

Fertility desire and associated factors among antiretroviral therapy users in South Gondar Zone, Northwest Ethiopia, 2022

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Abstract

Introduction: There were approximately 38 million human immune deficiency virus/acquired immune deficiency syndrome cases worldwide in 2019, of which 36.2 million were adult cases, of these 25.4 million had access to antiretroviral therapy. The desire to have children among human immune virus-infected people has significant implications for the transmission of the human immune virus. In many developing countries such as Ethiopia, where the prevalence of the human immune virus is high, the risk of human immune virus transmission to the baby is inevitable.

Objective: This study's objective is to evaluate fertility desire and associated factors among antiretroviral therapy users at South Gondar public hospitals, Northwest Ethiopia, 2022.

Methods: A multicenter institutional-based cross-sectional study design was conducted among patients attending antiretroviral therapy at South Gondar Zone public hospitals, from April 1 to May 30, 2022. A total of 551 study participants were selected using systematic random sampling. Data were collected through face-to-face interviews using a pretested, semi-structured questionnaire. The data were entered into Epi-Data version 4.6 and then exported to SPSS version 26 for analysis. Multivariable logistic regression analysis was performed to identify factors associated with the outcome variable, and adjusted odds ratios with 95% confidence intervals were calculated to determine the level of significance.

Result: The study included 551 participants with a 100% response rate. The prevalence of fertility desire among antiretroviral therapy users in South Gondar Zone public hospitals was 42.5% (95% confidence interval: 38.6, 46.8). Independent predictors of fertility desire included being a merchant (adjusted odds ratio=0.06; 95% confidence interval: 0.01, 0.08), being a farmer (adjusted odds ratio=0.21; 95% confidence interval: 0.09, 0.47), having no children (adjusted odds ratio=20.04; 95% confidence interval: 4.7, 24.2), disclosing HIV status (adjusted odds ratio=0.05; 95% confidence interval: 0.01, 0.30), and being diagnosed with HIV (adjusted odds ratio=15.5; 95% confidence interval: 12.79, 20.54).

Conclusions: The prevalence of fertility desire among antiretroviral therapy users is found to be high. It is important to improve the existing Information, Education, and Communication interventions on fertility desire among antiretroviral therapy attendants at the individual and community levels.

Keywords

Anti retrovirus therapy, fertility desire South Gondar

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Introduction

Fertility desires is the intention to have more children despite the diagnosis of human immune deficiency virus (HIV).¹ Since the widespread introduction of antiretroviral therapy (ART), the number of diseases and fatalities related to HIV/acquired immunodeficiency syndrome (HIV/AIDS) has greatly declined. Additionally, the quality of life for people living with HIV (PLHIV) has significantly improved,

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leading to an increased desire among them to have children.² The desire to have a child reflects the wish of people living with HIV (PLHIV) to have children in the future, despite their diagnosis. If PLHIV want to have children, it is crucial that they receive counseling from medical professionals to ensure planned pregnancies and reduce the risk of mother-to-child transmission.³ However, a significant number of HIV-positive individuals who wish to have more children have not discussed reproductive health and family planning with their medical professionals in various settings.⁴ HIV/AIDS primarily affects sexually active individuals in the economically productive age group of 25–49, with high fertility rates and a desire for larger families often linked to the socioeconomic status of people living with HIV, particularly in low-income countries such as Ethiopia. In Ethiopia, the most affected groups are young people, women, and those living in urban areas. Efforts are ongoing to raise awareness and provide support to those impacted by the HIV/AIDS pandemic. In Sub-Saharan Africa, the region most affected by HIV, women and girls remain the hardest hit, accounting for 59% of all new HIV infections in 2019.⁵ High fertility rates and the desire to have more children are often linked to the socioeconomic status of both HIV-positive and HIV-negative individuals, a common trend in many low-income countries, including Ethiopia.⁶

In many developing countries like Ethiopia, where the prevalence of HIV is high the risk of HIV transmission to the baby is inevitable.⁷ Despite these risks and challenges, many people living with HIV decide to have children.⁸ However, the desire to have children among HIV-positive people has serious consequences for HIV transmission to sexual partners and babies.⁷ So far, the evidence on reproductive desire among HIV-positive people on highly active antiretroviral therapy has led to inconsistent results.^{9–11} ART has unquestionably improved health, leading to substantial drops in HIV-related morbidity and death as well as increases in quality of life.¹² Advances in HIV/AIDS treatment and management have significantly reduced the challenges faced by PLHIV when having children, as ART and measures to prevent mother-to-child transmission (PMTCT) have become more widely available, and global patterns of morbidity and mortality have shifted.¹³

