Saharan African countries, including Ethiopia. One way to foster male involvement in family planning is to provide couples with more contraceptive choices by promoting male-oriented methods, including vasectomy[7].

More education and support for vasectomy at a national level would address the gender imbalance in contraceptive availability and use. It also promotes couples' fertility as a shared responsibility. This more holistic approach to reproductive health supports an informed choice of a wide range of high-quality contraceptive methods[8].

This study will discuss the factors behind men's passive participation in family planning compared to countries with high utilization rates. It will also help assess the knowledge status about vasectomy and the cultural barriers concerning health issues regarding the procedure to create a good insight for healthcare stakeholders and address any identified factors that may contribute to poor utilization.

## METHOD AND MATERIALS

### Study setting and period

The study was conducted in the Arada Sub-city of Addis Ababa, Ethiopia. Addis Ababa City Government has ten sub-cities, of which Arada sub-city was randomly selected for this study. Arada is one of the ten sub-cities in the town with a population size of over 225,000 per the latest estimate (9-10).The study period was one month, from December 1– 31, 2021.

### Population and eligibility criteria

The source population for the research are all married men whose wives are in the reproductive age group living in Arada Sub-city, and the study population are all married men whose wives are in the reproductive age group in the selected woredas of the Arada sub-city during the study period and fulfill the inclusion criteria for the study. All married men who had already undergone vasectomy or whose wives are critically ill (bedridden), infertile or had undergone surgical sterilization were excluded.

### Sample size and sampling procedure

The sample size was calculated using single population proportion formula with the assumption of proportion (p) for intention to use vasectomy to

be 19.6% (i.e., p = 0.196) from a previous study with 95% CI and a 5% marginal error (6). With an assumption of a 10% non-response rate, we planned to include 264 participants.

Arada sub-city has ten woredas, of which three woredas were selected by simple random sampling (lottery method) for the study. Then, the calculated sample size of 264 was proportionately allocated for each woreda based on the number of households. The study utilized systemic random sampling to select the study participants. One married man per household was interviewed. When two or more eligible men were found in one household, only one was interviewed by lottery method. If no eligible men are identified in the selected household, the next eligible household located in the clockwise direction was visited and included until we get the desired sample size.

**Data analysis**

Data were checked for completeness and entered into SPSS version 26 for analysis. Descriptive data analysis with frequencies and percentages was performed to describe the socio-demographic status, intention, and barriers to using vasectomy. The study used a 95% confidence interval (CI) and p-value of < 0.05 to determine statistical significance. The statistical association between the outcome variables and independent variables were first tested with binary logistic regression. To control confounders, those variables that showed significant association with a p-value of less than 0.05 were further analyzed with multivariate logistic regression.

**Ethical Clearance and Data Collection**

Ethical clearance was obtained from the institutional review board of St. Paul's Hospital Millennium Medical College (SPHMMC). Participants were recruited voluntarily after complete information about the research was provided.

Data were collected by trained data collectors via face-to-face interview techniques using a structured, validated, and pre-tested questionnaire. For some of the knowledge and attitude questions, we used questionnaires from similar studies customized to our study setting (3, 13). The tool was first prepared in English, then translated to Amharic and back to English by language experts to maintain the instrument's consistency.

## RESULTS

**Socio-demographic and reproductive health characteristics**

During the study period, a total of 264 men were interviewed. The mean age of the participants was 38.7 with a range between 21 and 70 years. The study showed that most participants were between the ages of 31 to 40 years (35.6%). Moreover, in the study, 43.2% (n=114) stated that they had attended tertiary education (Table 1).

**Table 1- Sociodemographic characteristics of study participants**

| | Classification | Frequency | Percentage |
|---|---|---|---|
| **Age (years)** | 21-30 | 66 | 25.0% |
| | 31-40 | 94 | 35.6% |
| | 41-50 | 68 | 25.8% |
| | 51-60 | 21 | 8.0% |
| | 61-70 | 15 | 5.7% |
| **Monthly income (in Ethiopian birr, ETB)** | 1000-5000 ETB | 70 | 26.5% |
| | 5000-10000 ETB | 105 | 39.8% |
| | 10000-15000 ETB | 70 | 26.5% |
| | >15000 ETB | 19 | 7% |
| **Educational level** | Does not read or write | 3 | 1% |
| | Read and write | 8 | 3% |
| | Primary school | 40 | 15% |
| | Secondary school | 99 | 37.5% |
| | College | 114 | 43.2% |
| **Religion** | Orthodox | 148 | 56.1% |
| | Muslim | 53 | 20.1% |
| | Catholic | 24 | 9.1% |
| | Protestant | 39 | 14.8% |

The majority, 76.9% (n=203) of study participants reported having one to three children. Not only the number of children but also the researcher explored the participants' intention to have any more children. On the other hand, the majority of participants, 54.5% (n=144) reported that they do not want to have any more children as illustrated in table 2.

