



Determinants of Primary Infertility Among Married Women Attending Obstetrics and Gynecology Speciality Centers at Adama Town, Oromia, Ethiopia

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Abstract: Primary infertility is denoted for those women who have not been conceived previously. There are many biological causes of infertility such as ovulatory factors, utero-tubal peritoneal factor, semen migration factor and the male factor respectively. However, comprehensive epidemiological studies on the risk factors for primary infertility are not well documented in Ethiopia in particular current study area so far. Therefore the objective of this study was to assess determinants of primary infertility and outcome among married women attending obstetrics and gynecology specialty centers at Adama Town, Oromia, Ethiopia, 2020. *Methods:* Institution based unmatched case control study was conducted from November 16 to December 30, 2020. A sample of 178 married women with 1:2 ratio (59: cases and 119; controls) who attended obstetrics and gynecology clinic at Adama Town were included in the study by stratified random sampling technique. Data were collected using structured interview-administered questionnaire. Then data were entered in to Epi-Info version 7 then exported to SPSS version 24 for processing and analysis. To identify determinants of primary infertility, binary logistic regression model was used. In final fitted regression model a p-value of less than 0.05 was considered to declare significance of association. *Result:* A total of 178 participants (59 cases and 119 controls) were included in the study making a response rate of 100%. A significant determinants of primary infertility in this study were: Rural residence [AOR]: 27.95 (7.0, 111)], Husband Engaged in High Temperature Occupation [AOR]: 18.86 (3.8, 93.4)], eating diet enriched with saturated fat [AOR]: 10.97 (3, 40.1)], not undergoing adequate sex [AOR]: 0.120 (0.03, 0.57)], Menstruation flow greater than 3 days [AOR]: 4.4 (1.17, 16.6)], Ever use contraceptives [AOR]: 0.146 (0.05, 0.405)] and Chronic pelvic pain [AOR]: 18.7 (3.6, 94)]. More than one third of cases (33.9%) reported that perceived causes of infertility were punishment from God/Allah. *Conclusion and recommendation:* Being Rural residence, husband engaged in high temperature occupation, eating diet enriched with saturated fat, not undergoing adequate sex, Menstruation flow greater than 3 days, Ever used contraceptives and Chronic pelvic pain were identified as determinants of women's primary infertility. Therefore we recommend all married women to take treatment of any gynecological diseases like pelvic inflammatory disease.

Keywords: Primary Infertility, Married Women, Adama Town, Ethiopia

1. Introduction

Infertility is defined by the World Health Organization as a

failure to achieve a clinical pregnancy in childbearing age after 12 months or more of regular unprotected sexual intercourse [1, 2]. It could be either primary or secondary. In primary infertility, the couples have never been able to conceive; while in

secondary infertility, there is difficulty in conceiving after having conceived, carried the pregnancy to term or had a miscarriage [3]. Normally it is observed that 50% couples conceive within 3 months of regular unprotected intercourse, 75% in 6 months and 80-85% conceive within a year [4]. Our study however dealt with primary infertility among married women.

Despite the fact that infertility affects both men and women fairly equally, Most of the time, women are blamed for it, considering it as a particular problem among females, particularly in developing countries [5]. Accordingly about 30% of infertility is due to female problems, 30% to male problems, and 30% to combined male/female problems, while in 10%, there is no recognizable cause [6]. The most common causes of female infertility is ovulation problem; tubal blockage, age related factors, uterine problems, sexual disorder and other unknown causes [7]. While Common causes of male infertility include poor sperm quality, structural or hormonal disorders, genetic disorders, decreased libido due to substance abuse or depression, or impotence, which is often linked to alcohol, or certain prescriptions such as antihypertensive or anti-seizure medications [8]. According to the findings of different studies, reproductive system disorders like sexually transmitted disease and endometrial and ovarian dysfunction, genetic factor, age, alcohol consumption, smoking, obesity, irregular menstrual cycle, age at menarche, age at marriage, and dysmenorrheal are found to be factors affecting infertility [9–11].

Globally, an predictable 580 million people suffer from infertility, approximately 372 millions of people exist in low- and middle-income nations [12]. The average prevalence of infertility in developed countries and developing countries is 3.5-16.7% and 6.9-9.3% respectively [11, 13]. In fact it was difficulty to get the accurate statistics across the world wide, there are about 10%-15% couples worldwide suffered from infertility [14]. According to a report by WHO, one in every four couples in developing countries is affected by infertility. The magnitude of the problem calls for urgent action, particularly when the majority of cases of infertility are avoidable [12].

Fertility and parenthood are highly valued in developing countries to the extent that procreation is usually considered the most important purpose of marriage [15]. Infertility management takes on an added dimension that is beyond the physical and organic and which is firmly embedded in the social and cultural environment of that region. It is a devastating burden on the social, economic, and personal wellbeing of those affected a burden that is disproportionately borne by women. Psychological stress, economic hardship, stigma, isolation, mental and physical violence have all been described as consequences of infertility [16–18].