Fertility concerns in PLHIV have changed in favor of childbearing through PMTCT and safe conception therapies now that HIV is considered a treatable chronic condition.² The desire to have children has been changed into a genuine intention, thanks to ART.^{2,14}

In 2019, there were approximately 38 million people worldwide living with HIV/AIDS, with 36.2 million of them being adults.⁸

According to the Ethiopian Public Health Institute's (EPHI) HIV-related assessments and forecasts for 2017, the national HIV prevalence rate was 1.16% in 2017. There are 722,248 HIV-positive people in the world, with 60.5% of them being women.⁹

In 2018, 23.3 million persons with HIV received ART globally, with 65% of HIV patients in Ethiopia receiving treatment.¹⁵ The global agenda Start Free, Stay Free, AIDS Free was announced in 2016 to build on the Global Plan's to accomplish this plan fertility desire of PLWHIV has its own importance.¹⁴

The desire to have children among HIV-positive individuals has massive international concerns for HIV transmission.¹⁶ Even though focus on antiretroviral medication for HIV patients, Ethiopians have paid little attention to concerns of fertility and childbirth.¹⁷ Additionally, the World Health Organization has demonstrated that using contraception is a critical method for lowering the spread of new baby illnesses.¹³ Despite the fact that Ethiopia provided free ART beginning in January 2005, the issue of fertility among people was not addressed.¹⁸ Regardless of the circumstances, spreading ART to all PLWHIV and expanding preventive options will hopefully prevent 21 million AIDS-related deaths and 28 million new infections by 2030. Unfortunately, there is minimal evidence of fertility desire among persons on ART.¹⁹

According to findings from other countries, many HIV-positive individuals receiving follow-up care want to have children and have sexual and reproductive health (SRH) needs and aspirations similar to their uninfected counterparts, including making informed decisions about when and how many children to have.²⁰ In 2016, 420,000 people were on ART in the Western World.²¹ Ethiopia has implemented various PMTCT policies and initiatives since its inception. For example, the first national PMTCT guideline was established in 2001. Subsequent revisions were made in 2007, 2011, 2013, and 2017 to incorporate international standards.²²

The current PMTCT guideline (2017) is based on its 2017 Catch-Up-Campaign, which aimed to establish targeted testing in geographic regions where research indicates there are substantial numbers of undiagnosed persons living with HIV, with the hopes of dramatically “catching up” on treatment objectives. The countrywide test-and-treat plan was established in 2017 and will be applied in the future²³ in which, regardless of cluster differentiation four (CD4) count, all HIV-positive people are offered lifelong ART. As a consequence, life expectancy and quality of life for mothers, children, and their sexual partners have altered more dramatically than ever before. Despite this, the desire for conception is growing more difficult among Ethiopians on ART.²⁴

The number of HIV/AIDS-related diseases and fatalities has fallen dramatically since the introduction of ART across the world, and the quality of life of people living with HIV has improved tremendously, leading to an increase in the desire to have children.^{25,26} Pregnant women who undergo timely ART, achieve adequate viral suppression, deliver by cesarean section when necessary, and avoid breastfeeding have posed a risk of vertical development transmission reduced to 1%.²⁷ To improve the reproductive rights of people with HIV and prevent the spread of HIV, it is needed to explore and describe the experiences of fertility desire of

women with HIV within their local context. Because of the increased prospect of surviving longer with ART, resumption of a healthy life, and general physical and mental well-being, HIV-infected persons' reproductive desires have been observed to be growing.⁶