**Table 2: Reproductive Health Characteristics**

| Reproductive health-related issues | Values | Frequency | Percentage |
|---|---|---|---|
| **No. of Pregnancies (N= 264)** | Never Pregnant | 19 | 7 |
| | 1-3 Pregnancies | 192 | 72.7 |
| | 4-6 Pregnancies | 53 | 20.6 |
| **No. of Children (N= 264)** | Never gave birth | 23 | 8.7 |
| | 1-3 | 203 | 76.9 |
| | 4 and above | 38 | 14.4 |
| **Want to have more children (N= 264)** | Yes | 120 | 45.5 |
| | No | 144 | 54.5 |
| **If yes, how many? (N= 120)** | 1-2 | 85 | 70 |
| | 3-4 | 27 | 22.5 |

**Knowledge of family planning**

Among all study participants, 98.9% knew or had heard about family planning methods while 49% of participants have knowledge about female sterilization. The majority (67%) of participants did not know about male sterilization out of which 94.2% knew that vasectomy is permanent and irreversible (Table 3). Married men's knowledge about vasectomy was assessed using ten knowledge-related questions. Each correct and incorrect response was given a value of one or zero respectively. The individuals who scored below the mean score was considered to have poor knowledge while those who scored greater than or equivalent to the mean estimation of participants' scores were considered to have good knowledge[3].

About 51.7% (n=45) of the participants scored greater than the mean score which was categorized as good knowledge and 40% of participants have a positive attitude towards vasectomy (Table 3)

**Participants' attitudes toward vasectomy and its utilization**

A 10 item Likert scale with five response alternatives is adjusted from previous studies. The response alternatives include 'Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, and Strongly Agree = 5.' The mean attitude of married men towards vasectomy was 6 (SD ± 1.7); about 59.4% of the participants scored greater than or equal to the mean which was categorized as a positive attitude towards the use of vasectomy[13].

**Table 3: Knowledge and attitude about FP, Female Sterilization, and Vasectomy among married men living in Arada Sub-city, Addis Ababa**

| | | Frequency | Percentage |
|---|---|---|---|
| **Knowledge of FP** | | 261 | 98.9 |
| **Knowledge on Female Sterilization** | | 128 | 49 |
| **Knowledge on Vasectomy** | | 87 | 33 |
| **Know Vasectomy is permanent and irreversible** | | 82 | 94.2 |
| **Knowledge on Vasectomy** | | | |
| | Good knowledge | 45* | 51.7 |
| | Poor knowledge | 42* | 48.3 |
| **Attitude about vasectomy** | | | |
| | Positive attitude | 157 | 51.4 |
| | Negative attitude | 107 | 40.6 |

* Out of 87 who knew about male sterilization.

The participants were also requested to indicate whether they agreed that family planning benefits themselves and their families; 44.3% (n=117) agreed, and 53.8% (n=142) strongly agreed (Fig.3). More than half of the participants, 58.3% (n=154)

agreed that men could play a significant role in family planning. In order to gauge the participants' views on wanting to share responsibility, they were asked to state whether they agreed to share the responsibility to use family planning. More than half of the participants, (56%) agreed on wanting to share responsibility and 28% strongly agreed. Figure 1 illustrates the findings.

