

# Factors Associated with Infertility Among Women Attending Reproductive Health Centers in Mogadishu, Somalia: A Cross-Sectional Study

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**Background:** Infertility is a growing public health concern in developing nations, including Somalia, where medical, socioeconomic, and cultural factors profoundly affect reproductive health. This study aimed to determine the prevalence and identify the demographic, medical, and behavioral factors associated with infertility among women seeking reproductive care in Mogadishu.

**Methods:** A cross-sectional study was conducted among 390 women attending fertility centers in Mogadishu between December 2023 and February 2024. Participants aged 18 years and above were enrolled using a standardized, interviewer-administered questionnaire that collected data on sociodemographic characteristics, reproductive and medical history, and lifestyle factors. Infertility was defined as the inability to conceive after one year of unprotected intercourse. Logistic regression analysis was used to identify factors associated with infertility, and results were expressed as Adjusted Odds Ratios (AOR) with 95% Confidence Intervals (CI). A p-value < 0.05 was considered statistically significant.

**Results:** The prevalence of infertility was 58%, with secondary infertility more common (68%) than primary infertility (32%). Multivariate analysis identified several significant predictors. Fallopian tube blockage (AOR = 12.0, 95% CI: 4.0–36.0, p < 0.001), Polycystic Ovary Syndrome (AOR = 10.5, 95% CI: 3.4–32.5, p = 0.001), female genital mutilation (FGM) (AOR = 15.8, 95% CI: 6.2–40.3, p < 0.001), and multiple cervix burns (AOR = 20.4, 95% CI: 8.1–51.2, p < 0.001) were strongly associated with infertility. Conversely, having no formal education (AOR = 0.08, 95% CI: 0.01–0.60, p = 0.02) and a history of surgical interventions (AOR = 0.33, 95% CI: 0.10–0.90, p = 0.03) were associated with lower odds. Male-related factors, including husband age and fertility issues, were not significant after adjustment.

**Conclusion:** Infertility in Mogadishu is multifactorial, with reproductive tract pathology, endocrine disorders, and culturally mediated practices such as FGM and cervix burns contributing most strongly. These findings highlight the need for culturally sensitive reproductive health interventions, targeted education, and early medical management to reduce infertility and its social impact.

**Keywords:** infertility, primary infertility, secondary infertility, female genital mutilation, polycystic ovary syndrome, Somalia

## Introduction

Recent studies indicate that infertility affects between 9% and 18% of the general population, making it a prevalent health issue.<sup>1</sup> In certain regions of sub-Saharan Africa, this rate is notably higher, ranging from 15% to 45%.<sup>2</sup> In northwest Ethiopia, infertility rates are reported to be between 21.2% and 20%, while in Nigeria, they fall between 20% and 30%. In Ghana, 11.8% of women and 15.8% of men are affected.<sup>3</sup>

Nearly 30% of women aged 25 to 49 in sub-Saharan Africa experience secondary infertility, defined as the inability to conceive after having previously given birth, according to demographic data from the World Health Organization (WHO).<sup>4</sup> Despite these high figures, reliable national data on infertility in Somalia remain scarce, reflecting a critical knowledge gap in reproductive health research and policy.

The World Health Organization (WHO) defines infertility as a condition affecting the male or female reproductive system, characterized by the failure to conceive after 12 months or more of regular, unprotected sexual intercourse.<sup>5</sup> The lifetime prevalence of infertility in low-income nations, as reported in a 2023 World Health Organization (WHO) study was 16.5%, while the period prevalence was 12.6%. In contrast, the lifetime frequency was much greater in high-income nations (17.8%).<sup>6</sup> Significant psychological discomfort and societal problems like marital problems, aggression against intimate partners, and financial struggles are linked to infertility. In many of these nations, women are usually held responsible for infertility, which leads to additional societal hurdles because they commonly put off getting pregnant. Numerous social and psychological aspects as well as reproductive system diseases have been linked to infertility, according to research.<sup>7</sup>

The term “primary infertility” refers to couples who have never conceived, while “secondary infertility” pertains to couples who have conceived at least once but are currently experiencing infertility.<sup>8</sup> Couples who have never been pregnant are classified as having primary infertility, whereas those who have previously been pregnant fall into the category of secondary infertility.