The issue of fertility desire among individuals living with HIV involves unique challenges due to the risks of HIV transmission during conception and pregnancy. These risks can be managed through strategies such as antiretroviral therapy, pre-exposure prophylaxis, and assisted reproductive technologies (ART).²⁸ Pregnancy can pose additional health risks for individuals with HIV, including potential complications related to HIV infection, medication interactions, and overall health status. It is important for individuals with HIV to receive comprehensive medical care and counseling before attempting to conceive. People living with HIV may face stigma and discrimination related to their HIV status, which can impact their decisions about starting a family. Fear of judgment from others, concerns about disclosing their HIV status, and worries about potential discrimination against their children can all influence fertility desires.⁵ Individuals with HIV may face barriers in accessing reproductive health services, including fertility counseling, contraception, and ART. Lack of information, resources, and support can hinder their ability to make informed decisions about family planning. The desire to have children is a deeply personal and emotional aspect of many people's lives. For individuals living with HIV, concerns about their own health, the health of their partner, and the well-being of potential children can add complexity to their fertility desires and decision-making process.²⁹

Overall, the issue of fertility desire among individuals living with HIV requires a comprehensive and multidisciplinary approach that considers medical, social, psychological, and ethical factors. Open communication, access to quality healthcare services, and support from healthcare providers and community organizations are essential in addressing the unique challenges faced by individuals with HIV who wish to start a family.³⁰

Despite extensive studies elsewhere, there is a paucity of research on PLWHIV fertility wishes, particularly among people living in the study location.¹ To focus on the population of HIV-infected people who are most likely to become pregnant by choice, researchers must study fertility desire directly. This is a significant subgroup with counseling and treatment requirements that differ significantly from the general population. As a result, the goal of this study is to evaluate fertility desire and associated factors among HIV-positive individuals on ART.¹⁶

Methods

Study design, period, and area

A multicenter institutional-based cross-sectional study design was used to evaluate fertility desire and associated

factors among HIV-positive individuals on ART Users in Public Hospitals in South Gondar, Northwest Ethiopia from April 1 to May 30, 2022. The study was conducted in South Gondar Zone public hospitals in the Amhara region, Northwest, Ethiopia. The capital of the South Gondar Zone, Debre Tabor town, is about 103 km away from Bahirdar (the capital city of Amhara regional state) and about 667 km away from Addis Abeba (the capital city of Ethiopia). According to the South Gondar Zone Administrative Bureau, the zone has a total population of 2,609,823 of which 1304,911 are females. In the zone, there are 18 Woredas of which 13 are rural and 5 urban in which there are 8 governmental hospitals, 96 public health centers, 140 private clinics, and 403 health posts.³¹ All health centers and hospitals provide 24 h of delivery service. We were utilized to select one Tertiary Hospital and three Primary Hospitals by simple random methods among the institutions found at South Gondar Zone. Those are Debre Tabor Comprehensive Specialized Hospital (DTCSH) in Debre Tabor Town, Addis Zemen Primary Hospital (AZPH) in Libo Kemkem Woreda, Nefas Mewucha Primary Hospital (NMPH) in Lay Gaynt Woreda, and Mekane Eyesus Primary Hospital (MEPH) in Estey Woreda.

Source population and study population

Source population. The source population was all patients who attended ART clinics in the South Gondar Zone public hospitals.

Study population. The study population was all patients attending ART clinics of the South Gondar Zone selected from public hospitals during the data collection period and selected by systematic random sampling.

Inclusion and exclusion criteria

Inclusion criteria. Fertile HIV-positive individuals were included in the South Gondar Zone selected public hospitals during the study period.

Exclusion criteria. Seriously ill individuals who were unable to be interviewed were excluded.

Sample size and sampling procedure

The sample size was calculated by using a single population proportion formula by considering assumptions such as a 95% confidence interval, 5% margin of error, and magnitude of fertility desire from the previous study were taken at 32% ($p=0.32$) done at Finoteselam, Northern Ethiopia.³² By considering a 10% non-response rate and design effects of 1.5 the final sample size was 551.

A simple random sampling technique was utilized to select one Tertiary Hospital and three Primary Hospitals. The sample was allocated proportionally to all selected public

health institutions based on patient registration books from each hospital.

A systematic random sampling technique was used to select study participants from ART attendants in public hospitals of the South Gondar Zone until the required sample size at each public hospital was obtained. Data were collected from every seventh individual who had ART follow-up during the study period at each selected hospital. The sampling interval $k=7$ was calculated by dividing the source population by the total sample size and this interval was used in all health institutions to select study participants. For each of the public health institutions, the constant number K was also calculated and it was the same $K=7$. This interval was used in all public health institutions to select study participants. The first sample was selected randomly by lottery method among the first seven participants (one randomly selected) then every seventh unit was taken to get the required sample size from each hospital.