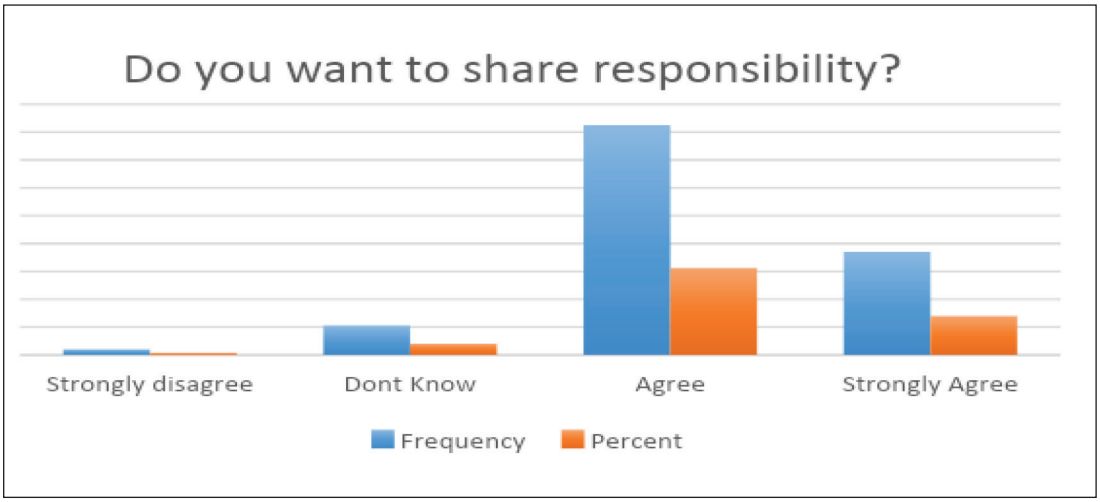


**Figure 1: Men's opinion on sharing responsibility of using contraception among married men living in Arada Sub-city, Addis Ababa**

**Intention to use vasectomy**

The participants were also asked to provide their views regarding their interest in having a vasectomy. Almost one-fifth (n=47) of participants reported that they are interested in having a vasectomy as a family planning method option (Fig.2).

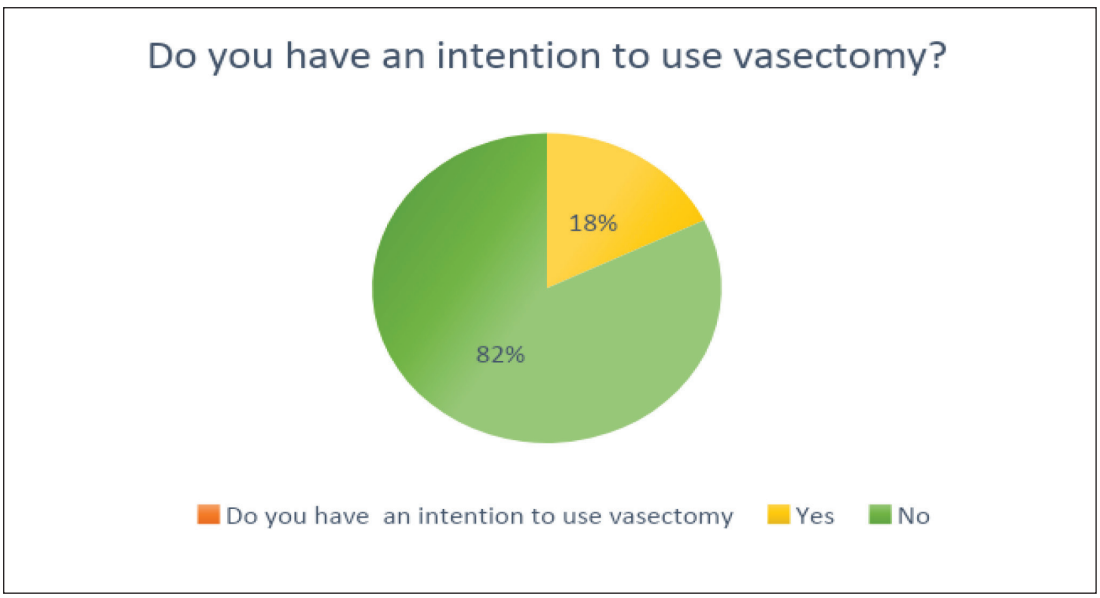


**Figure 2: Intention to use vasectomy among married men living in Arada Sub-city, Addis Ababa**

**Barriers to using vasectomy**

Around 89% (n=235) reported a lack of knowledge about vasectomy as the major reason for not using vasectomy. More than 45 % stated that they desire to have more children. Others stated the lack of role models who have undergone the procedure and the lack of trained providers as barriers to using vasectomy as a contraception option (Fig.3).

