

Research Article

Fertility Desire and Associated Factors among People Living with Human Immune Virus on Anti-Retro Viral Therapy Southern Ethiopia

Hafiso A¹, Asres AW² and Adale AT^{2*}

¹Halaba Zone Health department, southern Ethiopia

²Department of Public health, Wolayita sodo University, Ethiopia

*Corresponding author: Adale AT

Department of Public Health, Wolayita sodo University
POBOX 138, Ethiopia

Received: December 12, 2022; Accepted: February 06, 2023; Published: February 13, 2023

Abstract

Background: Antiretroviral therapy has increased the life expectancy of people living with HIV/AIDS. The attitude towards fertility desire is increasing, having a better health status and controlling system that addresses the desire of men and women wanting to have healthy children. However, there are limited studies conducted in Ethiopia. Our study has explored the magnitude of fertility desire and associated factors among PLWHIVA on ART in Southern Ethiopia, 2021.

Methods and Materials: A mixed institutional based cross-sectional study was used employing 417 participants. A structured interviewer-administered questionnaire was used to collect quantitative data and key informants interview for a qualitative study. Data were analyzed using SPSS version 21.0 and multivariable logistic regression models and thematic analysis was done for quantitative and qualitative data respectively. P-value less than 5% was considered to declare association.

Result: Four hundred and nine (98%) of the respondents completed the interview. The magnitude of fertility desire was 64.3%. Age range 18–30 years (AOR = 2.971; 95% CI: 1.06, 8.27), negative HIV test result for partners (AOR = 2.790; 95% CI: 1.199, 6.491), partners fertility desire (AOR = 8.740; 95% CI: 3.488, 21.90), community pressure (AOR = 2.352; 95% CI: 1.028, 5.385) and number of children (AOR = 0.713; 95% CI: 0.564, 0.903) were associated factors. Qualitative finding explored pressure from significant others and economic dependency.

Conclusion: Fertility desire was highest and health professional should provide adequate information regarding ART/PMTCT and involving partners in the counseling time.

Keywords: Fertility Desire; Married People; Magnitude; Factors; PLWHIVA; ART.

Introduction

Globally HIV/AIDS has huge challenged on human development, especially high burden in poor-resource settings. In 2016, women constituted nearly half (17.8 million) of the world's 36.7 million people living with HIV/AIDS. Fertility desire is want to have child or children in the future [1,2].

Sub-Saharan Africa (SSA) has the highest number of persons living with HIV/AIDS and the highest HIV prevalence among adults (15–49 years) [3]. After learning of their HIV status, many PLWHA continue to want and have children [4]. Pregnancy was formerly avoided among HIV-positive women due to the potential of vertical transmission. Vertical transmission is unlikely in today's world if PLWHA achieves adequate viral suppression with combination antiretroviral therapy (cART). PLWHA have a better likelihood of having children as a result of these circumstances. PLWHA believes that having children will strengthen their marriage and that their children will take better care of them in the future [5]. Some evidence showed that in the study in sub-Saharan African countries, nearly half (20–50%) of PLHIV want to have children [6].

Evidence-based research in Uganda, eastern Africa, found that nearly half (44%) of ART clients had fertility plans to achieve having a child, of whom the majority (35%) were found to have challenges or fear of discussing these intentions with their HIV care providers [7].

A previous study conducted in Harari regional state, Ethiopia, found that more than half (56.2%) of people living with HIV have fertility desire [8]. The implications of ART for an HIV-infected individual's (or couple's) future fertility are generating growing interest [9] and Brazil [10]. One study reported a significant negative association between ART use and fertility desires in Nigeria [11].

According to the EDHS 2016, the country's total fertility rate is 4.8% (2.6% in urban areas and 5.5% in rural areas) [10,12,13]. In general, in Ethiopia, the evidence is still inaccessible. That might be due to weak integrated activities of ART/PMTCT/FP services, viral load level, and other factors influencing the data handling system regarding fertility desire and factors associated with it. Therefore, this study tries to assess fertility desire and associated factors among PLHIVA who are taking ART/PMTCT services at Halaba zone, southern Ethiopia.

Two in every five pregnancies are not planned globally; women living with HIV are more at the danger of unintended pregnancies. Studies conducted in Africa including Ethiopia have indicated that, wanting to have children after ART/PMTCT initiation ranges from 31 – 60.9% (36.9%) [14-19].

A study in Harar Region ,Ethiopia indicated that Women have 58% times lesser fertility desire than men likewise age group 30-39 and Age >=40 have 61% and 85% times lesser fertility desire than 18-29 years respectively. Additionally, individuals who have a child in their life time have 76% times lesser desire than those who doesn't ever have. Those who were not using family planning were three times higher to desire for a child than their counter parts and respondents who were not sexually active in the last six months have 77% times lesser fertility desire than those who were not [13].

Methods and Materials

Study Area and Period

The study was conducted in Halaba Zone Health Institutions. Halaba zone is located 315 KM away from Addis Ababa. It contains three woreda and one town administration. It has nine health centers and two hospitals.