Data collection tools and procedure

Data were collected by using semi-structured questionnaire and patient chart review. It was prepared by the principal investigator based on literature reviews. The instrument was first arranged in English and converted into the local language Amharic and back to English by free language specialists. The tool consists of four sections; the first part contains the sociodemographic characteristics of the respondents, the second part of the questionnaire contains obstetric characteristics of the participants, the third part contains HIV-related factors and the fourth part contains magnitude of fertility desire. The data were collected by four diploma midwifery professionals who are working outside the study hospitals. The data collection process was supervised by two BSc Midwifery professionals. A total of seven persons were recruited including the principal investigator. We have used validated tools² and Cronbach's alpha coefficient was measured to know the reliability of tools which was 0.82 for this study. Data collectors described the purpose of the study and interview process, by emphasizing privacy and confidentiality.

Each eligible patient was approached privately in a separate room from the ART clinic. After checking the filled questionnaires for any missing items and correctness, it was collected and signed by supervisors. Besides this, there was continuous follow-up and supervision by the principal investigator throughout the data collection period.

The training was provided for data collectors and supervisors for 1 day about the purpose of the study and techniques of data collection. The principal investigator was given training for the data collectors and supervisors. The trained data collectors were supervised during data collection. Pretest was done on 5% of the sample size (28 individuals) before

the actual data collection at Dr. Ambachew Memorial Primary Hospital. The collected data were reviewed and checked for completeness, clarity, and consistency, and on-spot corrective measures were taken by both data collectors and supervisors.

Data processing and analysis

Data were entered by using Epi-Data version 4.6 and exported to SPSS version 26 software package for analysis after cleaning data for inconsistencies and missing values. Both descriptive and analytical statistical procedures were utilized. Bivariable logistic regression was carried out to see the association of each of the independent variables with the outcome variable. A variable with a p -value of <0.25 was a candidate for a multivariable logistic regression model.

Model goodness-of-fit was evaluated using the Hosmer-Lemeshow test ($p=0.81$). Then adjusted odds ratio (AOR), its 95% CI, and p -value of <0.05 in the multivariable analysis were considered to determine a statistically significant association. Finally, results were compiled and presented using tables, graphs, and texts and it was discussed using the odds ratio and 95% confidence interval.

Result

Sociodemographic characteristics of the respondent

A total of 551 ART users were approached, and all of them agreed to participate in the study, resulting in a response rate of 100%. Two hundred twenty-two of the participants (40.3%) belonged to the age group ≤ 29 with a mean age of 35 and standard deviation of (SD ± 9.3) years. All respondents (100%) were Amharic in ethnicity. Out of the total respondents (66.3%) were married and half of the respondents (50.8%) were women. Most (90.7%) of the participants were Orthodox Christian and the rest were Muslim and (60.4%) were living in urban areas (Table 1).

Disclosure of HIV status among HIV-positive individuals

The result of this study indicated that one-third, 196 (35.6%), of the participants disclosed their HIV sero status, with 58.7% of them disclosing to their partner. Of the total respondents, 441 (83.5%) were partner positive for HIV, and of this, 398 (90.2%) were on ART medication.

Among HIV-positive people attending in ART clinic, 64.4% of PLWHA kept their HIV status secret from their husband/wife, family, friends/peers, and sexual partners, and the reasons mentioned by the respondents were due to fear of abuse, stigmatization, and discrimination (Table 2).

Table 1. Sociodemographic characteristics of HIV-positive people attending ART clinics, South Gondar Zone Public Hospitals, Amhara region, Northwest Ethiopia, 2022 (N=551).

Variables	Frequency	Percentage
Sex		
Female	280	50.8
Male	271	49.2
Age		
≤29	222	40.3
30–39	158	28.7
≥40	171	31
Marital status		
Marriage	365	66.3
Single	92	16.7
Divorced	49	8.9
Windowed	45	8.1
Occupation		
Housewife	156	28.3
Government employ	100	18.6
Marchant	92	16.7
Daily laborer	77	14
Private employed	64	11.6
Farmer	42	7.6
Others	20	3.2
Family monthly income		
≤2700	183	33.2
2701–4932	181	32.8
≥4933	187	34
Place of residency		
Urban	333	60.4
Rural	218	39.6
Education status		
Unable to read and write	151	27.4
Able to read and write	71	12.9
Primary	105	19.1
Secondary	36	6.5
Preparatory	81	14.7
College and above	107	19.4

Others from occupations have no work, commercial sex workers.