Women not only suffer because they are mostly blamed for infertility, but they lose a very important chance to enhance their status. They are treated as an outcast after they die their bodies is buried on the outskirts of the town. Traditional customs such as having to wear a scarf until a woman has a child also contributes to more pressure on women who suffer from infertility [19]. It is also associated with marital instability; both males and females are engaged

in sex with multiple partners to prove their fertility. Consequently, infertile women commonly fear abandonment, divorce, and polygamy. There are also psychosocial consequences because; couples themselves view infertility as a tragedy, which carries social, economic, and physiological consequences like distress and depression [20, 21]. Moreover, in the absence of social security systems, older people are economically completely dependent on their children and infertile couples fail to pursue this chance [22].

Infertility is an important global health problem, but does not receive enough attentions and political will to directly address the problems associated with infertility especially in developing countries [14]. In Ethiopia, no study has comprehensively evaluated the burden and determinant factors of infertility, even though it is well documented in developed countries [23]. Thus, because there is no exact information on primary infertility and its determinants in Adama town so far, we decided to investigate determinants of infertility among married couple's women who attend obstetrics and gynecology clinic at Adama Town because determining causes of primary infertility can offer better clues in the process of infertility treatment.

2. Methods

2.1. Study Area and Period

This study was conducted in Adama town, one of the towns in East Showa Zone in Oromia regional state located 99 kilometers East away from the capital city of Ethiopia, Addis Ababa. It is located east Showa zone astronomically at 8 44' north latitude and 39 04' east longitude. The town administration consisting of 14 urban and 4 rural kebeles with a total population of 352,235 with a total household of 73,382 that is with an average of 4.8 persons per household according to the estimated population size of in 2010. The town has one governmental hospital that is Adama Hospital Medical College and many other non-governmental hospitals. Obstetrics and gynecology services offered at private and governmental health facilities in Adama town. Among private health facilities: Meristope International Ethiopia, Rift Vally Hospital, Bati MCH Center, Nurienat Specialized Center, Noah Specialized Center, Sister Aklesia Memorial Hospital, Medin Beza Hospital and Adama General Hospital Medical College. Among governmental health facility infertility was checked at AHMC. This study was conducted from November 16 to December 30, 2020.

2.2. Study Design

An institution-based unmatched case-control study design was used.

2.3. Populations

2.3.1. Source Population

The source populations for cases were all infertile married/cohabited women aged 15 to 49 years and while controls were all married/cohabited women aged 15 to 49

years who were on the first postnatal care from the same public and private GYN & OBS Specialty centers in Adama Town.

2.3.2. Study Population

The study populations for cases were sampled infertile married/cohabited women aged 15 to 49 years and whereas controls were sample of married/cohabited women aged 15 to 49 years who were on the first postnatal care from the same health facilities.

2.3.3. Study Unit

Randomly selected infertile women aged 15-49 and women on first post natal Care attending obstetrics and gynecology clinic at Adama Town during the data collection time.

2.4. Eligibility Criteria

2.4.1. Inclusion Criteria

The women who failed to achieve a clinical pregnancy for 12 months or more with regular unprotected sexual intercourse and married/cohabited women aged 15 to 49 years who were on the first postnatal care. All married women who participated in the study and being able to give consent were included in the study.

2.4.2. Exclusion Criteria

Women whose male partners were infertile and who had hearing and speaking problems were excluded.

2.5. Sample Size Determination and Sampling Procedure

2.5.1. Sample Size Determination

The required sample size was computed using open Epi Info

version 7 by considering the assumption that the ratio of cases to controls is 1: 2, the power was 80, the confidence level was 95%, the odds ratio (OR) was 4.17, the proportion of exposed cases (P₁) was 91.2%, and the proportion of exposed controls (P₂) was 71.27%(by taking the Menstruation flow greater than three days associated with women infertility recent study in Dessie, Ethiopia [23]. The sample size became 162. Taking the response rate of 10%, the final sample size was 178, and since the ratio of cases to controls was 1: 2, 59 samples were cases and 119 taken as controls.

2.5.2. Sampling Procedure

A stratified random sampling technique was used to select study participants from 8 private health facilities: Bati MCH center and Nurienat specialized center were selected by lottery method and the only governmental health facility (AHMC) that offered infertility checkup was also included in our study. The data obtained from each obstetrics and gynecology clinic at these three selected centers showed a total of 1,099 Reproductive age women got obstetrics and gynecology service per month from those clinics. First we stratified women into case (infertile) 183: Controls (fertile women on First PNC) 916. Then the second stratification was made into those selected obstetrics and gynecology clinics according infertile case by hospitals (Bati MCH center; 45, Nurienat specialized center; 52 and AHMC 86) and fertile controls on First PNC hospital (Bati MCH center; 54, Nurienat specialized center; 62 and AHMC 800). Lastly by systematic sampling technique was used to select study participants after proportional allocation made to each hospital (Figure 1).