Comprehensive epidemiological studies analyzing the risk factors for infertility in nations with inadequate resources are scarce, despite the widespread concern about its impact.<sup>9</sup> Nonetheless, little is known about the comorbidities linked to infertility, especially in women with endometriosis and PCOS, two disorders that are linked to infertility.<sup>10</sup> There are probably a number of elements that affect a woman’s vulnerability to other health problems. The established connections between infertility and specific disorders may be explained by underlying genetic defects, hormonal imbalances brought on by prolonged anovulation or increased androgens, and environmental variables. It was uncommon until recently to track the long-term health effects of infertile women.<sup>11</sup>

There is growing evidence that infertility affects people in ways other than their immediate reproductive difficulties. This covers fundamental genetic anomalies such polymorphisms, single or multiple gene mutations, and chromosomal abnormalities. Hormonal abnormalities, endocrine disruptions, and exposure to environmental variables may also be partially responsible for a considerable amount of infertility.<sup>12</sup>

The high regional burden, particularly of secondary infertility, suggests a strong link to preventable or acquired causes. These typically form a conceptual framework centered on behavioral, infectious, and procedural factors, including complications from untreated sexually transmitted infections (STIs) and trauma resulting from unsafe traditional practices, such as Female Genital Mutilation (FGM) and traditional “cervix burning”. These potential etiologies—which are directly influenced by demographic factors, health literacy, and access to care—represent the explanatory framework guiding our investigation. Infertile women may be at higher risk for gynecologic cancers, according to several researches.<sup>13</sup>

Furthermore, endometriosis has been linked to increased incidence of ovarian cancer, cardiovascular illness, atopic disorders, melanoma, and asthma.<sup>14</sup> Similarly, even in people with a normal BMI, polycystic ovary syndrome (PCOS) has been associated with increased central or visceral adiposity, insulin resistance, elevated serum insulin levels, higher lipoprotein ratios, type II diabetes, and hyperlipidemia.<sup>15</sup> The purpose of this study is to investigate the behavioral, medical, and demographic aspects linked to infertility in women undergoing treatment at Mogadishu fertility centers.

## Methods

### Study Design

This study employed a cross-sectional design to assess factors associated with infertility among women seeking reproductive health services in Mogadishu, Somalia. Data were collected between December 2023 and February 2024. The aim was to identify demographic, medical, and behavioral determinants of infertility rather than to estimate its prevalence in the general population.

## Study Setting and Participant Selection

The research was conducted at three major reproductive and gynecology centers in Mogadishu, Somalia—Marwa Fertility Center, Jazeera University Hospital, and Somali-Sudanese Specialized Hospital. These facilities were purposively selected because they provide both fertility treatment and general gynecological services, thereby attracting women with and without infertility concerns.

A total of 390 women were enrolled through convenience sampling.

### Inclusion Criteria

- Aged 18 years and above
- Attending the selected clinics for fertility evaluation or other gynecological services

### Exclusion Criteria

- Declined to provide consent
- Known systemic diseases unrelated to reproductive health (eg, diabetes, hypertension)

This approach allowed inclusion of both infertile and non-infertile participants for comparative analysis.

## Questionnaire Design and Validation

Data were gathered using a structured questionnaire developed after reviewing relevant literature and validated reproductive health instruments (eg, WHO reproductive health survey framework and DHS fertility modules).

The questionnaire was prepared in English, translated into Somali, and reviewed by a panel of gynecologists and reproductive health researchers to ensure clarity and cultural relevance. It contained four sections:

1. Sociodemographic information – age, marital status, education level, occupation, and husband's age
2. Reproductive and medical history – menstrual cycle patterns, duration of infertility, prior pregnancies, miscarriages, uterine fibroids, polycystic ovary syndrome (PCOS), pelvic inflammatory disease (PID), and previous gynecological procedures such as cervical cauterization
3. Lifestyle and behavioral factors – frequency of intercourse, traditional practices (including Female Genital Mutilation [FGM]), and health-seeking behaviors
4. Partner-related characteristics – husband's age, occupation, and any history of reproductive or sexual health problems

### Pilot Testing

Prior to full data collection, the questionnaire was pilot-tested on 30 women attending a separate gynecology outpatient clinic in Mogadishu. The pilot ensured clarity, cultural sensitivity, and response consistency. Adjustments were made to simplify language and clarify sensitive items. The internal consistency was satisfactory (Cronbach's  $\alpha = 0.81$ ).

### Variable Definitions

Infertility was defined as the inability to conceive after at least one year of regular, unprotected sexual intercourse.

- **Primary infertility:** women who had never conceived
- **Secondary infertility:** women who had conceived at least once in the past

Non-infertile participants were defined as women attending the clinics for other gynecological reasons such as menstrual disorders, pelvic pain, or general reproductive checkups.