The study was conducted at ART/PMTCT facilities in two public health centers & two hospitals kulito general & besheno primary hospitals. The estimated population of the Halaba zone. Based on the 2007 Census conducted by the Central Statistical Agency (CSA) of Ethiopia is 353,486 of this 42,353 people are living in Halaba town. Out of the Zone population 180, 278 are females with a pregnancy rate of 3.46% which implies the total number of expected women who give birth in a given year is 12,231 & as zonal level and ART service given at four health institution and their facilities HMIS & ART/PMTCT data showing currently on ART clients is 514. The study period was from Feb 17/2021 to Apr 17/2021G.C.

Study Design

A mixed facility based cross sectional study design was conducted.

Source Population

All PLWHIVA clients on ART/PMTCT within the reproductive age group female (15-49 years) and male 18 years and above living in the study area.

Study Population

Randomly selected PLHIVA clients on ART/PMTCT within the reproductive age group female (15-49 years old) and male 18years and above who fulfilled inclusion criteria and had follow-up for receiving care and treatment in ART units at selected four public health ART facilities of Halaba zone during the study period.

Inclusion Criteria

All PLWHIV who visited ART/PMTCT clinics of the health centers & hospitals at least one times and their age were 18years and above for men and reproductive age group (15-49 years old) for women and who appeared during the study period.

Exclusion Criteria

All PLWHIV who were unable to hear, not communicate, mentally disabled since they cannot provide responses for the study.

Sample Size Determination

The sample size is determined by single population proportion formula by taking the prevalence of 0.44 (21) obtained from a recent study conducted in Hawassa city hospitals and health center with assumption that of HIV positive individuals may desire and intend to have children with 5% margin of error and 95% confidence interval (alpha=0.05). A non-response rate was assumed to be 10%. Based on these assumptions the actual sample size determined using the formula for single population proportion.

$$\text{Where: } n = \frac{(Za/2)^2 p(1-p)}{d^2}$$

- Proportion of fertility desire (p) = 0.44
- Level of Confidence 95 %

- Margin of error (d) = 5% , Non-response rate =10%

Then sample size = 379

After adding non-response rate of 10% the final total sample size became 417 (379 + 38).

Sample Size Calculation for the Second Specific Objective (Table 1)

The proportion of size is 379 and the largest sample size of the exposure variable 356, we have used to the largest sample size of proportion of 379 and adding 10% non-response rate the total sample size was 417.

Table 1: Shows sample size calculation for factors associated with fertility desire among PLHIVA on ART clients in Halaba ART facilities, 2021.

Exposure variable	Confidence level	Power of test	% of un-exposed group among outcomes	AOR	Sample	Reference
Discusses with ART provider	95%	80	23.3	3.17	274	[20]
Disclosed HIV status to partner	95%	80	39	1.96	232	[22]
Partner test result	95%	80	24.4	0.64	283	[22]
community pressure to have child	95%	80	36.6	1.94	356	[23]

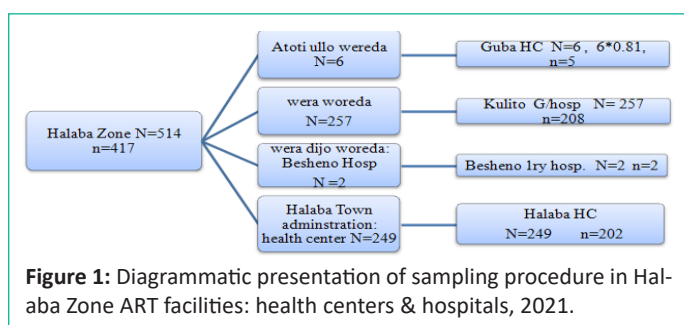
For Qualitative Part

Polkinghornere commended for phenomenological studies, which consist of in-depth interviews, that researchers interview 5 to 25 individuals who have all experienced the phenomenon of interest. The number of samples was determined by saturation level.

Audio-recording of interviews was used after obtaining the participant’s permission. There may be a tendency for some interviewees to forget that they are being audio taped. Therefore, the tape recorder was placed in full view of the participant.

Sampling Techniques

The number of study subjects in each health facility was decided using proportional allocation, and individuals were taken using systematic random sampling in order to have a representative respondent from four ART institutions. We used a systematic Random sampling technique to select the first K value (k=1) from which we started, as well as knowing the interval clients from each health institution at the end of data collection $n=417/514=0.81$, then multiply each site by 0.81, to get proportional numbers just taking from sample size 417 divided by zonal ART cases 514 (Figure 1).



lection and two supervisors who were trained on PMTCT/ART from each ART unite were selected and trained for one day on data collection tool.

In-depth interview was conducted by the principal investigator and the supervisor supported in the course of data collection. The data were checked for completeness, eligibility and clarity by the supervisor on daily bases.

Operational Definition

Fertility Desire: Desire of client who is on ART wishing to have a child or having more children in the future. Those clients who want to have another child in the near future were categorized as fertility desire “Yes” and those who don’t want were considered as “No” [15].

Fertility: The ability to conceive and have children, the ability to become pregnant through normal sexual activity [15].

Desire: to want something, especially a strong and a conscious impulse toward something [15].