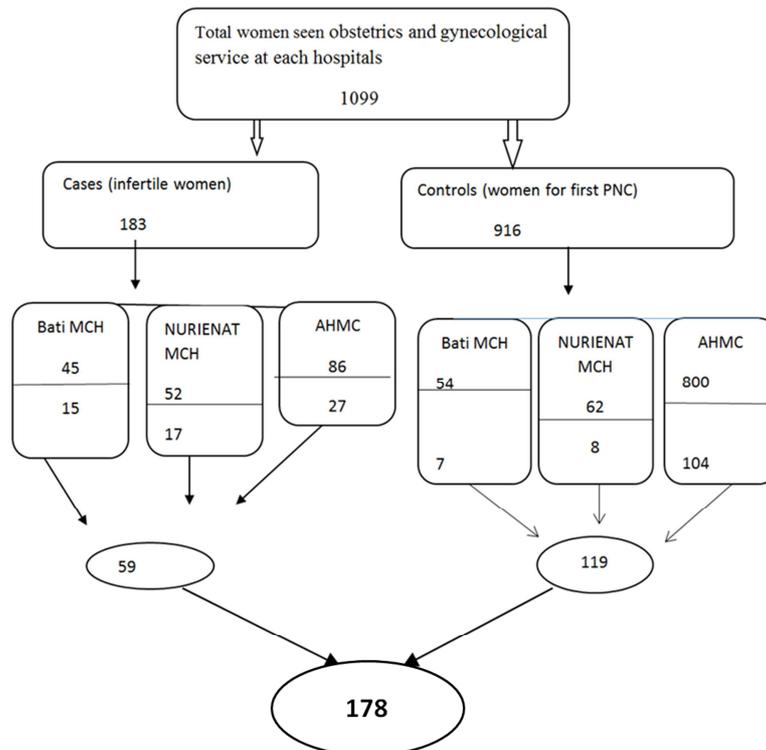


Figure 1. Sampling procedure.

2.6. Variables

2.6.1. Dependent Variable

Primary Infertility

2.6.2. Independent Variables

- 1) Socio-demographic factor: - Age, Education, Occupation, Marital states, Monthly income, Ethnicity, Religion, History of family infertility;
- 2) Behavioral: Cigarette Smoking, Alcohol consumption, chat chewing, eating diet enriched with saturated fat, not eating fruit and vegetables on regular basis, multiple sexual partner;
- 3) Health/medical related factors: History of chronic illness, History of STI, Obesity/overweight;
- 4) Male/female related factors: Menstruation flow in days, Previous contraceptive usage, Lower Sperm count, Lack of ovulation, Blocked fallopian tubes uterine abnormalities;
- 5) Psychological factors: Sexual violence, Anxiety, Depression.

2.7. Operational Definitions

- 1) Infertility: the inability to conceive after twelve months or more of regular unprotected sexual intercourse [10].
- 2) Primary infertility: a situation where couples married for at least one year have never achieved conception despite of having regular unprotected sexual intercourse [24].
- 3) Cases were married/cohabited women aged between 15 and 49 years who failed to achieve a clinical pregnancy after 12 months or more with regular unprotected sexual intercourse [23].
- 4) Controls were married/cohabited women aged between 15 and 49 years who were on the first postnatal care [23].
- 5) Normal male sperm analysis was when all parameters were in normal range (the volume >2ml, sperm concentration 20×10^6 spermatozoa/ml or more, total sperm count 40×10^6 spermatozoa/ml or more, morphology 30% or more with normal head, neck and tail, vitality; 75% or more live and Motility 50% with forwarding progression [25].
- 6) First postnatal care was the health care for women and their child for the first 24 hours after the delivery was completed.
- 7) History of contraceptive use was the use a contraceptive method (COC, IUD, implants, and injectable) before 2 years.
- 8) Uterine abnormality was the female uterus that differs from the normal structure and position of the uterus [26].
- 9) Substance use was an intentional ingestion of one or more psycho stimulant drugs (alcohol, khat, and cigarette smoking). Individuals who use any of the substances at least once in their lifetime were classified as ever users, and those who consumed at least once within the last 30 days were classified as current users.

2.8. Data Collection Tool and Data Quality Assurance

Data were collected using a pretested interviewer-administered structured questionnaire. adopted and modified from different kinds of literature [12, 23]. Weight and height were measured using a digital weight scale and a stadiometer,

respectively. Body Mass Index (BMI) was calculated for each participant. Medical and laboratory results were taken from the participant's medical folder. The women were asked during their visit to health facilities for health services. Data were collected by four trained BSc nurses.