Reproductive characteristics

Out of the 551 respondents interviewed, 311 (56.4%) had been diagnosed with HIV for less than 5 years. Most participants (65.7%) were not using any type of family planning method. All participants were on ART at the time of the survey, with a median duration of ART use of 4 years. Additionally, 253 respondents (45.9%) had a CD4 count above 350 cells/mm³ at the time of data collection (Table 3).

Regarding to fertility desire of the respondents

Magnitude of fertility desire among ART clients in this study was 42.5% (95% CI: 38.6, 46.8). One hundred

Table 2. Respondents' HIV status disclosure in selected public hospitals of South Gondar Zone, Northwest Ethiopia, 2022 (N=551).

Variables	Frequency	Percentage
Disclosed your HIV sero status to others (N=551)		
Yes	196	35.6
No	355	64.4
For whom you disclosed (n=196)		
Partner	115	58.7
Family	53	27
Friend	28	14.3
The reasons not to disclose their HIV status (n=355)		
Fear of divorce	15	4.2
Fear of abuse	87	24.5
Fear of stigma and discrimination	253	71.3
Partner HIV status (N=551)		
Positive	441	83.5
Negative	80	14.5
Don't know	40	7
Partner on medication (n=441)		
Yes	398	90.2
No	22	5
Don't know	21	4.8

Table 3. Reproductive and clinical characteristics of HIV-positive people attending ART clinics, South Gondar Zone public hospitals, Northwest Ethiopia, 2022.

Characteristics	Frequency	Percentage
HIV diagnosis duration (N=551)		
<5 years	311	56.4
≥5 years	240	43.6
Family planning use (N=551)		
Yes	189	34.3
No	362	65.7
Which family planning they used (N=189)		
Condom	77	40.7
Injectable	83	43.9
Implants	19	10
Others	10	5.4
Had child death (N=551)		
Yes	121	22
No	430	88
Had abortion (N=551)		
Yes	105	19.1
No	446	80.9
Know your CD4 count		
Yes	341	61.9
No	210	38.1
Recent CD4 count (N=341)		
<350	298	54.1
≥350	253	45.9

Other family planning used is combined oral contraception, intrauterine device, and post-pill. CD4, cluster differentiation four.

Table 4. Magnitude of fertility desire among people on antiretroviral therapy users at South Gondar Public Hospitals Amhara region Northwest Ethiopia, 2022.

Variable	Frequency	Percentage (95% CI)
Fertility desire to have children in the future (N=551)		
Yes	234	42.5% (38.6, 46.8)
No	317	57.5% (53.2, 61.4)
Number of children they had (N=551)		
0	190	34.5%
1–2	113	20.5%
≥3	248	45%
Reasons for need to give birth (N=234)		
Want at least one child	73	31.2%
To strengthen marriage	134	57.3%
ART/PMTCT	23	9.8%
To replace a dead child	4	0.7%

PMTCT, Prevent Mother-to-Child Transmission.

thirty-four (24.3%) of the study participants want a child for a reason to strengthen their marriage (Table 4).

Factors that affect fertility desire among HIV-positive people on ART

The factors influencing fertility desire among people living with HIV (PLWHIV) were investigated. According to Table 5 of the binary logistic regression model, significant factors included age (≤ 29 years; crude odds ratio (COR)=4.20; 95% CI: 2.69, 6.56), informal education (COR=1.89; 95% CI: 1.34, 2.68), and single marital status (COR=15.6; 95% CI: 3.7, 19.21).

Farmers and merchants had corresponding odds ratios of (COR=0.21; 95% CI: 0.09, 0.47) and (COR=0.02; 95% CI: 0.02, 0.04), respectively.

In the bivariable analysis, significant associations with fertility desire included disclosure of HIV status (COR=0.13; 95% CI: 0.06, 0.48), time since HIV testing, CD4 count, child death, perceived partner pressure, partner HIV status, parental and community influences, and discussions with health professionals about children's needs.