ART follow up status: Keeping monthly and timely coming history and evidence of ART user follow up status (19).

People Living with HIV (PLHIV) on Chronic HIV care: are people with confirmed and documented HIV test results who have already been enrolled to ART clinic, had at least one visit and have got comprehensive HIV care and treatment in the health facilities before the interview [15].

Family planning use: those clients have been on any types of contraceptive methods until the date of data collection [25].

Good adherence: a client taking ART medication more than 95% dose but missing 2 or less dose per month [23].

Poor adherence level: a client taking ART medication less than 85% dose but missing 6 or more dose per month [23].

Fair adherence: a client taking ART medication less than 85-94 % dose but missing 3-5 or more doses per month [23].

Data Analysis Procedures

The collected data were checked, entered in to Epi data version 7.1, and then exported to SPSS version 23 for further analysis. The descriptive analysis such as proportions, percentages and frequency were conducted.

To investigate the association between the proposed factors and a desire for fertility, binary logistic regression was used.

For qualitative data collection using in-depth interview was done on fertility desire by open ended questioners. The participants were interviewed at each ART facilities during ongoing treatment follow uptime.

Data Collection Technique, Tool and Quality Assurance

Exit interview were conducted after the clients leaving ART clinics which was developed first in English then translated in to Amharic language and halabissa. The questionnaire is adapted from different source of literature & USAID on fertility desire [20,21,24,25,41,42] and some modification was done after a 5% pretest which was conducted at Durame General Hospital which is out of the study area. Four health professionals for data col-

Variables having a p-value of less than 0.25 in the bivariate analysis were re-entered into a multivariable analysis to find variables related with the desire for fertility that were independently linked. To examine the statistical significance of the relationship between the variables, 95 percent Confidence Intervals (CI) with respective Adjusted Odds Ratios (AOR) were utilized, and P-value 0.05 was reported. Result was presented using text, tables and charts.

Qualitative data were captured by using short note and audio records taking from their discussion, information on fertility desires. Then transcribed and translated word by word into English language and coded, organized and summarized under the main thematic area and presented the result by extracted concepts from main themes, and the matic analysis was used. The result was presented using by providing explanation and direct quote of the respondents.

Ethical Consideration

Ethical approval letter was obtained from Wolaita Sodo University Ethical Review Board. Additional written permission letters were gotten from Halaba Zone Health Department and Woreda Health Offices. Finally, written consent was obtained from each participant.

Table 2: Socio-demographic characteristics of PLWHA attending ART clinic of public health institution in Halaba zone, Ethiopia, May 2021 [n=409].

Socio-demographic variable	Frequency (n)	Percent (%)
Age		
18-30 years	118	28.9
≥ 30 years	291	71.1
Sex		
Male	186	45.5
Female	223	54.5
Residence		
Rural	109	26.7
Urban	293	71.6
Religion		
Orthodox	140	34.4
Muslim	147	36.1
Protestant	105	25.8
Catholic	15	3.7
Marital status		
live together	260	64.0
Divorced/separated	110	27.1
Widowed/widower	36	8.9
Educational level		
No formal education	202	49.8
Primary	129	31.8
Secondary	52	12.8
Above secondary	23	5.6
Family income		
<1000 EBR	144	36.6
1000-5000 EBR	191	48.6
>5000 EBR	58	14.8
Occupation		
Farmer/housewife	143	35.6
Employee	45	11.2
Merchant/daily laborer	198	49.3
Others	16	4.0

Results

Socio-Demographic Characteristics of the Respondent

A total of 409 respondents participated in this study, making the response rate 98%. Among the total respondents, 223 (54.5%) were females, and most (293, or 71.6%) lived in urban areas. Regarding the client's age, 71.1% were older than 30 years. The majority (260, or 64.0%) of respondents were married and living together. Regarding educational status, 202 (49.8%) of respondents had no formal education. In addition, 147 (36.1%) were Muslim, followed by orthodox religious followers with 140 (34.4%). Among the total clients, half (49.3%) were merchants/daily laborers, and 144 (36.6%) of the respondents earned less than 5000 ETB monthly (Table 2).

Reproductive, Family and Social Factors

Among the total study participants, most (326, or 79.9%) have children, with a mean number of children of 2.15±1.7. More than one third (158, 38.8%) reported they face community pressure, 160 (41.1%) face parent/family pressure, and half (204, 51.1%) reported they face pressure from their partners.

Most of the 286 (71.5%) participants utilized one of the family planning methods, and two thirds had at least one antenatal follow up on a current or previous pregnancy (Table 3).

Table 3: Reproductive life, social, HIV, FP utilization among HIV positive patients Ethiopia [n=409].