To ensure quality of data, training were given for data collectors and supervisor for two days prior to study period on objectives of the study, how to collect data, regarding ethical issues, and on data quality. The questionnaire was also be pretested in 5% of sample size in Adama General Hospital and Medical College, one week prior to the actual data collection to determine it's appropriateness on the local context. The finding of the pretest was incorporated to modify and clarify the collection tool before actual data collection. The supervisor and principal investigator closely supervised the performance of the data collectors on a daily basis and the collected record sheets were thoroughly scrutinized every day at the end of data collection session and any inconsistencies were amended on time.

2.9. Data Processing and Analysis

Data were checked for completeness and entered into Epi info version 7 and exported to SPSS version 24 (IBM, New York, USA) for analyses. Bivariate binary logistic regression analyses were done to see the association between each independent variable and the outcome variable. Variables were entered into SPSS using a backward stepwise multivariable logistic regression to control for all possible confounders and to identify determinants of primary infertility. P-value 0.25 was used as a cutoff point to select candidate variables of the final model to improve the chances of retaining meaningful confounders. The adjusted odds ratios with it's 95% confidence interval were estimated to identify the determinants of infertility. The level of statistical significance was declared at a p-value <0.05.

2.10. Ethical Consideration

Ethical clearance was obtained from the Institutional Review Board of Adama General Hospital and Medical College. Then the objectives and importance of the study were explained to Adama Hospital Medical College, Bati MCH center and Nuriyat specialized center administrative office before the actual investigation. A written memorandum of understanding was signed between the Hospital administrator body and the investigator. Then all the participants can be explained about the purpose of the study and their right to participate in the study. Moreover, all personal information of the study participants was kept confidential.

3. Result

3.1. Socio-demographic Characteristics of the Study Participants

A total of 178 participants (59 cases and 119 controls)

were included in the study making a response rate of 100%. Thirty nine (66.1%) of cases and 39 (32.8%) of controls were from rural residence. Regarding their educational status; 27 (45.8%) of cases and 41 (37.0%) of controls were college and above in their literacy. In terms of Husband Occupation,

about 15 (25.4%) of cases and 7 (5.9%) of controls husband were engaged in high temperature work environment. Among study participants, 51 (86.4%) of cases and 113 (95.0) of controls earned average monthly income less than 5000 Ethiopian birr/month (Table 1).

Table 1. Socio-demographic Characteristics of infertile and fertile women attending Gynecology and Obstetrics Specialty Clinic at Adama Town, Oromia, Ethiopia, January 2021. (n=178; case=59, controls=119).

Variables	Category	Case (Infertile) N (%)	Control (Fertile) N (%)
Age	<30	43 (72.9)	96 (80.7)
	>30	16 (27.1)	23 (19.3)
Residence	Rural	39 (66.1)	39 (32.8)
	Urban	20 (33.9)	80 (67.2)
Educational Status	College and Above	27 (45.8)	41 (37.0)
	Primary and Secondary	11 (18.6)	63 (52.9)
	No Formal Education	21 (35.8)	15 (10.1)
Religion	Catholic	3 (5.1)	2 (1.7)
	Muslim	14 (23.7)	18 (15.1)
	Orthodox	37 (62.7)	67 (56.3)
	Protestant	5 (8.7)	32 (26.9)
Husband Engaged In High Temperature Occupation	Yes	15 (25.4)	7 (5.9)
	No	44 (28.2)	112 (94.1)
Average Monthly Income	<5000	51 (86.4)	113 (95.0)
	=>5000	8 (13.6)	6 (5.0)
Family History Of Infertility	Yes	14 (23.7)	34 (28.6)
	No	45 (76.3)	85 (71.4)
Occupation	Employed	28 (47.5)	46 (38.7)
	Farmer	6 (10.2)	40 (33.6)
	Merchant	8 (13.6)	15 (12.6)
	No Job	17 (28.8)	18 (15.1)

3.2. Lifestyle and Behavioral Characteristics of Study Participants

Of study participants, 17 (28.8%) of cases and 6 (5.0%) of controls had history of cigarettes smoking. In addition about 35 (59.3%) of cases and 56 (47.1%) of controls had history of drinking alcohol. Regarding chewing habit about 22 (37.8%) of cases and 25 (21.0%) controls had chat chewing

habit. Intermis of dietary habit, 43 (72.9%) of cases and 78 (65.5%) of controls were Eat fruit and vegetables less than 4 days in typical week. Moreover about 34 (57.6%) of cases and 28 (23.5%) of controls had the habit of eating diet enriched with saturated fat. Among study participants about 23 (39.0%) of cases and 18 (15.1%) of controls had a feeling of anxiety during sex and about 20 (33.9%) of cases and 19 (16.0%) of controls had a feeling of depression (Table 2).

Table 2. Lifestyle and Behavioral Characteristics of infertile and fertile women attending Gynecology and Obstetrics Specialty Clinic at Adama Town, Oromia, Ethiopia, January 2021. (n=178; case=59, controls=119).