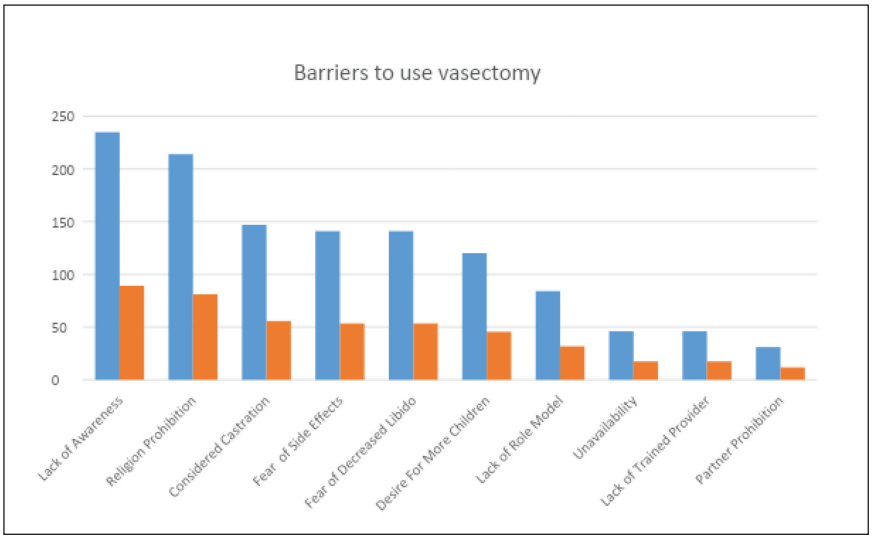


**Figure 3: Barriers to using vasectomy among married men living in Arada Sub-city, Addis Ababa**

**Factors associated with intention to use vasectomy**

In binary logistic regression, the age and attitude of participants had an association with the intention to use vasectomy. In multivariable binary logistic regression analysis, attitude towards vasectomy was found to have a significant association with intention of married men to use vasectomy (Table 4). Participants who had a positive attitude towards vasectomy were 2.1 times more likely to have the intention to use vasectomy as compared with their counterparts [AOR = 2.1(95%CI: 1.1–8.80)].

**Table 4: Factors associated with intention to use vasectomy among married men living in Arada Sub-city, Addis Ababa**

| Variable | Intention to use vasectomy | | COR(95%CI) | AOR (95%CI) | P-value |
|---|---|---|---|---|---|
| | Yes | No | | | |
| **Age (in years)** | | | | | |
| 21 - 30 | 10(15.2) | 56(84.8) | 0.654(0.068-5.298) | 0.457(0.05-4.158) | 0.487 |
| 31 - 40 | 21(22.3) | 73(77.7) | 0.256(0.027-1.179) | 0.185(0.022-1.528) | 0.117 |
| 41 - 50 | 8(11.8) | 60(88.2) | 0.399(0.049-3.510) * | 0.367(0.042-3.197) | 0.364 |
| 51 - 60 | 6(28.6) | 15(71.4) | 0.108(0.019-1.675) | 0.146(0.015-1.429) | 0.098 |
| 61 - 70 | 2(13.3) | 13(86.7) | 1 | 1 | 1 |
| **Attitude** | | | | | |
| Positive | 34(21.7) | 123(78.3) | 0.388(0.204-0.740) * | 2.1 (1.1 – 8.80) | 0.035* |
| Negative | 13(12.1) | 94(87.9) | 1 | 1 | 1 |

* P-value <0.05

## DISCUSSION

Reproductive health decision-making is a shared responsibility of men and women. Effective utilization of family planning is one of the most important indicators of reproductive health. While vasectomy is an easy procedure with a high achievement rate (> 99%) and minimum complications, most FP methods often focus solely on women, with the objectives of preventing recurrent births and reducing maternal and fetal death[3].

In this study, of the 264 participants, around 33% knew or had heard about male sterilization. This finding is higher than the 2016 EDHS report, which indicated that only 23.5% of married men had ever heard about vasectomy. This may be because of a time change since EDHS 2016 was done five years ago. Also, the current study was done in a more urban setting, the EDHS incorporates both rural and urban areas. It is also higher than a study done in Dashen, Ethiopia, which reported that 17.1% had heard or knew about vasectomy. But compared to research done at Dangila regarding men's knowledge about vasectomy, the number is significantly low (75% to 33%)[11]. This may be due to differences in sample size, socio-demographic differences, and the involvement of non – governmental institutions and health care advisement at the peripheral level.

The present study showed that among those who knew or heard about vasectomy, 51.7% had good knowledge about the contraceptive method. This is higher than the results obtained from studies in Gulele, Addis Ababa (34.8%), Debre Tabor (38.5%), and Dangila (44.8%)[3,6,11]. The difference can be explained by the difference in the socio-demographic characteristics of the population and access to information, which is better in an urban setting. However, this finding is lower than a study conducted in India, which showed that 70.2% of married men were knowledgeable about vasectomy[12]. This could be attributed to a health system difference between the two countries.

In the current study, 40.6% had a negative attitude toward the use of vasectomy. Some of the reasons for refusing to use vasectomy as a means of contraception in this study are cultural/religious beliefs, lack of support from a spouse, fear of complications of the procedure, fear of irreversibility, and fear of impotence among others. This finding is consistent with studies conducted in East Wollega, Ethiopia, and Nigeria[13-14]. A study conducted in Turkey similarly showed that contraception is a women's obligation and undergoing vasectomy may lead to loss of men's status in the public eye as well as in the family[15].