Variables	Frequency	Percentage
Have a child		
Yes	326	79.9
No	82	20.1
Pressure from your community to have child		
Yes	158	38.8
No	249	60.2
Parents or family pressure		
Yes	160	41.1
No	229	58.9
Partner pressure		
Yes	204	51.1
No	195	48.9
Discussion with health worker		
Yes	289	70.7
No	120	29.3
ANC		
No	127	33.4
Yes	253	66.6
Current family planning utilization		
Yes	286	71.5
No	114	28.5
Types of family planning method		
Condom	116	41.3
Dipo-provera	64	22.8
IUCD	21	7.5
Implants	41	14.6
Pills	23	8.2
Other method plus condom	16	5.7

HIV and ART Related Characteristic of Respondent

More over half of the participants 225 (56.5%) had not tested for HIV in more than four years, and just 51 (12.6%) of their children were on antiretroviral therapy. In terms of mother-to-child HIV transmission knowledge, 20.3 percent of participants had no idea what the PMTCT was, two-thirds were on WHO stage I, and virtually all 389 (96.1%) said their health improved after starting the treatment. The majority of their spouses 329 (83.5%) underwent HIV tests, with almost two-thirds 217 (66.0%) testing positive. However, 81 (19.8%) of the participants had not told their partners about their findings (Table 4).

Table 4: HIV and ART related characteristic of respondent PLWHA attending ART clinic.

Variables	Frequency (n)	Percent (%)
When did respondent got HIV test		
1-12 months	48	12.1
13-48 months	125	31.4
>48 months	225	56.5
Child on ART		
Yes	51	12.6
No	354	87.4
Child death by HIV		
Yes	39	9.7
No	365	90.3
Knowledge about PMTCT		
Yes	321	79.7
No	82	20.3
WHO Staging		
stage I	271	66.7
stage II	120	29.6
Stage III	12	3.0
Stage IV	3	0.7
Spouse had HIV test		
Yes	329	83.5
No	64	16.5
Test result of spouse		
Negative	112	34.0
Positive	217	66.0
Disclosure to spouse		
Yes	328	80.2
No	81	19.8
Partners fertility desire ever after you know the status		
Yes	287	70.4
No	121	29.6

Fertility Desire

Among the total respondents, majority 267 (65.3%) of the PLWHA had desire to have a child in the near future and 34.7% doesn't have it.

Factors Associated with Fertility Desire

In this study, bivariate and multivariate logistic regression was conducted to assess the association between fertility desire and factors. The assumptions (multi-collinearity (VIF<10) and

model goodness of fit (Hosmer-Lemeshow, $P = 0.717$) are all fit. Variables with a P-value of 0.25 in the bivariate logistic regression model were entered into the multivariate model to control the confounding effect of multiple factors. The multivariate logistic regression model revealed that the age of participants, sex, monthly income, spouse/partner HIV test result, partner's fertility desire, partner pressure, and number of children they have were found to be significantly associated with fertility desire at a 5% significant level after controlling for other factors.

The odds of having a fertility desire were higher among young HIV-positive patients, so as compared to the age group of ≥ 30 years, people aged < 30 years had three times the odds of having a fertility desire (AOR = 2.971; 95%CI: 1.06, 8.27). The gender of the respondents was also linked to the desire for fertility in HIV patients. Men have a higher fertility desire as compared to female HIV patients (AOR = 2.677; 95% CI: 1.272, 5.633). When we compared participants who earned monthly income below 1000 EBR, the odds of fertility desire were 71.7% lower as compared to those who earned above 5000 EBR (AOR = 0.283; 95% CI: 0.081, 0.953).

Participants who were discordant had higher odds of fertility desire as compared to their counterparts.

(AOR = 2.790; 95% confidence interval (1.199, 6.491). parents' and partners' fertility desire (AOR = 8.740; 95% CI: 3.488, 21.90) and partner pressure (AOR = 2.352; 95% CI: 1.028, 5.385) were also associated with increased odds of fertility desire as compared to their counterparts, respectively. The number of children was also another significant predictor of fertility desire among HIV positive patients. Thus, for every additional child they have, fertility desire will decrease by 28.7% (AOR = 0.713; 95% CI: 0.564, 0.903) (Table 5).

Qualitative Findings

Desire of fertility and the reason behind: Qualitative data was analyzed using thematic analysis, and all the responses from the interview were transcribed and translated manually before the actual analysis. The responses were categorized into four different themes ("have a desire for fertility," "not have a desire for fertility," "pressure from community," and "pressure from family and partner"), and the descriptions were made based on the themes of the data.

In-depth interviews with seven key informants on Mother Support Group (MSG) in a health institution who have both their life or lived experience of fertility desire and medication impact and their working challenges on fertility desire, clients who have been following medication for a long time, experienced and discordant clients' experience and yielded similar results for clients.

One of the respondents of a 29-year-old woman on ART for 11 years stated that ".....I have a great fertility desire that led me to divorce my first husband after staying with him for eight years and also with my second husband for one year, but I did not give birth to either. I also married by family pressure the third husband, and currently we have a two-year-old child who is non-reactive, including my discordant partners. As she stated, she did not use any family planning methods properly, with the exception of an emergency contraceptive method that she used intermittently....."

A respondent, on the other hand, offers another reason for wanting to have children. The interviewer cited family, commu-

Table 5: Multivariable analysis of factors associated with fertility desire among PLWHIA.