Variables	Category	Case (Infertile) N (%)	Control (Fertile) N (%)
History of smoking	Yes	17 (28.8)	6 (5.0)
	No	42 (71.2)	113 (95)
History of Alcohol consumption	Yes	35 (59.3)	56 (47.1)
	No	24 (40.7)	63 (52.9)
History ofchewing chat	Yes	22 (37.8)	25 (21.0)
	No	37 (62.7)	94 (79.0)
Eatingof fruit and vegetables in typical week	<4	43 (72.9)	78 (65.5)
	>4	16 (27.1)	41 (34.5)
eating diet enriched with saturated fat	Yes	34 (57.6)	28 (23.5)
	No	25 (42.4)	91 (76.5)
History of underlying chronic illness like DM, hypertension	Yes	1 (1.7)	15 (12.6)
	No	58 (98.3)	104 (87.4)
Feeling of anxiety	Yes	23 (39.0)	18 (15.1)
	No	36 (61)	101 (84.9)
Feeling of depression	Yes	20 (33.9)	19 (16.0)
	No	39 (66.1)	100 (84.0)
Under go adequate sex	Yes	54 (91.5)	84 (70.6)
	No	5 (8.5)	35 (29.4)
Frequency of inter course	1-3 days	4 (6.7)	1 (0.8)
	4-6 days	23 (39.0)	47 (39.5)
	every day	32 (54.3)	71 (59.7)

3.3. Obstetric History of Infertile and Fertile Women

Among total, 44 (74.6%) of cases and 105 (88.2%) of controls had greater than 3-day menstruation flow. About 32 (54.2%) of case and 35 (29.4%) of controls had an irregular Menstrual pattern. From total, 24 (40.6%) of cases and 18

(15.1%) of controls had excessive menstruation flow. In terms of family planning utilization, nearly more than half (54%) of case and 103 (86.6%) of controls were use contraceptives. Nearly one third (27.1%) of cases and 10 (8.4%) of controls had chronic pelvic pain (Table 3).

Table 3. Obstetric History of infertile and fertile women attending Gynecology and Obstetrics Specialty Clinic at Adama Town, Oromia, Ethiopia, January 2021. (n=178; case=59, controls=119).

Variables	Category	Case (Infertile) N (%)	Control (Fertile) N (%)
Age of marriage in years	<30	51 (86.4)	119 (100)
	>30	8 (23.6)	0 (0)
Menstruation flow in days	<3	15 (25.4)	14 (11.8)
	>3	44 (74.6)	105 (88.2)
Frequency of menses	irregular	32 (54.2)	35 (29.4)
	regular	27 (45.8)	84 (70.6)
	moderate	15 (25.4)	100 (84.1)
Menstruation flow pattern	excessive	24 (40.6)	18 (15.1)
	scanty	20 (34.0)	1 (0.8)
	Yes	32 (54)	103 (86.6)
Ever use contraceptives	No	27 (46)	16 (13.4)
	<2	20 (60.6)	68 (57.1)
Duration of family planning utilization	>2	11 (30.4)	38 (42.9)
	Yes	8 (15.7)	43 (36.1)
Sexually transmitted infection	No	51 (84.3)	76 (63.9)
	Yes	12 (20.3)	15 (12.6)
Abnormal vaginal discharge	No	47 (79.7)	104 (87.4)
	Yes	16 (27.1)	10 (8.4)
Chronic pelvic pain	No	43 (72.9)	109 (91.6)

3.4. Determinants of Primary Infertility Among Women Seeking Health Service

From the result of binary logistic and multivariable logistic regression analysis, the significant predictors for primary infertility were: Rural residence [AOR]: 27.95 (7.0, 111)], Husband Engaged in High Temperature Occupation [AOR]: 18.86 (3.8, 93.4)], eating diet enriched with saturated fat [AOR]: 10.97 (3, 40.1)], not undergoing adequate sex [AOR]: 0.120 (0.03, 0.57)], Menstruation flow greater than 3 days [AOR]: 4.4 (1.17, 16.6)], Ever use contraceptives [AOR]: 0.146 (0.05, 0.405)] and Chronic pelvic pain [AOR]: 18.7 (3.6, 94)].

The odd of primary infertility increased 28 fold [AOR]: 27.95 (7.0, 111)] among women from rural residence as compared to women from urban residence. The odd of primary infertility 19 times [AOR]: 18.86 (3.8, 93.4)] more likely higher among women whose Husband Engaged in

High Temperature Occupation as compared to those that did not. Likewise the log odd of primary infertility increased by 11 fold [AOR]: 10.97 (3, 40.1)] among couples that eat diet enriched with saturated fat as compared to their counter parts. The odd of primary infertility was 88% less likely among couples not undergoing adequate sex as compared those that made adequate sex. The odds of primary infertility among women whose duration of menses was greater than 3 days were 4 times higher than those women whose duration of menses was less than or equal to 3 days.