However, the multivariate analysis revealed that among ART clinic-attending HIV patients, marital status, occupation, number of children, CD4 count, disclosure status, and length of time since HIV diagnosis were significantly associated with fertility desire.

One aspect of participants' socioeconomic position that influenced their desire for children was marital status. Single individuals were nearly 19 times more likely to desire children than their divorced counterparts (AOR=19.4; 95% CI=6.2, 21.3).

In terms of occupation, merchants were 6% more likely to want children compared to daily laborers and commercial sex workers (AOR=0.06; 95% CI=0.01, 0.08). Farmers also showed a favorable correlation with reproductive desire

(AOR=0.09; 95% CI=0.015, 0.56) compared to day laborers and commercial sex workers.

Patients without formal education were 5.8 times more likely to want children than those with formal education (AOR=5.88; 95% CI=1.85, 18.72). Respondents with no children were 20 times more likely to desire more children compared to those with more than three children (AOR=20.04; 95% CI=4.7, 24.21). Additionally, participants who had been diagnosed with HIV for more than 5 years were 15 times more likely to desire children compared to those diagnosed for less than 5 years (AOR=15.5; 95% CI=12.79, 20.54; Table 5).

Discussion

This finding showed that 42.5% of the participants had fertility desire with range from 36.8% to 46.8% at 95% CI.

The result of this finding was in line with cross-sectional studies conducted in Northwest Ethiopia (40.3%),³³ Gondar University Hospital (44.8%),³⁴ Tigray region, Ethiopia (42.21%),¹⁰ and Jimma town (46.8%),³⁵ South West Ethiopia (46.8%).³⁶

This study was also in agreement with cross-sectional studies conducted in African countries such as Malawi, Uganda, and Tanzania^{8,38,42}. This may be explained by the similarity of the study participants and the study design.

On the other hand, the fertility desire in this study was higher than in the study conducted in Finoteselam Hospital, Northwest Ethiopia (32%),⁹ Malawi (34%),³⁷ India, and South Africa. This might be due to the difference in the study population, the current study used both men and women as study participants as a result men may have more decision to have a child.

In addition, the study of this finding was lower than the findings of other studies conducted in Afar (63.9), Addis Ababa, Ethiopia (54.6%).² This finding is also lower than a study conducted in Uganda (63.1%),³⁸ Thailand.³⁶ The addresses, financial security, and habits of participants in the study may account.

The result of this study revealed that those participants who were married were more likely to have fertility desire. This study was supported by studies conducted in Addis Ababa,² Finoteselam Hospital Northwest Ethiopia,⁹ and Jimma southwest Ethiopia.³⁵ This might be due to individuals who were single having no children and wanting a child due to factors such as cultural beliefs, access to health care services, availability of support networks, and individual circumstances.

According to our study, those who had informal education were the second predictor variable, as it stated that those participants who didn't attend formal education were 5.8 times more likely to have fertility desire. The study was the number of children with fertility desire supported by the cross-sectional study conducted in Uganda and Tanzania.²⁶ This may be explained by those individuals whose educational

Table 5. Bivariate and multivariable analysis of factors associated with fertility desire among people living with HIV attending ART clinic in South Gondar public Hospital, Amhara Northwest Ethiopia, 2022 (N=551).