In the current study, 18% reported that they are interested in having a vasectomy. This finding was similar to studies done in India, Indonesia, and Bangalore that showed between 16.6 - 21.4% of the participants had the intention to use vasectomy respectively[12,16-18]. Similar studies conducted in different regions of Ethiopia also showed that between 18.1-30% of men have intentions to use vasectomy[13, 19]. A slight discrepancy in the studies could be due to differences in study settings and participants. The current study was community-based while the previous was a facility-based study and the participants were men who were visiting health institutions together with their partners for family planning services which could have positively influenced their intention by increasing their awareness about the method.

Men with a positive attitude towards vasectomy had increased intentions to use the method than men who had a negative attitude. The finding of this study was in agreement with the study finding from two rural cities in Ethiopia (Debretabor and Gulele)[3, 6]. This indicates that men with a positive attitude towards vasectomy are better able to use it and share responsibilities in FP practice with their partners. Thus, attitude could be an entry point to improve vasectomy uptake in the community by breaking the myths and misconception that was negatively affecting intentions to use vasectomy.

Women can influence the contraceptive choice of thier partners. Hence further studies involving women's knowledge and attitude towards vasectomy are a potential area for future research.

In spite of its limitations, this study showed that the majority of married men do not have adequate knowledge about vasectomy as a family planning method option available to men and religion plays a significant role in the decision to use vasectomy as a contraception method. Educational strategies such as; training and public enlightenment may help in addressing these problems.

## CONCLUSION

The study showed that a negative attitude towards vasectomy significantly affects the intention to use vasectomy as a contraception method. The study also enlightens the lack of awareness and the role of religion as a major barrier to using vasectomy as a form of contraception among married men. In view of these, health education strategies need to be employed to bring about a positive behavioral change in men and enhance the utilization of vasectomy as a method of contraception, and in turn, ensure their participation in family planning. To further promote the use of vasectomy, effective communication strategies in family planning programs could also play a role. This may also help in increasing awareness, and creating a positive attitude towards vasectomy. Men are key role players in the decision of family planning. So, to alleviate women's burden, it is imperative to make men part of this important reproductive health issue.

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## CORRESPONDING AUTHOR

Tesfaye H. Tufa, MD, MPH
Department of Obstetrics and Gynecology, St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia.
Email: tesfaye.hurisa@sphmmc.edu.et

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# A CASE OF UTERINE DIDELPHIS WITH CERVICAL ATRESIA: A CASE REPORT

Eskinder Kebede, MD[1], Yitbarek Fantahun, MD, MPH[1], Hamelmal Abate, MD[1]

## ABSTRACT

Congenital uterine malformations are deviations from normal anatomy resulting due to defective fusion of Mullerian ducts or the paramesonephric ducts in the developing embryo.

The prevalence of female genital tract anomalies is 4%-7% in general population and up to 8%-10% in women who have recurrent pregnancy loss.[1] The type and degree of anatomical distortion has associated health implications that may include, cyclical abdominal pain, reproductive failure, obstructed menses and inability to engage in sexual intercourse.[2]

Uterus didelphys (double uterus) is a developmental abnormality that results from the failure of fusion of the Mullerian ducts leading to separate uterine cavities and 2 cervices 1. It is a rare anomaly accounting for 5% of all uterine anomalies.[3] Cervical agenesis is a rare Mullerian anomaly with an incidence of 1 in 80,000 females.[4] It represents 3% of all uterine anomalies. It is rarely associated with a functioning uterus (4.8%). Cervical agenesis is often associated with vaginal atresia (less than 50%). It is important to classify these anomalies for easy diagnosis and plan appropriate preoperative treatment.

**KEYWORDS:** Case report, Cervical atresia, Mullerian anomaly, Uterine Didelphis.

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1 Department of Obstetrics and Gynecology, School of Medicine, Addis Ababa University, Addis Ababa, Ethiopia

## BACKGROUND

Mullerian duct anomalies (MDAs) are congenital defects of the female genital system that arise from embryological mal development of the Mullerian ducts. These abnormalities result from either failure of development, fusion, canalization, or reabsorption, which normally occurs between 6 and 22 weeks in utero. As estimated by most resources, the incidence of these abnormalities ranges between 0.5 to 5.0% in the general population.[5]

Most women with a didelphys uterus are asymptomatic, but some present with dyspareunia or dysmenorrhea in the presence of a varying degree of longitudinal vaginal septum. Rarely, hematocolpos hematometrocolpos, and renal anomalies are reported in association with didelphys uterus. Despite some of these complications, there are many cases of women with a didelphys uterus that did not exhibit any reproductive or gestational challenges. When classifying these anomalies solely based on abnormal development, four major types are apparent. The most recent and widely used classification systems for the different types of Mullerian duct abnormalities were created by Buttram Jr. and Gibbons (1979) and the American Fertility Society (1988)[6]