Our study finding also showed the odd of primary infertility in women were 85% [AOR]: 0.146 (.05, 0.405)] less likely among family planning users as compared to those that did not use family planning. Moreover the log odd of primary infertility increased by 19 fold [AOR]: 18.7 (3.6, 94.0)] among women that complain Chronic pelvic pain as compared to those that did not (Table 4).

Table 4. Determinants of primary infertility among women seeking health service from Gynecology and Obstetrics Specialty Clinic at Adama Town, Oromia, Ethiopia, January 2021. (n=178; case=59, controls=119).

Variables	Category	Case N (%)	Control N (%)	COR (95% CI)	AOR (95% CI)
Age	<30	43 (72.9)	96 (80.7)	1.00	
	>30	16 (27.1)	23 (19.3)	.64 (.31, 1.34)	
Residence	Rural	39 (66.1)	39 (32.8)	4.00 (2.07, 7.75)*	27.95 (7.0, 111)
	Urban	20 (33.9)	80 (67.2)	1.00	
Husband Engaged In High Temperature Occupation	Yes	15 (25.4)	7 (5.9)	5.46 (2.083, 14.28)*	18.86 (3.8, 93.4)
	No	44 (28.2)	112 (94.1)	1.00	
Average Monthly Income	<5000	51 (86.4)	113 (95.0)	.34 (.112, 1.026)	
	=/>5000	8 (13.6)	6 (5.0)	1.00	
Family History Of Infertility	Yes	14 (23.7)	34 (28.6)	0.78 (0.38, 1.6)	
	No	45 (76.3)	85 (71.4)	1.00	

Variables	Category	Case N (%)	Contro IN (%)	COR (95% CI)	AOR (95% CI)
Eatingof fruit and vegetables in week	<4 days	43 (72.9)	78 (65.5)	1.41 (0.71, 2.81)	
	>4 days	16 (27.1)	41 (34.5)	1.00	
eating diet enriched with saturated fat	Yes	34 (57.6)	28 (23.5)	4.42 (2.27, 8.62)*	10.97 (3, 40.1)
	No	25 (42.4)	91 (76.5)	1.00	
chronic illness like DM, hypertension	Yes	1 (1.7)	15 (12.6)	0.12 (0.015, .928)*	
	No	58 (98.3)	104 (87.4)	1.00	
Feeling of anxiety	Yes	23 (39.0)	18 (15.1)	3.59 (1.737, 7.40)*	
	No	36 (61)	101 (84.9)	1.00	
Feeling of depression	Yes	20 (33.9)	19 (16.0)	2.7 (1.30, 5.59)*	
	No	39 (66.1)	100 (84.0)	1.00	
Under go adequate sex	Yes	5 (8.5)	35 (29.4)	0.22 (0.08, 0.6)*	0.120 (.03, .57)
	No	54 (91.5)	84 (70.6)	1.00	1.00
history of smoking	Yes	17 (28.8)	6 (5.0)	7.62 (2.82, 20.64)*	
	No	42 (71.2)	113 (95)	1.00	
history of Alcohol consumption	Yes	35 (59.3)	56 (47.1)	1.64 (.87, 3.08)	
	No	24 (40.7)	63 (52.9)	1.00	
ever chew chat	Yes	22 (37.8)	25 (21.0)	2.24 (1.12, 4.45)*	
	No	37 (62.7)	94 (79.0)	1.00	
Menstruation flow in days	<3	15 (25.4)	14 (11.8)	1.00	1.00
	>3	44 (74.6)	105 (88.2)	2.56 (1.14, 5.74)*	4.4 (1.17, 16.6)
Frequency of menses	irregular	32 (54.2)	35 (29.4)	2.84 (1.49, 5.43)*	
	regular	27 (45.8)	84 (70.6)	1.00	1.00
Ever use contraceptives	Yes	32 (54)	103 (86.6)	0.18 (.088, 0.38)*	0.146 (.05, .405)
	No	27 (46)	16 (13.4)	1.00	1.00
Duration of contraceptive utilization	<2	20 (60.6)	68 (57.1)	1.00	
	>2	11 (30.4)	38 (42.9)	1.016 (.44, 2.34)	
Sexually transmitted infection	Yes	8 (15.7)	43 (36.1)	0.28 (0.12, 3.56)	
	No	51 (84.3)	76 (63.9)	1.00	
Abnormal vaginal discharge	Yes	12 (20.3)	15 (12.6)	1.77 (0.77, 4.07)	
	No	47 (79.7)	104 (87.4)	1.00	
Chronic pelvic pain	Yes	16 (27.1)	10 (8.4)	4.06 (1.71, 9.64)*	18.7 (3.6, 94)
	No	43 (72.9)	109 (91.6)	1.00	
BMI	overweight	20 (33.9)	37 (31.1)	1.137 (0.58, 2.21)	
	Normal	39 (66.1)	82 (68.9)	1.00	
hemoglobin	anemic	14 (23.7)	61 (51.3)	0.29 (0.14, 2.6)	
	Normal	45 (76.3)	58 (48.7)	1.00	