Variable	Fertility desire		Crud Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)	P-value
	No	Yes			
Age of the participants					
18-30 years	11	107	7.964 (4.107, 15.441)**	2.971 (1.06,8.27)*	.037
≥ 30 years	131	160	1	1	
Sex					
Male	46	140	2.301 (1.501, 3.521)**	2.677 (1.272, 5.633)**	.009
Female	96	127	1	1	
Educational status					
No formal education	88	114	0.273 (0.090,0.830)*	0.368 (0.038, 3.525)	.321
Primary education	35	94	0.565 (0.180, 1.778)	0.718 (0.072, 7.195)	.386
Secondary education	15	37	0.519 (0.151, 1.784)	0.361 (0.032, 4.098)	.778
College and above	5	19	1	1	
Monthly income					
<1000 EBR	84	60	0.131 (0.060, 0.287)**	0.283 (0.081, 0.953)*	.042
1000-5000 EBR	47	144	0.563 (0.257, 1.232)	1.125 (0.336, 3.772)	.848
>5000 EBR	9	49	1	1	
Knowledge about PMTC					
Yes	97	224	2.094 (1.277, 3.434)	0.847 (0.262, 2.737)	.782
No	39	43	1	1	
At least one ANC follow up /partners if male					
Yes	52	75	0.667 (0.429, 1.038)	0.690 (0.287, 1.659)	.407
No	80	173	1	1	
Pressure from the community					
Yes	47	111	1.457 (0.951, 2.231)	.654 (0.287, 1.488)	.311
No	95	154	1	1	
Spouse HIV test result					
Negative (discordant)	16	96	4.252 (2.347, 7.703)**	2.790 (1.199, 6.491)*	.017
Positive	90	127	1	1	
Partners fertility desire					
Yes	63	224	6.450 (4.04, 10.273)**	8.740 (3.488, 21.90)**	.000
No	78	43	1	1	
Discussion with healthcare worker					
Yes	89	200	1.778 (1.147, 2.756)*	1.914 (0.655, 5.595)	.235
No	53	67	1	1	
Partners pressure					
Yes	39	165	4.546 (2.904, 7.115)*	2.352 (1.028, 5.385)*	.043
No	101	94	1	1	
Pressure from family/parents					
Yes	36	124	2.718 (1.727, 4.278)**	1.584 (0.690, 3.636)	.278
No	101	128	1	1	
Current FP utilization					
Yes	88	198	1.758 (1.124, 2.749)**	1.502 (0.583, 3.867)	.399
No	50	64	1	1	
Spouse HIV testing status					
Yes	105	223	1.820 (1.061, 3.124)*	5.981 (0.305, 17.162)	.239
No	30	35	1	1	
No of children Have			0.715 (0.630, 0.811) **	0.713 (0.564, 0.903) **	.005

** indicates significant association at P<0.01, * indicates significant association at P< 0.01-0.05.

nity, and partner pressure as the most common reasons. According to one of the 34 elderly women, MSG, who has three children but one is HIV positive and on ART treatment follow up, said that:-

“.....There is pressure from my community, especially my friends. They push me to have a baby because we spend the day working together, and they tell me what to do because I am still young. And now that treatment for HIV has intensified,

children are less likely to become infected. My husband, also on ART treatment for the past 15 years, wants me to have children, so I am very worried, but my experience was good using the jaddel long acting family planning method as a preventive measure.....”.

In contrast to the quantitative data analysis results, respondents in the in-depth interview stated that community pressure is the most important factor influencing fertility desire. As

a result, a 28-year-old man, on ART for six years, and his wife, who has an HIV negative result, raised the issue of community peruse, which leads to marriage conflict:

“.....In my society, if you do not even have a child, you are not considered a human being. So, having children is necessary. A child gives you a name and honor in the community. In addition, the child assists the parents in their old age. You are also aware that if you do not have children, other people are going to come and start taking over your property when you die.....”

He also added another reason that is similar to another 45-year-old man on ART for ten years with his wife, responding that they were raising him as the reason for their desire for fertility.

“.....Children are always referred to as the wielders of the lineage. As a result, if you do not have a child, no one will be modeled after you. When your child has a child, he or she will name him or her after you. Again, if you do not have children, you will not have someone to care for you in your old age.....”

Furthermore, partner pressure, particularly husband pressure, is one of the reasons for women's desire for fertility. Because quantitative analysis revealed a significant relationship between male and female desire, partner pressure, and desire for fertility, she also brings up the family's influence on her husband:

Another respondent, a 29-year-old woman, suggested that the reason was a financial and income issue rather than a fear of HIV transmission and child infection. This suggests that HIV positive clients are unconcerned about mother-to-child transmission of the virus.

According to one respondent from a mother's support group life experience, clients usually pretend to have no desire but arrive pregnant. She suggests that the main reasons for this could be partner pressure and a failure to attend counseling together.

“.....Though PLWHA informs us about their decision not to have a child, in reality, they become pregnant. And this happens mainly because both partners usually do not come to get counseling and testing at the same time to arrive at a common decision “that leads to their disclosure challenges and un-trustful life....”.

Discussion

The magnitude of fertility desire among PLWHAs on ART in Halaba Zone public health institutions was 267 (65.3%). Age under 30 years, sex, monthly income, HIV test results of spouses/partners, fertility want of couples, partner pressure, and number of children they had were all major factors in fertility desire, according to previous research [8,20,26].