Cervical agenesis is a rare Mullerian anomaly with an incidence of 1 in 80,000 females. It represents 3% of all uterine anomalies. It is rarely associated with a functioning uterus (4.8%).(4) MRI is the investigation of choice for evaluation of Mullerian duct anomaly due to its high accuracy and detailed delineation of uterovaginal anatomy. MRI has a reported accuracy of up to 100% in the evaluation of mullerian duct anomalies.[7]

## CASE PRESENTATION

A 20 years-old Ethiopian female who is the first child for her family, has a younger sister who is 16 years old, has cyclic menses since 13. She has no family history of similar illness. She was referred to the outpatient gynecology clinic of Addis Ababa University Hospital in March 2016 with a history of primary amenorrhea and severe lower abdominal pain and vomiting occurring at regular intervals over a period of 5 years. The medical and surgical history was normal. Physical examination revealed normal breast development and other sexual characters. On a genital examination a normal eschuteon was observed and the hymen was intact, with a normal perforations. The vagina was 9 cm in length as measured by trans hymenal catheter. The abdominal pelvic ultrasound showed duplicated uterine fundus, Didelphys uterus. The right uterus measures 6.9 cm in length and has 1cm fluid collection and the left uterus measures 7.4 cm in length, with minimal hematometra. Magnetic resonance imaging (MRI) revealed a double uterus with widely separated horns, and a rudimentary right horn and cervical atresia. Both kidneys were normal sized and located in their usual place.


**Figure 1. Ultrasonographic image of the separated uterine horns. Notice the minimal endometrial collection in both cavities.**