3.5. Perceived Causes and Outcome of Infertility Among Married Women

From the finding it was observed that 20 (33.9%) of cases and 57 (47.9%) of controls reported that perceived causes of infertility were punishment from God/Allah. About 35 (59.3%) of cases and 53 (44.5%) of controls women perceive causes of infertility were either of couples not a problem of women only. In response to the question "What would you do if you were infertile, about 51 (86.4%) of cases and 64

(53.8%) of controls were reported they will visit health institution. With regard to question pertaining to " What happens to infertile women in the area in terms of their marriage and social activity due to their infertility?", about 17 (28.8%) cases and 47 (39.5%) of controls women reported get divorced. In addition nearly one third of cases (28.8%) and one third of controls women (32.8%) were reported that their husband will marry another woman while the supposedly infertile woman is living with him (Table 5).

Table 5. Perceived causes and outcome of infertility among married women from Gynecology and Obstetrics Specialty Clinic at Adama Town, Oromia, Ethiopia, January 2021. (n=178; case=59, controls=119).

Variables	Category	Case (Infertile) N (%)	Control (Fertile) N (%)
perceive causes of infertility	do not know	3 (5.1)	5 (4.2)
	either of couples	35 (59.3)	53 (44.5)
	genetic disease	1 (1.7)	4 (3.4)
	punishment from God/Allah	20 (33.9)	57 (47.9)
	do nothing	1 (1.7)	2 (1.7)
What would you do if you were infertile (Measures taken against infertility)	pray to god/Allah	0 (0)	50 (42.01)
	visit health institution	51 (86.4)	64 (53.8)
	visit witch craft	7 (11.9)	3 (2.49)
	get divorced	17 (28.8)	47 (39.5)
	marital disharmony	7 (11.9)	22 (18.5)
Consequences of infertile women in your area	no help her in house activity	0 (0)	9 (7.5)
	she will be social outcast	18 (30.5)	2 (1.7)
	the husband will marry another women	17 (28.8)	39 (32.8)

4. Discussion

Our study attempted to assess determinants of primary infertility among women who were seeking health service at Bati Maternal and Child Health center, Nuriyat specialized center and Adama Hospital Medical College gynecology and obstetrics specialty clinic in Adama town. Accordingly, variables like Rural residence, Husband Engaged in High Temperature Occupation, eating diet enriched with saturated fat, not undergoing adequate sex, Menstruation flow greater than 3 days, Ever use contraceptives and Chronic pelvic pain were identified as determinants of women's primary infertility.

In current study the odd of primary infertility increased by 28 fold among women from rural residence as compared to women from urban residence. This finding is consistent with Negdel et al and Mokhtar et al they reported that Females lived in rural areas were more likely to develop infertility relative to those living in urban areas [24, 27]. In contrast to our study the study by purkayesta and Abdullah shows urban women are more prone to experience infertility in some regions, which might be due to the differentials in environment and lifestyles. This result might come due to women who live in urban more vulnerable to pollutants and chemicals such as; polluted air from factories, vehicles and electric generators, in addition frequent use of detergents, cosmetic and pesticides [5, 28]. The probable justification for increased primary infertility among rural women in our case probably due to low access to health services particularly gynecology and obstetrics specialty clinic were not find in near proximate rural women which can be a barrier for them to undergo regular screening and majority of rural women also believe this infertility was God/Allah punishment and less likely to seek health institution.

This study also shows odd of primary infertility 19 times more likely higher among women whose Husband Engaged in High Temperature Occupation as compared to those that did not. This finding is in line with study by Cong et al from China that they reported Men who engaged occupations with high temperature working environment suffered from an infertility incidence of about four times more than the others [29]. Another study from Iran by Sharif et al also reports high-temperature occupations should also be listed as risk factor for male infertility [30]. The possible justification for this may high temperature reduces Sperm density, mobility and number of morphologically normal sperms [29, 30].

In current study we observed that the log odd of primary infertility increased by 11 fold among couples that eat diet enriched with saturated fat as compared to their counter parts. The finding by Cekici also supports our finding that unhealthy diet were significant determinants of infertility among male and female according his finding shows saturated fat, red meat, processed meats, fatty dairy products, sugar and sweeteners, alcohol and caffeine come to the

forefront as cause of infertility [31]. The possible justification for this High intake of Trans fatty acids cause significant decline in sperm concentration and sperm count and Trans fatty acids play a negative role in reproduction by increasing risk of ovulatory infertility in women with polycystic ovary syndrome [31].

In the present study it was observed that the odd of primary infertility was 88% less likely among couples not undergoing adequate sex as compared those that made adequate sex. this finding is in line with Marci et al that organic sexual dysfunction are regarded as a minor causes of infertility, with estimated rate of about 5% of all infertility cases [32]. This probably may result from male sexual disorder such as chronic erectile dysfunction and failure to ejaculate make conception impossible.