In this study, the magnitude of fertility desire was higher than in previous studies in India, South Africa, and Ethiopia [27,28]. It is also the greatest when compared to prior surveys conducted in other parts of Ethiopia, with fertility desire levels of 46.8%, 40.3%, 33.4%, and 39.1%, respectively [20,21-23]. The difference could be explained by the study population (the population in this study was married), which has been found to be one of the most important predictors of fertility desire in other studies [29], socioeconomic and cultural differences, or other health-related factors such as counseling skills. Differences between regions can also be attributed to the year and the research population. Indeed, the relative rise over the ear-

lier study could be linked to PLWHA's health-related initiatives.

In the present study, age was an independent determinant of fertility desire among HIV-positive clients. Thus, as compared to the age group of 30 years, people aged 30 years had three times the odds of fertility desire (AOR = 2.97). A similar report was reported from other studies done in other regions of Ethiopia [30]. The reason could be that young people generally have higher sexual desire [28,31]. Aside from that, many efforts are required to make family planning services available to young females in the country's developing regions based on their context [22, 32].

One of the factors associated with a desire for fertility was the participants' sex. Men have a higher fertility desire as compared to female HIV patients (AOR = 2.677). This finding is supported by a study conducted in different developing countries [20,33,34]. When they die, men may have a stronger desire because they are more likely to have kids and leave something of themselves and their descendants behind when they die. As a result, it is critical that it assists policymakers and healthcare providers in increasing partners' active participation in reproductive health decisions in order to prevent unwanted pregnancy and mother-to-child transmission. It could also be explained by the fact that women had less decision-making power than men did.

Participants with a monthly family income of less than 1000 Birr were less likely to make a fertility decision than those with a monthly income greater than 5000 Birr (AOR = 0.283). The previous studies in Zambia and Ethiopia [34,35] also identified income as the most important and most common factor that influenced childbearing decisions. This could be because PLWHAs with better income may feel that they could have the opportunity to take better care of their children. This finding is also explained by a qualitative in-depth interview with a woman who suggested that the reason was an economic and income problem and she spoke

“Balancing health and economic situation is the key to raising and educating a child, if he or she is born “this statement goes in line with another in-depth interview response done in previous study [36].

The study demonstrated that partner fertility desire and pressure were also important determinants of the current fertility decision in this study (AOR = 2.35). This was in agreement with the study in North East Ethiopia [35]. Partner desire and partner pressure, are intertwined, and the desire to have a child causes people to put pressure on their partners. This could be due to more opportunities for couples to discuss fertility-related decisions. However, according to the study results, the client's partner's fertility desire was found to be much higher than the client's own decision, which could be due in part to the non-disclosure to partner [25]. Moreover, due to the cultural impact, because, in most parts of Ethiopia, having a child after marriage is obligatory, male partners want to put pressure on their wife [33]. As a result, couple and partner counseling would be beneficial in terms of HIV transmission from mother to child.

A similar response was obtained from qualitative data, partner pressure, particularly husband pressure, which is one of the reasons for women's desire for fertility. Because quantitative analysis revealed a significant relationship between male and desire, partner pressure, and desire for fertility, she also brings up the family's influence on her husband: *“....He is especially*

under pressure from his own family. They want to have many children and so, we will have one more soon...."

Participants who were discordant (their partners' HIV test results were negative) had higher odds of fertility desire as compared to their counterparts (AOR = 2.79). This is in line with other studies conducted in other regions of Ethiopia [21,23] and Uganda [9]. This finding could be explained by the fact that partners with opposite sero-status, particularly partners with negative test results, are thought to be non-infectious. Despite the fact that HIV-discordant couples are at a 10% annual risk of contracting HIV and that a large number of new HIV infections occur in stable partnerships, most HIV prevention programs focus on reducing casual sexual partners, condom use, and increasing fidelity among married partners [37].

Similar concerns were also reflected in the in-depth interview analysis. Thus, one of the 33-year-old women who responded that her husband's result was negative or discordant stated: *".....HIV is found in my blood. My husband is free. Our daughter is now four years old and is very happy that she is free of the virus, like our first son. I want to have two more children, a girl and a boy. Medical care and counseling have made a big difference in the past four years of my life. Both of us used the dual family planning method (condom with injectable type). A counselor working in a facility also reinforced this idea...."*

Therefore, health professionals working in ART clinics should pay special attention to patients seeking VCT and provider-initiated therapy. HIV testing and counseling, as well as providing health messages about fertility and vertical transmission of HIV for discordant couples, are critical in this context to ensuring informed reproductive decisions among PLHIVs and encouraging HIV sero-status disclosure.

In this study, the number of children was identified as a significant factor (AOR = 0.713). The finding was consistent with other studies done in Ethiopia [8]. This indicates that there is a high likelihood that participants who wish to have a child will engage in pregnancy-risk behavior. In addition, HIV care and treatment may also be an effective way to raise awareness and provide advice to spouses in order to increase their involvement in reproductive health services and PMTCT. Because access to ART has increased people living with HIV's life expectancy, ART users are willing to consider childbearing. There was no difference in the factors that influence pregnancy decisions between HIV-positive and HIV-negative people, specifically partner desire and age [35]. However, having children has great social importance in the Ethiopian context [22].