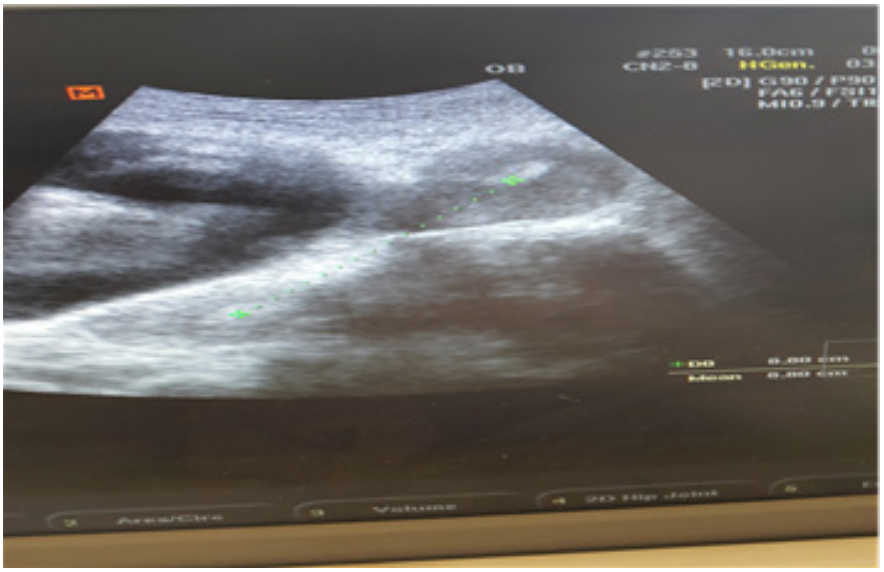


**Figure 2. Ultrasonographic image showing the widely separated uterine horns.**

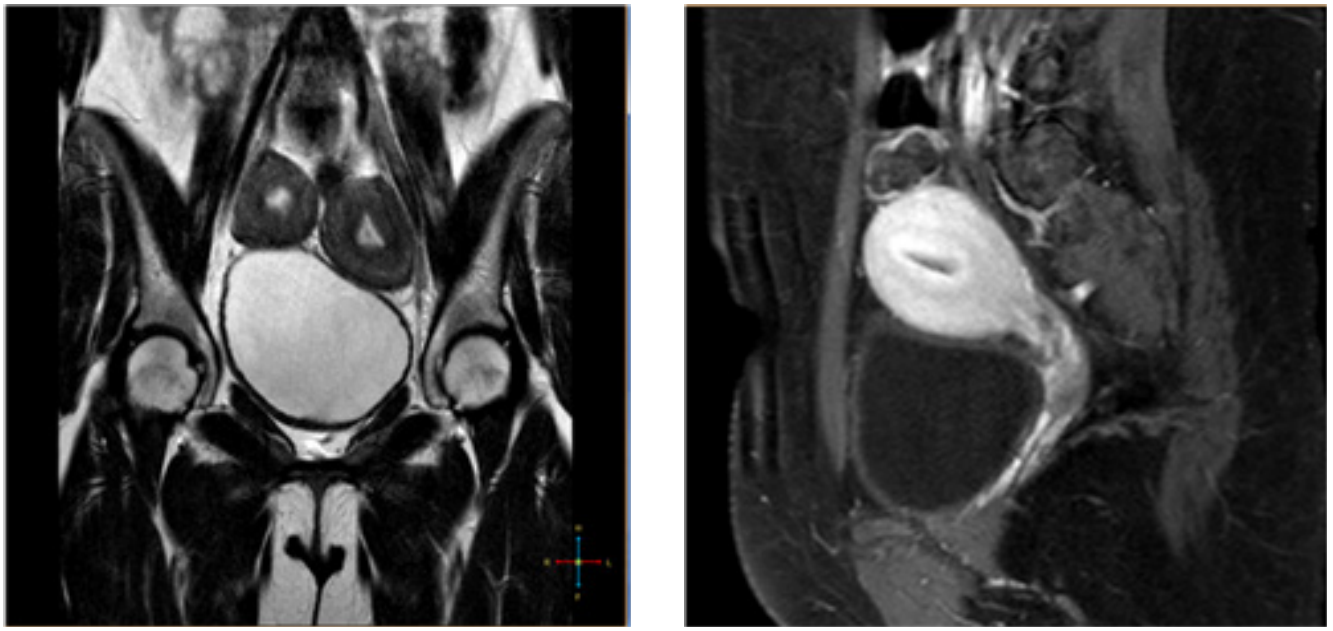
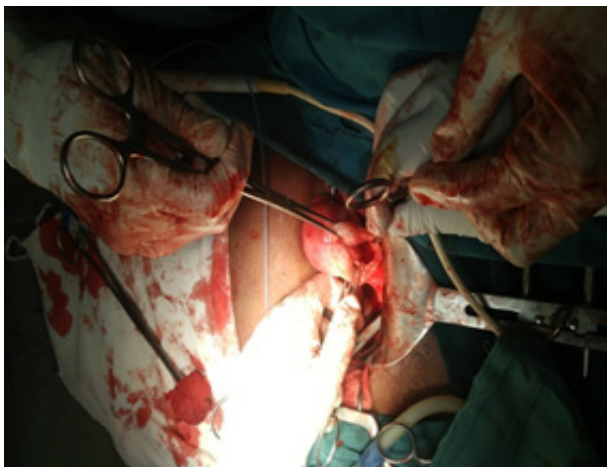


**Figure 3. Magnetic resonance imaging showing a uterine didelphys with a rudimentary right horn. Notice that the right hemi-uterus leads to an atretic cord like cervix and vagina**

After written informed consent was taken, the patient was taken to the operating theatre and the abdominal cavity was entered via midline infra-umbilical incision. Intraoperative there was double uterus with their tubes and ovaries which were healthy looking bilaterally (Fig 2).

Surgical therapy included resection of rudimentary horn and a trial of creation of a patent cervix by making a midline vertical cervical and upper vaginal incision with a subsequent trial of canalization using a metallic probe but was difficult to place a stent because of sever atresia and cord like long cervix without canal. Finally hysterecetomy was done.



## DISCUSSION

This case report, we discuss a rare case of didelphys uterus and cervical atresia in a woman with a history of primary amenorrhea.

A didelphys uterus is characterized by complete failure of the Mullerian ducts to fuse leading to separate uterine cavities and two cervices. A longitudinal vaginal septum may also present in most cases. Initial suspicion of the condition followed by the diagnosis usually begins with a routine speculum exam where visualization of anatomical abnormalities warrants further investigation. Further, because the Mullerian ducts develop often in association with Wolffian ducts, abnormalities of the kidneys may be found in conjunction with uterine abnormalities.

Uterine cervix agenesis is an extremely rare congenital anomaly and it occurs in 1 in 80,000 to100,000 births (sugunuma et.al 2002). Patients affected by this rare, "non communicating", abnormality have a functional uterus, but due to lack of cervix they get primary amenorrhea with cyclic pelvic pain, due to hematometra [8].

Congenital agenesis or dysgenesis of the uterine cervix is a class IB in the American Fertility Society classification system (1998). The presence of a normal uterine corpus is a challenge for the clinician because a successful surgical repair could restore normal menses and potentially preserve the patient's fertility. However, current opinion in the literature considers complete agenesis to be the most difficult anatomic form of cervico-uterine anomaly to correct. In this form, a total hysterectomy is recommended, because of the high incidence of complications or failure when attempting surgical correction.[9]

A didelphys uterus remains a very rare Mullerian duct anomaly in comparison to other anomalies described in the Buttram and Gibbons classification. Most women with a didelphys uterus are asymptomatic, but may present with dyspareunia or dysmenorrhea in the presence of a thick, sometimes obstructing, vaginal septum. This obstructing vaginal septum can lead to hematocolpos/hematometrocolpos and thus present as chronic abdominal pain as well. Rarely, genital neoplasms and endometriosis are reported in association with cases of didelphys uterus.