Variable	Category	Fertility desire		COR (95% CI)	AOR (95% CI)	p
		Yes	No			
Age in years	≤29	123	99	4.20 (2.69, 6.56)	0.12 (0.01, 1.55)	0.1
	30–39	72	86	2.83 (1.76, 4.56)	0.513 (0.09, 3.03)	0.4
	≥40	39	132			
Marital status	Marriage	183	254	2.88 (0.80, 10.34)	12.10 (7.80, 18.20)**	0.001
	Single	43	11	15.61 (3.75, 19.21)	19.4 (6.23, 21.31)	0.03
	Windowed	5	40	0.50 (0.10, 2.40)	1.2 (0.24, 5.12)	0.1
	Divorced	3	12			
Occupation	Housewife	77	110	0.28 (0.17, 0.48)	1.19 (0.32, 4.44)	0.79
	Farmer	12	23	0.21 (0.09, 0.48)	0.09 (0.015, 0.56)	0.009
	Marchant	2	79	0.02 (0.02, 0.04)	0.06 (0.01, 0.08)**	0.0
	Employer	69	75	0.37 (0.22, 0.64)	0.21 (0.03, 1.29)	0.93
	Others	74	30			
Educational status	Informal education	115	107	1.89 (1.34, 2.68)	5.88 (1.85, 18.72)*	0.04
	Formal education	119	210			
Family income in ETB	≤2700	94	89			
	2701–4932	58	123	0.45 (0.29, 0.68)	5.58 (0.71, 6.34)	0.12
	≥4933	82	105	0.73 (0.49, 1.11)	1.24 (0.16, 9.45)	0.83
Number of children they have	0	136	54	7.56 (4.93, 11.57)	20.04 (4.71, 24.23)**	0.00
	1–2	36	77	1.41 (0.86, 2.29)	1.62 (0.19, 3.98)	0.65
	≥3	62	186			
CD4 cell count	<350	86	148			
	≥350	212	105	0.288 (0.20, 0.41)	8.18 (2.15, 21.17)**	0.002
Time since HIV diagnosis	<5	196	114			
	≥5	38	203	0.109 (0.07, 0.17)	15.57 (12.74, 20.54)**	0.00
Discloser status	Yes	40	194	0.13 (0.06, 0.48)	0.05 (0.01, 0.30)**	0.01
	No	156	161			
Partner wants a child	Yes	105	185	0.36 (0.06, 0.97)	1.26 (0.37, 1.92)	0.34
	No	159	102			
Community wants a child	Yes	79	115	26.42 (11.21, 27.93)	2.6 (0.37, 24.80)	0.71
	No	6	311			
parents want a child	Yes	142	129	2.28 (1.59, 3.17)	0.07 (0.02, 2.24)	0.13
	No	92	188			
Partner HIV status	Positive	233	208			
	Negative	11	99	0.09 (0.01, 0.094)	20.70 (20.1, 24.72)**	0.01

Others from the occupational status of the respondents are daily laborers, students, and commercial sex workers. AOR, adjusted odds ratio; CD4, cluster differentiation four; COR, crude odds ratio; ETB, Ethiopian birr.

*Significant at p-value <0.05 and **significant at p-value <0.001. Bold numbers indicate significant association.

levels increase, the number of children will decrease, and various factors such as cultural norms, lack of access to accurate information on family planning and HIV prevention, and limited awareness about the impact of HIV on pregnancy. Additionally, individuals with informal education backgrounds may face challenges in accessing healthcare services, including SRH services, which can affect their fertility desire.

Another significant finding in this study was the number of children with fertility desire. Study participants who had no children were 20 times more likely to have fertility desire. This finding was supported by studies conducted in Jimma southwest Ethiopia,³⁵ Finoteselam Hospital Northwest

Ethiopia,⁹ University of Gondar,³⁴ Addis Ababa, and also in Tanzania³⁹ where people who did not have children want to replace themselves to have a caregiver when they were older.⁸ People could also want to have children to relieve social pressure.⁸ Concerns about the risk of HIV transmission to their offspring people living with HIV may be aware of the potential risks and challenges associated with transmitting the virus to their children and therefore may choose to limit their family size to prevent transmission. Additionally, individuals living with HIV may prioritize their own health and well-being, as well as the health of their children.

The odds of fertility desire among participants who have been on diagnosis for more than 5 years were more than 15

times higher than those who were on diagnosis for less than 5 years. The result was supported by the study conducted at Finoteselam Hospital Northwest Ethiopia and West Shoa zone.^{9,13} This could be due to early diagnosis yields early initiation of ART immediately improving their health status in the early years of medication. This conclusion is confirmed by a similar study carried out in Malawi, which found that persons with HIV who survived longer were more likely to want to have children.²⁵ This could be explained by the fact that persons with HIV who have had their condition for a longer time are more likely to be aware of the prospect of having an HIV-negative baby as a result of their adherence to HIV preventive measures for the child.

Another important significant finding in this study was discloser status. Study participants who disclosed their HIV status were 1.2 times more likely fertility desire. This finding was supported by studies conducted in Uganda, Tanzania,^{39,40} and Addis Ababa² explained that the disclosure of one's HIV status to the sexual partners could increase options to facilitate the ability to make informed decisions on childbearing.