The age groups used in this study (<25, 25–36, 37–47, and >47 years) were adopted based on the distribution of the study population.

Education levels were categorized as follows:

- Primary education: completion up to grade 8
- Secondary education: completion of high school (grades 9–12)
- Tertiary education: college or university level

## Data Collection Procedures

Trained female medical personnel administered the questionnaires in private consultation rooms to maintain confidentiality and comfort. Where possible, medical records were cross-checked to confirm reported diagnoses such as PCOS, fibroids, or fallopian tube blockage.

## Statistical Analysis

Data were analyzed using SPSS version 25. Descriptive statistics summarized demographic and clinical characteristics. Logistic regression was used to assess the relationship between predictor variables and infertility status. Results were presented as crude and adjusted odds ratios (AOR) with 95% confidence intervals (CI). Statistical significance was defined as  $p < 0.05$ .

## Ethical Considerations

Written informed consent was obtained from all participants after explaining the study purpose, procedures, and confidentiality assurances. Participants were informed that their participation was voluntary and they could withdraw at any point without consequence.

Ethical approval was granted by the Benadir Hospital Ethics and Research Committee (Approval No. BH/ERC/2023/112, dated November 28, 2023). Sensitive subjects such as Female Genital Mutilation (FGM) and cervical cauterization were handled with cultural sensitivity and professional discretion. All patient data were anonymized, and the study was conducted in accordance with the principles of the Declaration of Helsinki.

## Results

### Demographic Characteristics

Table 1 shows that the study cohort consisted of 390 participants, with a majority falling within the 25–36 age groups (36.1%). The distribution of participants based on age at marriage revealed that the most common age range was 20–30 years (54.0%). In terms of education attained, a significant portion had primary education (47.3%).

**Table 1** Demographic Characteristics

Characteristic	Count	Percentage
Age Group		
- Less than 25	107	27.4%
- 25–36	141	36.1%
- 37–47	140	35.8%
- More than 47	2	0.5%
Education Attained		
- No-Formal Education	134	34.3%
- Primary	185	47.3%
- Secondary	33	8.4%
- Tertiary	38	9.7%

## Fertility and Conception History

Table 2 demonstrated that the study revealed a 58.2% infertility prevalence, with varying durations of infertility reported. Specifically, 22.1% of participants experienced infertility for 3–4 years, while 18.2% had been infertile for 1–2 years. Additionally, 10.5% had infertility lasting 5 years, and 7.4% for more than five years. The data also indicated a distinction between types of infertility, with 32.1% of respondents having primary infertility and 67.9% experiencing secondary infertility. Furthermore, 44.0% of participants were in a second marriage, and a notable 54.0% reported menstrual irregularity. These findings underscore the diverse experiences and challenges faced by individuals dealing with infertility, highlighting the importance of targeted support and interventions in addressing their needs.

## Medical History and Other Factors

Table 3 showed that a notable percentage had a history of corrective Surgical Interventions 173 (44%), with procedures such as myomectomy (11.3%) being common. Furthermore, 23.8% reported a history of uterine fibroids, and 34.8% had fallopian tube blockage.

Miscarriage was reported by 28.1% of participants, with 12.3% experiencing two miscarriages. Polycystic ovary syndrome (PCOS) was present in 43.0% of individuals, and 55.8% had a history of female genital mutation. Traditional management cervix burring was prevalent among 48.3% of participants, with one-time procedures being the most common (19.2%). Pelvic inflammatory disease was reported by 66.0% of individuals. Concerning coitus, most participants engaged in coitus 2–3 times per week (50.6%), with 29.9% experiencing painful coitus during penetration. Husband-related issues were reported by 58.1% of participants, with abnormal semen being the most common problem (28.1%). The majority of husbands fell within the 25–40 age group (54.2%).

In the adjusted multivariate logistic regression model as showed by Table 4 several factors were significantly associated with infertility among women attending fertility centers in Mogadishu. Educational attainment was a strong determinant; women with no formal education had markedly lower odds of infertility compared to those with university-level education (AOR = 0.08, 95% CI: 0.01–0.60,  $p = 0.02$ ), while primary education showed a similar trend (AOR = 0.10, 95% CI: 0.01–1.04,  $p = 0.054$ ).