The result of current study shows the odds of primary infertility among women whose duration of menses was greater than 3 days were 4 times higher than those women whose duration of menses was less than or equal to 3 days. the finding by Bayu et al also supports our finding that they reports the odds of infertility among women whose duration of menses was greater than 3 days were 4.2 times higher than those among women whose duration of menses was less than or equal to 3 days [23]. This might be related to hormonal disorders. The inability of women at ovulation and regulation of hormone levels leads to hormonal imbalances. These hormonal disorders are characterized by symptoms such as irregular menstrual cycles, excessive bleeding or very little bleeding, absence of menstruation, or long menstruation periods which are risk factors for infertility [11]. In this study we found that the log odd of primary infertility increased by 19 fold among women that complain lower abdominal/pelvic pain as compared to those that did not. This finding in agreement with study by Musa indicated that the incidence of primary infertility was significantly higher women of chronic lower abdominal/pelvic pain increased the risk of infertility by more than three times [12].

Our study finding shows the odd of primary infertility in women were 85% less likely among family planning users as compared to those that did not use family planning. The finding of our study contradict with study from Nigeria that it was discovered that more than 50% of participants thought that previous use of oral contraceptive pill (OCP) and intra-uterine contraception device (IUCD), leads to infertility. This was a common belief in this region, regardless of the level of socio-economic status and education, that contraceptives themselves cause infertility. Many people believe that the use of exogenous hormones will eventually disrupt the body's natural functions, and lead to infertility [33]. The placement and removal of IUDs (intrauterine devices) are correlated with reproductive system infections, especially pelvic infections. An early study confirmed that pelvic infection is a vital factor leading to female infertility [29].

5. Strength and Limitation of Study

5.1. Strength

- 1) Response rate being 100%.
- 2) Randomization was used in selection of study participants.

5.2. Limitation of Study

- 1) Facility based study and findings may not be representative for the general population.
- 2) Due to the retrospective nature of case-control studies, recall bias could increase the likelihood that infertile women recall and report exposures compared to their controls, women on first PNC. Moreover, temporal relationships between studied risk factors and female infertility cannot be ascertained.
- 3) The study did not assess hormonal factor of infertility due to resource constraint.

6. Conclusion and Recommendation

6.1. Conclusion

Among several possible factors of primary infertility: Rural residence, Husband Engaged in High Temperature Occupation, eating diet enriched with saturated fat, not undergoing adequate sex, Menstruation flow greater than 3 days, Ever use contraceptives and Chronic pelvic pain were identified as independent determinants of women's primary infertility. More than one third of cases 33.9% of cases and 47.9% of controls reported that perceived causes of infertility were punishment from God/Allah. About 59.3% of cases and 44.5% of controls women reports perceive causes of infertility were either of couples not a problem of women only.

6.2. Recommendation

In order to decrease the risk of infertility and to increase the probability of conception among the married women, we recommend women husband to reduce high temperature occupation. We recommend all married infertile women to avoid consumption of diet enriched with saturated fat and to practice health diet. We also recommend married infertile women to undergo early detection and treatment of any gynecological diseases like lower abdominal/pelvic pain. We recommend health extension worker and health care provider to increase referral of infertile couples to centers of gynecological clinics to reduce preventable infertility. We recommend pregnant women to avoid common belief that family planning causes infertility as it is less likely to be causes of infertility. We recommend Adama town health office to expand infertility screening and gynecological services targeting rural community. We recommend researchers to conduct this study on large sample and experimental studies to accurately put exact causes of primary infertility.

Abbreviations/Acronyms

AOM	Age of Menarche
ART:	Artificial Reproductive Technology
COR:	Controlled Ovarian Hyper stimulation
CVD:	Cardiovascular Disease
ESHRE:	European Society of human Reproduction and Embryology
FGAE:	Family Guidance Association of Ethiopia
FIDs:	Fertility Inducing Drugs
FSH	Follicle stimulating hormone
GBD:	Global Burden of Disease
GIFT:	Gamete Intra-fallopian transfer
ICSI:	Intra-Seminal Sperm Injection
IUI:	Intrauterine Insemination
IVF:	In-vivo Fertilization
LHL	lutinizing hormone
MCH:	Maternal and Children Health
NCCWCH:	National Collaborating Center for Women's and Children's Health
OHSS:	Over hyper stimulation Syndrome
PCOS:	Polycystic Ovarian Syndrome
PROM:	Preterm pre-labor rupture of membranes
STD:	Sexually Transmitted Disease
WHO:	World Health Organization
ZIFT:	Zygote Intra fallopian transfer

Compliance with Ethical Standards

Conflict of Interest

The authors declare that they have no competing interests.

Financial Disclosure

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Ethics Approval

Ethical Approval was obtained from Adama General and Medical College, Adama Town Health Office.

Key Message

Original data is available on request.

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