Conclusion

The highest fertility desire has been reported in PLWHA on antiretroviral treatment. Age, male sex, and discordant HIV test results are all independent predictors of fertility desire. The top reasons for having fertility desire were relationship pressure, the issue of replacing himself/herself or generational replacement, community pressure, and family monthly income.

PLHIVA should emphasize to ART/PMTCT clients and care providers the need of having an open dialogue about RH issues. HIV-positive women and men, as well as their children, should receive comprehensive, culturally relevant, and family-oriented reproductive health education. During periods of heightened reproductive desire, health-care providers should focus on the essential issue of avoiding HIV transmission from mother to child.

Abbreviation and ACRONYMS: AIDS: Acquired Immuno-Deficiency Disease; ART: Anti-Retroviral Therapy; cART: Combination Antiretroviral Therapy; EDHS: Ethiopian Demographic and Health Survey; eMTCT: Elimination of Mother to Child Transmission; FP: Family Planning; HAART: Highly Active Anti Retroviral Treatment; HIV: Human Immune-Virus; HMIS: Health Management Information System; ICPD: International Conference On Population & Development; IUCD: Intra Uterine Contraceptive Device; MOH: Ministry of Health; MSG: Mother Support Group; MTCT: Mother To Child Transmission; OCP: Oral Contraceptive Pill. PLHIV: People living with Human Immune Virus; PMTCT: Prevention of Mother to Child Transmission; RH: Reproductive Health; SNNPR: Southern Nations, Nationality and Peoples Region; SSA: Sub-Saharan Africa; TDIB: Traits –Desire -Intention-Behavior; UNAIDS: Joint United Nation Program on HIV/AIDS; WHO: World Health Organization

References

1. Streatfield PK, Khan WA, Bhuiya A, Hanifi SMA, Alam N, et al. HIV/AIDS-related mortality in Africa and Asia: evidence from INDEPTH health and demographic surveillance system sites. *Glob Health Action*. 2014; 7: 25370.
2. Shao Y, Williamson C. The HIV-1 epidemic: low- to middle-income countries. *Cold Spring Harb Perspect Med*. 2012; 2: a007187.
3. UNAIDS. UNAIDS report on the global AIDS epidemic. 2012.
4. WHO/UNAIDS/UNICEF. Global Update on HIV Treatment 2013: Results, Impact and Opportunities 2013; 2.
5. Kashesya Beyeza J, Kaharuza F, Mirebe F, Neema S, Ekstrom AM, et al. The dilemma of safe sex and having children: challenges facing HIV sero-discordant couples in Uganda. *African Health Sciences*. 2014; 9: 2-12.
6. Kakaire O, Osinde MO, Kaye DK. Factors that predict fertility desires for people living with HIV infection at a support and treatment centre in Kabale, Uganda. *Reprod Health*. 2010; 7: 27
7. King R, Khana K, Nakayiwa S, Katuntu D, Homsy J, et al. Pregnancy comes accidentally - like it did with me': reproductive decisions among women on ART and their partners in rural Uganda. *BMC Public Health*. 2011; 11: 530.
8. Mosisa G, Tsegaye R, Wakuma B, Mulisa D, Etefa W, et al. Fertility desire and associated factors among people living with HIV in Ethiopia: a systematic review and meta-analysis. *Arch Public Health*. 2020; 78: 123.
9. Kakaire O, Osinde MO, Kaye DK. Factors that predict fertility desires for people living with HIV infection at a support and treatment centre in Kabale, Uganda. *Reproductive Health*. 2010; 7.
10. FMOHE). FdoEMoHE. Health and Health Related Indicators. 2011.
11. Smith DJ, Mbakwem BC. Antiretroviral therapy and reproductive life projects: mitigating the stigma of AIDS in Nigeria. *Soc Sci Med*. 2010; 71: 345-352.
12. Central Statistical Agency (CSA) [Ethiopia], ICF. Ethiopia Demographic and Health Survey 2016 Key Indicators Report. Addis Ababa, Ethiopia, and Rockville, Maryland, USA: CSA and ICF; 2016.
13. Wanyenze RK, Tumwesigye NM, Kindyomunda R, Beyeza-Kashesya J, Atuyambe L, et al. Uptake of family planning methods and unplanned pregnancies among HIV-infected individuals: a cross-sectional survey among clients at HIV clinics in Uganda. *J Int AIDS Soc*. 2011; 14: 35.