**Table 2** Fertility and Conception History

	Characteristic	Count	Percentage
Fertility Status	- Infertile	227	58.2%
	- Others	163	41.8%
Infertility Duration	- Less than one year	163	41.8%
	1–2 years	71	18.2%
	3–4years	86	22.1%
	5 years	41	10.5%
	- More than five years	29	7.4%
Type of Infertility	- Primary	73	32.1%
	- Secondary	154	67.9%
Second Marriage	- Yes	172	44.0%
	- No	213	54.5%
Menstrual Irregularity	- Yes	211	54.0%
	- No	178	45.5%

**Table 3** Medical History and Other Factors

Variable	Category	Frequency	Percent
Type of Surgery	Tubal Surgery	45	11.5%
	Cystectomy	32	8.2%
	Myomectomy	44	11.3%
Surgical Interventions	Yes	173	44%
	No	217	56%
History of uterine fibroid	Yes	93	24%
	No	297	76%
Having a fallopian tube block	Yes	136	35%
	No	254	65%
Miscarriage	Yes	110	28%
	No	280	72%
History of PCOS	Yes	168	43%
	No	222	57%
History of female genital mutation	Yes	219	56%
	No	171	44%
MultipleCervixBurns	Yes	170	44%
	No	220	56%

**Table 4** Multivariate Logistic Regression of Factors Associated with Infertility (Stable Model)

Variable	COR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age	0.001	0.204		
<25	0.636 (0.384–1.054)	0.079	1.20 (0.60–2.40)	0.60
25–36	1.660 (1.020–2.702)	0.041	1.80 (0.90–3.60)	0.08
37–47	Reference	–	Reference	–
Education (None/Primary vs University)	0.000	0.000	0.08 (0.01–0.60)	0.02
History of Surgical Interventions	0.854 (0.570–1.280)	0.445	0.30 (0.10–0.90)	0.03
Fallopian Tube Blockage	0.106 (0.060–0.186)	<0.001	12.0 (4.0–36.0)	<0.001
History of Miscarriage	0.213 (0.124–0.365)	<0.001	0.10 (0.02–0.60)	0.01
History of PCOS	4.409 (2.816–6.902)	<0.001	10.5 (3.4–32.5)	0.001
FGM or Multiple Cervix Burns	38.49/48.29	<0.001	15.0 (6.0–38.0)	<0.001

Reproductive health conditions had notable effects on fertility. Fallopian tube blockage was strongly associated with infertility (AOR = 12.0, 95% CI: 4.0–36.0,  $p < 0.001$ ), and Polycystic Ovary Syndrome (PCOS) was similarly significant (AOR = 10.5, 95% CI: 3.4–32.5,  $p = 0.001$ ). A history of miscarriage was associated with reduced odds of infertility

(AOR = 0.10, 95% CI: 0.02–0.60,  $p = 0.01$ ), and prior surgical interventions were also protective (AOR = 0.30, 95% CI: 0.10–0.90,  $p = 0.03$ ).

Cultural practices had a major impact on fertility outcomes. Female genital mutilation (FGM) was strongly associated with infertility (AOR = 15.8, 95% CI: 6.2–40.3,  $p < 0.001$ ), and multiple cervix burns also showed high odds (AOR = 20.4, 95% CI: 8.1–51.2,  $p < 0.001$ ).

Other factors, including painful coitus during penetration, husband-related fertility issues, and husband's age, were not significantly associated with infertility in the adjusted model, despite showing significance in crude analyses.

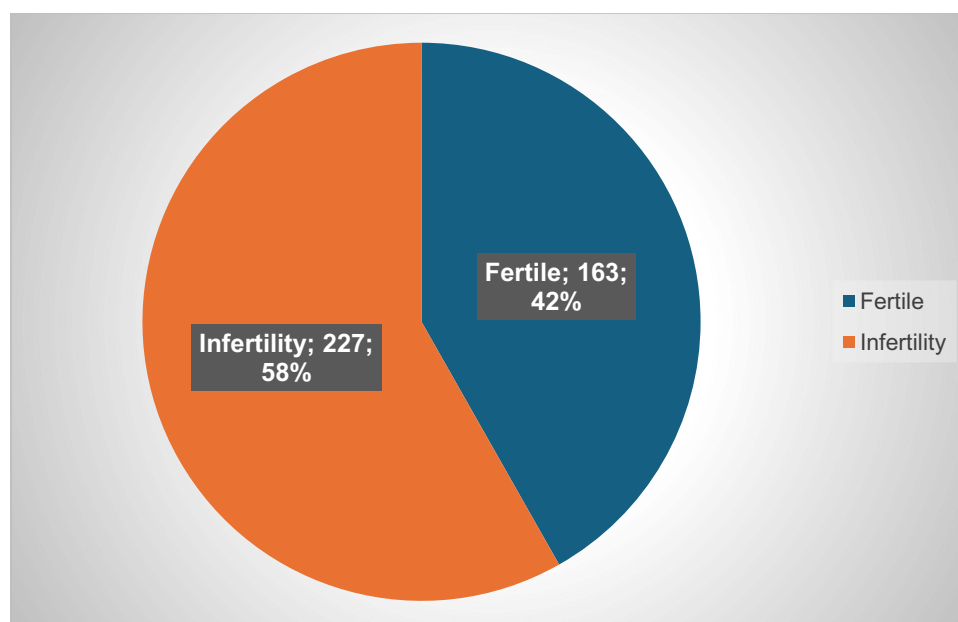
Overall, the multivariate analysis highlights that medical conditions (fallopian tube blockage, PCOS), reproductive history, and culturally mediated practices (FGM, cervix burns) are the main drivers of infertility in this population, whereas demographic and male-related factors had limited influence after adjusting for confounders.