The fertility of women with untreated didelphys uterus has been shown by some sources to be better than those with other Mullerian duct abnormalities but still less than women with normal uterine anatomy. There is also an increased risk of spontaneous abortion, fetal growth retardation, and prematurity with an estimated 45% (or lower) chance of carrying a pregnancy to term in comparison to a normal uterus, which is similar to that of a unicornuate uterus. This indicates poor reproductive performance, but still not as poor as a septate or bicornuate uterus which are more common amongst the MDAs.

A didelphys uterus has been shown in many case reports to occur as a part of a syndrome, more specifically called, Herlyn-Werner-Wunderlich (HWW) syndrome, also known as obstructed hemivagina and ipsilateral renal anomaly (OHVIRA). It is a very rare congenital anomaly of the urogenital tract involving Mullerian ducts and Wolffian structures, and it is characterized by the triad of didelphys uterus, obstructed hemivagina, and ipsilateral renal agenesis. This condition can cause hematometrocolpos or hematocolpos on the side of the obstructed hemivagina which produces a mass effect with subsequent lower abdominal pain. Most cases present after menarche as intense lower abdominal pain and/or a protruding mass over the vaginal introitus. A preliminary pelvic Ultrasound is done followed by an MRI to confirm the diagnosis. The uterine cervix provides a conduit for menstrual flow, a barrier to infection from vaginal microflora, maintenance of an intrauterine pregnancy, and mucus for sperm transfer. Atresia (dysgenesis) of the cervix may result from local segmental atrophy.' Buttram has suggested a classification for "muillerian"agenesis or hypoplasia. Cervical anomalies are designated class IB.

There is a consensus in the international literature that hysterectomy is the procedure of choice in a patient with cervical agenesis. Alternatively, when cervical dysgenesis is noted, reconstruction of the cervix may be warranted. The goals of reconstructive surgery for cervical malformations are to provide a conduit for menstruation to relieve pain and preserve reproductive potential.

The goals are usually achieved when there is substance to the cervix. Pregnancy has been documented after cervical reconstruction when cervical stroma is substantial.

Rock et al(1995) clearly defined the different anatomic findings that they had encountered in their study.[9] They classified anatomic forms of their 21 cases into 4 categories: cervical agenesis , cervical fragmented , cervical cord and cervical obstruction . Patients with cervical dysgenesis may have one of three anatomical variations.

They performed reconstructive surgery in the clearly defined categories, yielded differing prognoses their[4] attempts at surgical correction of cervical agenesis and fragmented dysgenetic groups, invariably failed requiring reoperative and hysterectomy within 6 months. Their 5 attempts at surgical correction of cervical cord and obstruction dysgenetic groups, lead to a[4] success with one pregnancy. Patients with atresia or cervical fragmentation are not usually candidates for canalization. Patients with either cervical obstruction or a fibrous cord may reasonably be considered for reconstruction.

## CONCLUSION

In our case as both uterus were suspended high in pelvis. Trials of canalization using a metallic probe was difficult to place a stent because of sever atresia and cord like long cervix without canal. With no cervix and no connection between the suspended uterus and vagina, there was no possibility of creating a utero-vaginal anastomosis, hence hysterectomy was done

## DECLARATION:

**Ethical approval and consent to participate**: Informed written consent was obtained from the patient for treatment.

**Consent to publish**: Consent was taken for the publication of the case and the accompanying images.

**Availability of data and materials**: NA

**Competing interest**: The authors declare that there is no conflict of interest regarding the publication of this paper.

**Funding**: The authors haven't received funding from any organization.

**Author's contributions**: YF identified, evaluated, and diagnosed the case. YF, EK and HA managed the patient. EK reviewed the literature and wrote the case report. All authors have read and approved the manuscript.

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**CORRESPONDING AUTHOR**
Yitbarek Fantahun, MD, MPH
Department of Obstetrics and Gynecology, School of Medicine, Addis Ababa University, Addis Ababa, Ethiopia
Email: yitbarekobgyn@gmail.com/
Yitbarek.fantahun@aau.edu.et

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**Tables and Figures:** All tables and figures should be submitted on separate sheets of paper and be clearly labeled in the order of their citation in the text. A reader should be able to read only the tables and easily understand all information without reading the text.
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