14. Liyeh TM, Cherkose EA, Limenih MA, Yimer TS, Tebeje HD. Knowledge of prevention of mother to child transmission of HIV among women of reproductive age group and associated factors at Mecha district, Northwest Ethiopia. *BMC Research Notes*. 2020; 13: 166.
15. Hailu CK, Yohannes BB, Efrata GT. Fertility Desire and Associated Factors among People Living with HIV/AIDs at Selected Health Facilities of Wolaita Zone, Southern Ethiopia: Cross-sectional Study. *American Journal of Public Health Research*. 2017; 5: 79-88.
16. Jose H, Madi D, Chowta N, Ramapuram J, Bhaskaran U, et al. Fertility Desires and Intentions among People Living with HIV/AIDS (PLWHA) in Southern India. *J Clin Diagn Res*. 2016; 10: OC19-OC22.
17. UNAIDS. *Global AIDS Epidemic*. 2012.
18. Nigatu T, Woldegebriel Y. Analysis of the Prevention of Mother-to-Child Transmission (PMTCT) Service utilization in Ethiopia: 2006-2010. *Reproductive health*. 2011; 8: 6.
19. Nakiganda LJ, Nakigozi G, Kagaayi J, Nalugoda F, Serwadda D, et al. Cross-sectional comparative study of risky sexual behaviours among HIV-infected persons initiated and waiting to start antiretroviral therapy in rural Rakai, Uganda. *BMJ Open*. 2017; 7: e016954.
20. Abbawa F, Awoke W, Alemu Y. Fertility desire and associated factors among clients on highly active antiretroviral treatment at finoteselam hospital Northwest Ethiopia: a cross sectional study. *Reproductive health*. 2015; 12: 69.
21. Demissie D, Tebeje B, Tesfaye T. Fertility desire and associated factors among people living with HIV attending antiretroviral therapy clinic in Ethiopia. *BMC pregnancy and childbirth*. 2014; 14: 382.
22. Mekonnen B, Minyihun A. Fertility Desire And Associated Factors Among HIV Positive Women Attending ART Clinics In Amhara Region Referral Hospitals In Northwest Ethiopia, 2017. *HIV/AIDS - Research and Palliative Care*. 2019; 11: 247-254.
23. Shiferaw T, Kiros G, Birhanu Z, Gebreyesus H, Berhe T, et al. Fertility desire and associated factors among women on the reproductive age group of Antiretroviral treatment users in Jimma Town, South West Ethiopia. *BMC Research Notes*. 2019; 12: 158
24. Withers M, Dworkin S, Harrington E, Kwena Z, Onono M, et al. Fertility intentions among HIV-infected, sero-concordant couples in Nyanza province, Kenya. *Cult Health Sex*. 2013; 15: 1175-1190.
25. Wagner GJ, Wanyenze R. Fertility Desires and Intentions and the Relationship to Consistent Condom Use and Provider Communication Regarding Childbearing Among HIV Clients in Uganda. *ISRN Infect Dis*. 2013; 2013: 478192.
26. Simba MA, Gitonga L, Ng Z, Orege P. Determinants of Fertility Desires and Intentions among HIV Infected and Uninfected Women and Contraceptive use among HIV-infected women in the study at Six hospitals in two regions of Kenya. 2018; 5: 302-17.
27. Agbo S, Rispel LC. Factors influencing reproductive choices of HIV positive individuals attending primary health care facilities in a South African health district. *BMC Public Health*. 2017; 17: 540.
28. Berhan Y, Berhan A. Meta-analyses of fertility desires of people living with HIV. *BMC Public Health*. 2013; 13: 409.
29. Yan X, Du J, Ji G. Prevalence and factors associated with fertility desire among people living with HIV: A systematic review and meta-analysis. *PLOS ONE*. 2021; 16: e0248872.
30. Niragire F, Ndikumana C, Nyirahabimana MG, Uwizeye D. Prevalence and factors associated with fertility desire among HIV-positive women in Rwanda in the context of improved life expectancy. *Arch Public Health*. 2021; 79: 209.
31. Beutel ME, Stöbel-Richter Y, Brähler E. Sexual desire and sexual activity of men and women across their lifespans: results from a representative German community survey. *BJU International*. 2008; 101: 76-82.
32. Segurado AC, Paiva V. Rights of HIV Positive People to Sexual and Reproductive Health: Parenthood. *Reproductive Health Matters*. 2007; 15: 27-45.
33. Iddrisu A-K, Bukari FK, Opoku-Ameyaw K, Afriyie GO, Tawiah K. Factors That Determine the Likelihood of Giving Birth to the First Child within 10 Months after Marriage. *Journal of pregnancy*. 2020; 2020: 4675907.
34. Rutenberg N, Biddlecom A, Kaona F. Reproductive Decision-Making in the Context of HIV and AIDS: A Qualitative Study in Ndola, Zambia. *International Family Planning Perspectives*. 2000; 26: 124-30.
35. Getachew M, Alemseged F, Abera M, Deribew A. Factors affecting fertility decisions of married men and women living with HIV in South Wollo Zone, Northeast Ethiopia. *Ethiopian Journal of Health Development*. 2010; 24: 204-20.
36. Wekesa E, Coast E. Fertility desires among men and women living with HIV/AIDS in Nairobi slums: a mixed methods study. *PLOS ONE*. 2014; 9: e106292.
37. Tadesse M. Assessment of HIV discordance and associated risk factors among couples receiving HIV test in Dilla, Ethiopia. *BMC Research Notes*. 2014; 7: 893.