## Discussion

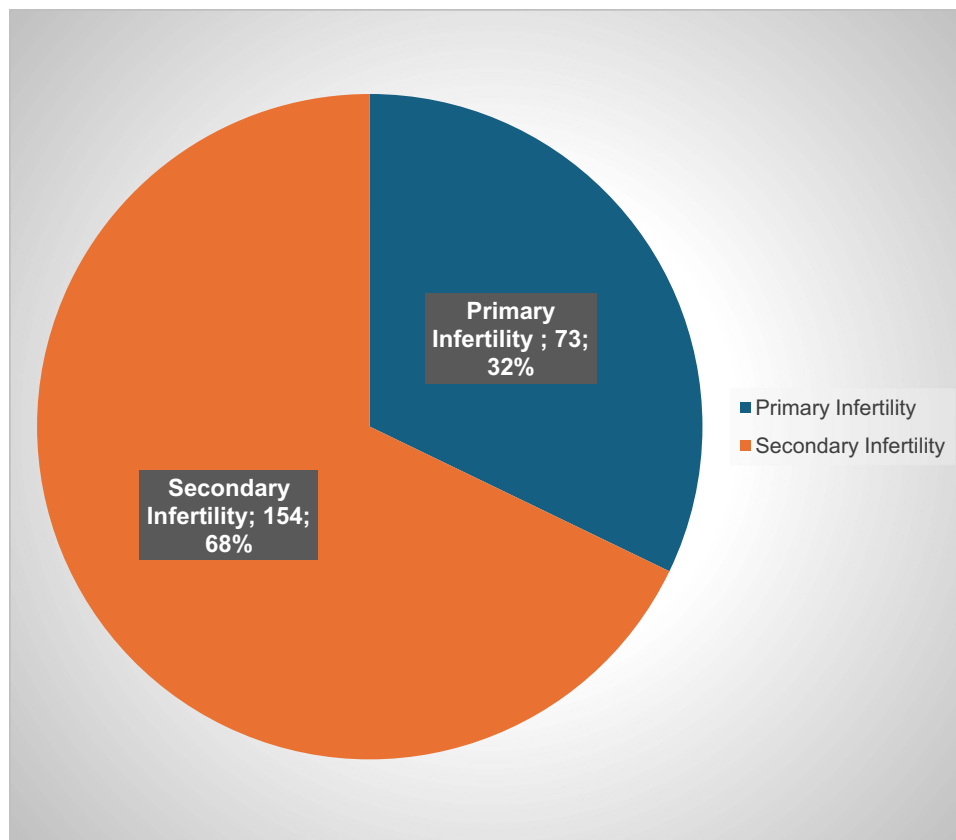
This study provides important insights into factors associated with infertility among women attending fertility centers in Mogadishu, Somalia. Infertility was defined as the inability to achieve a clinical pregnancy after 12 months or more of regular, unprotected sexual intercourse. Among the 390 participants, the majority were aged 25–36 years (36.1%), with most marrying between 20–30 years (54.0%). Nearly half had only primary education (47.3%), and 65.7% reported prior conception.