According to this study, individuals with a CD4 count ≥ 350 cells/mm³ were more likely to have fertility desire than participants with a CD4 count of 350 cells/mm³. Similarly in research among HIV-infected persons beginning ART in Nepal, having a CD4 cell count ≥ 350 cells/mm³ was linked to a desire for children. This may be because these people are more determined to fulfill their desire for children as a result of their health situation improving.

Last but not least, those ART attendants who had sexual partners with negative HIV status had higher odds of fertility desire as compared to people who had positive HIV sexual partners.

Individuals with HIV-negative partners had a 20 times more likely fertility desire than those with HIV-positive partners. This result is also in line with the study in Ethiopia that reported the same finding.⁴¹ Probably, this may be due to the fact that having HIV-negative sexual partners may believe they are safe to be fertile, which stated that the odds of fertility desire were higher in such cases.

Another study also supports Tanzania and Nepal^{39,42}, which stated that the odds of fertility desire were higher in individuals who had sexual partners negative than their counterparts. This may be the similarity of the study design.

The study conducted by China, Tanzania, Nigeria, Uganda, and Nepal supports this finding.^{25,26,37} This can be a result of those partner-negative individuals who may think that mother-to-child transmission is low and the similarity of the study subjects. There could be several reasons why an individual with a negative sexual partner may have a high fertility desire. There could be several reasons why an individual with a negative sexual partner may have a high fertility desire. Biological urge: Fertility desire is a natural biological urge for many individuals, regardless of their current sexual partner situation. The desire to have children and start a family can be strong and may override other concerns,

some individuals may place a high value on having children and starting a family, regardless of their current relationship status, and cultural or societal norms may place a strong emphasis on having children, leading individuals to desire parenthood even if their current relationship is not ideal, emotional needs, and future planning. Some individuals may have a strong desire for children because they see it as part of their long-term plans and goals. They may want to build a family and create a legacy for future generations.

Limitations of the study

- The cross-sectional nature of the study prevents the establishment of cause-and-effect relations.
- Social desirability biases.
- Due to time and logistic constraints this study used only quantitative approach, which could not address "why" questions in detail.
- The time of HIV diagnosis and start of ART might be subjected to recall bias which is also another limitation of the study.
- The presence of associated chronic illnesses such as diabetes and heart problems may bias the results.

Conclusion

This study showed that fertility desire among ART attendees was high. Occupation being a farmer or a merchant, people with informal education, number of children, CD4 count, discloser status, time of HIV diagnosis, and having an HIV-negative partner were significantly associated with fertility desire.

Recommendation

The zonal department among ART user may provide existing Information, Education, and Communication (IEC) interventions on fertility desire at the individual and community levels.

Health care providers should provide in-depth counseling to ART attendants about disclosing their sero stats.

Longitudinal research should be conducted, incorporating a qualitative study design, and it is preferable to perform it among couples.

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Authors contributions

AKM: Conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Critical revision of the article, final approval of the version to be published; BWY, HA, WYF, and BBE: Conception and design, Acquisition of

data, analysis, and interpretation of data revised the subsequent drafts of the manuscript, final approval of the version to be published.

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Ethics approval

Ethical approval for this study was obtained from the ethical review committee of the School of Midwifery on behalf of the Internal Review Board of the University of Gondar, College of Medicine and Health Sciences (ethical approval number UOG 1076/2022) to the concerned office, then a letter of support was obtained from Amhara Public Health Institution.

Informed consent

Written informed consent was obtained from the individual participants. After getting written informed consent from all literate and legally authorized representatives of all illiterate, the data were collected. Moreover, the purpose, procedures of the study, advantages, and disadvantages were told to the participants. All the participants in the study participated voluntarily and their information was kept confidential. Participants have been informed that they have the right to withdraw at any time.


Any information given by participants was kept confidential and participants did not write any personal identification such as name or phone cell number. Finally, written informed consent was obtained before data collection.

Trial registration

Not applicable.

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Availability of data and material

When ethical approval was obtained from the institutions, we agreed and signed not to publish the raw data retrieved from the information of the individual. However, the datasets collected and analyzed for the current study are available from the corresponding author and can be obtained at a reasonable request.

Supplemental material

Supplemental material for this article is available online.

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