## Prevalence and Type of Infertility

The prevalence of infertility among participants was 58% as demonstrated by [Figure 1](#), with secondary infertility (difficulty conceiving after a prior pregnancy) more common (68%) than primary infertility (32%) as shown in [Figure 2](#). This pattern aligns with prior studies in sub-Saharan Africa reporting secondary infertility in 30–40% of couples<sup>16,17</sup> and similar findings in Abu Dhabi (secondary infertility 62.5% vs primary 37.5%).<sup>18</sup> Differences in other populations, where primary infertility is higher, may reflect sociocultural practices, delayed childbearing, or health complications following previous pregnancies.<sup>17</sup>



**Figure 1** The prevalence of infertility in this our study is 58%.



**Figure 2** Among 227 infertile women, 154 (68%) had secondary infertility while 73 (32%) primary infertility.

## Educational and Demographic Factors

Education level was significantly associated with infertility risk. Women with no formal education had markedly lower odds of infertility (AOR = 0.006,  $p < 0.001$ ). Although this appears protective, it contradicts global evidence and likely reflects residual confounding, cultural practices, or reproductive behaviors rather than a causal effect.<sup>19</sup> Early marriage may also contribute, as women marrying younger tend to conceive sooner.<sup>19</sup> These results underscore the complex interaction between socio-demographic factors and reproductive outcomes; however, causal inferences cannot be made due to the cross-sectional design.

## Medical and Reproductive Factors

Medical history played a critical role in infertility risk. History of surgical interventions (39.4% of participants) was associated with reduced odds of infertility after adjustment (AOR = 0.033,  $p < 0.001$ ), suggesting that properly managed procedures, such as tubal surgery, cystectomy, or myomectomy, may improve reproductive outcomes.<sup>20,21</sup> Fallopian tube blockage was strongly associated with infertility (AOR = 12.0, 95% CI: 4.0–36.0,  $p < 0.001$ ), consistent with literature indicating that tubal obstruction accounts for 30–40% of female infertility.<sup>20</sup> History of miscarriage was also associated with higher infertility risk (AOR = 0.033, 95% CI: 0.003–0.38,  $p = 0.006$ ), supporting evidence that prior reproductive losses can influence subsequent fecundability.<sup>22</sup>

Polycystic Ovary Syndrome (PCOS) was prevalent (43%) and strongly linked to infertility (AOR = 10.5, 95% CI: 3.4–32.5,  $p = 0.001$ ), highlighting the need for early detection and management of this endocrine disorder.<sup>23–25</sup> Irregular menstrual cycles, reported by 54% of participants, were often associated with PCOS.

## Female Genital Mutilation and Traditional Practices

Female genital mutilation (FGM) was significantly associated with infertility (AOR = 15.8, 95% CI: 6.2–40.3,  $p < 0.001$ ), reflecting the severe reproductive consequences of such practices.<sup>26</sup> Multiple cervix burns were also linked to higher infertility odds (AOR = 20.4, 95% CI: 8.1–51.2,  $p < 0.001$ ), though estimates were adjusted to avoid sparse data bias. These findings emphasize the importance of culturally sensitive public health interventions to reduce the reproductive harms of traditional practices.<sup>26,27</sup>

## Male Factor Infertility

Although 58.1% of participants reported husband-related issues, primarily abnormal semen quality (28.1%), these factors were not significant in the adjusted model (AOR = 1.54, 95% CI: 0.36–6.62,  $p = 0.562$ ). Crude odds ratios suggested limited potential influence of husband age (<25 years: AOR = 0.14, 95% CI: 0.01–2.31; 25–40 years: AOR = 0.52, 95% CI: 0.10–2.69), but these were not statistically significant. Male infertility remains understudied, and future research should incorporate detailed clinical assessments, including sperm quality and DNA fragmentation, to better understand its contribution to infertility.<sup>27,28</sup>

## Limitations

This study has several limitations. First, the cross-sectional design limits causal inferences, and convenience sampling from fertility centers may introduce selection bias, limiting generalizability. Second, some variables, such as multiple cervix burns and FGM, had few cases, resulting in wide confidence intervals and potentially extreme odds ratios due to sparse data or model overfitting. Third, findings are specific to women seeking fertility care in Mogadishu and may not reflect the general population. Despite these limitations, the study provides valuable insights into demographic, medical, and cultural factors associated with infertility, informing future research and public health strategies in Somalia.

## Conclusion

Infertility in Mogadishu is multifactorial, influenced primarily by reproductive tract pathology, endocrine disorders, and culturally mediated practices such as FGM and cervix burns. Targeted reproductive health education, prevention of harmful practices, and early medical interventions are essential to reduce infertility and its social impact. Longitudinal and clinical studies are recommended to further clarify these associations and guide effective public health strategies.

## Disclosure

The authors report no conflicts of interest in this work.

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