

# Fertility Intentions among HIV-positive and HIV-negative mothers in Zambia: Analysis of 2013-14 and 2018 DHS data

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## Research article

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# Abstract

**Background:** HIV infection is a strong predictor of fertility as it might influence one's fertility desire. With advent treatment, HIV-infected mothers are now living longer and healthier just like the HIV-negative mothers. Zambia is among the developing countries in the region with high desire for more children in spite of government efforts to reduce the fertility rate. However, little is known on the influence of HIV status on the desire for children among mothers of reproductive ages in Zambia.

**Methods:** The analyses are based on mothers with linkable information on HIV testing and fertility preferences from the 2013-14 and 2018 Zambia and Demographic Health Survey data, with national representative samples of 16,411 and 13,683 women, respectively. HIV data was merged with each woman's individual file, which also contained household variables to create an analytical file. Of the total sample; 11,683 mothers in 2013-14 and 9,172 mothers in 2018 were eligible for the study. Cross-tabulations with statistical tests were conducted to ascertain the crude relationship and finally multiple logistic regression analysis were employed to identify the major predictors of fertility intentions among HIV positive and HIV negative mothers using Stata software version 14.0.

**Results:** Findings indicate that fertility intentions among women either HIV-positive or HIV-negative reduced as parity increases. Generally, in both data sets, there is a significant difference between HIV-negative mothers preferring more children compared to HIV-positive mothers. Interestingly, in the 2018 survey, HIV-positive mothers residing in urban areas were 33 percent more likely to prefer more children compared to HIV-negative mothers.

**Conclusion:** According to this study, predictors of fertility intentions among women of reproductive age are different by HIV status. Other significant variables are age, education level, marital status, and parity, which were found to be the major predictors of fertility intentions among HIV-positive. Among the HIV-negatives, age, education level, parity, marital status, employment status, wealth quintile and region explained their fertility intentions. The fact that many HIV-infected mothers expect to have more children has important implications for the prevention of vertical and horizontal transmission of HIV. There is, therefore, the need for comprehensive and continuous expansion of family planning, voluntary counseling, and prevention of mother-to-child transmission (PMTCT) and integration of HIV treatment care among HIV-positive mothers to meet diverse reproductive intentions.

## 1. Introduction

The human devastation being shaped by the Human Immune Virus and Acquired Immune-Deficiency Syndrome [HIV/AIDS] in sub-Saharan Africa (SSA) and other regions, and the ripple effect that this epidemic is having on communities around the world presents one of the greatest challenges to global public health. Nearly 40 years after the first case, HIV has continued to spread world over and it is now firmly established as an important public health issue and can still be considered a strong predictor of fertility world over. HIV is one of the most significant causes of illness and death in human life history [1]. The burden is, however, heaviest in SSA [19]; with approximately 58% of adults living with HIV and 53% of all adult deaths in the region are women [20]. In Zambia, for example, (14.2%) of women 15-49 compared to (7.5%) of men in the same age group are living with HIV (Zambia Statistical Agency [25]. Since a larger proportion of these women are in the reproductive age (15-49), they risk infecting their newborn babies and sexual partners and thus face difficult choices about childbearing.

Over the past two decades, the HIV epidemic in many parts of the world has drastically reduced, but in Africa the situation is very different. In 2010 UNAIDS reported that SSA still remains the region most heavily affected by HIV, accounting for 67% of the global prevalence of infections with women in the reproductive age being the majority of the population living with HIV in the region (UNAIDS, 2010). In 2015, WHO highlighted that Africa is the leading continent and remains the center of HIV epidemic in the world due to high poverty levels, lack of innovation, lack of capacity, and government commitments to fight against HIV [23]. Since the beginning of the epidemic, it is estimated that more than 70 million people have been infected with HIV in Africa and about 35 million people have died due to HIV infection in this continent. In 2008, UNAIDS estimated that three quarters of the 3.3 million pregnant women infected with HIV who gave birth each year lived in Africa, where most (700,000) of the annual new infections of HIV in children occurred [21]. Another report by the UNAIDS in 2012 showed that about 70% of the 34 million people living with HIV globally resided in SSA, with women comprising 58% of persons HIV infected [18]. These disproportionately higher rates of HIV among women of reproductive ages in SSA have implications not only for health but also life course transitions such as childbearing.

Generally, the effects of HIV infection on fertility have been extensively studied in generalized HIV epidemic settings in SSA [4]. Principally, this has been to help forecast the demographic impacts of hyperendemic HIV [8] and because HIV prevalence among pregnant women has been widely used for estimating general population HIV prevalence levels and trends [8]. Existing literature, largely based on cross sectional data, has demonstrated that the relationship between HIV infection and fertility depends strongly on age. For instance, studies conducted by Chen et al., 2010 on the impact of HIV on fertility in Africa using cross sectional data revealed that younger (15-24 years) women had higher antenatal care (ANC) when compared to other women in the reproductive ages. Their findings further indicated that higher ANC was associated with pregnancy and HIV risks which mostly occurred among the subset of women who are sexually active while among older age groups (25-49 years), the Fertility Rate Ratio (FRR) of the HIV-positive women tended to increase lower relatively to their HIV-negative counterparts. This understanding is critical, because from this pivotal study, it is indicative that in some way HIV have a negative influence on fertility desires especially to those living with HIV.

Another study by Marston (2016) and colleagues was carried out to determine the effects of HIV on fertility by infection duration in Uganda using evidence from the population cohorts among the HIV-positive women. Interestingly, their findings revealed that longer duration of infection was significantly associated with greater relatively fertility reduction for HIV-positive women (Marston, 2016). Marston's findings were in tandem with those by Chen et al., 2003 as they all postulated that HIV infection tend to reduce fertility desires among HIV-positive women which may also be suggesting possible influence of HIV infection on fecundity. In this regard, the current study considers these study findings critical in its assessment of fertility intentions among HIV-positive and treats HIV infection a strong influence on the fertility desires among those living with HIV.

Other studies have also indicated that without intervention, HIV has between a 25% to 50% chance of infecting an HIV-positive mother's baby [13]. These findings are crucial since they establish important information on the implication of HIV infection on the general population. Further, this information can help family planning programme planners at country level assess the desire for children, the extent of mistimed and unwanted pregnancies, and the demand for contraception to space or limit births. Although several studies have generated important nexus between HIV and fertility desires among those living with HIV, other existing research on fertility intentions of HIV-infected women in SSA shows considerable diversity in perspectives on future fertility intentions due to the advent of Anti-Retroviral Therapy [ART].

In SSA, for instance, some studies conducted have indicated that with the advent of ART, the quality of life for people living with HIV has also improved, potentially impacting fertility intentions among HIV-infected individuals [12, 1, 10, 7]. From these study findings, it can be deduced that the introduction of free ART means having HIV is no longer a big barrier to having children. Although this may be anticipated, the change seems to have enormous implications for reproductive decisions and behaviors of HIV-infected individuals. Further, issues of fertility and childbearing among HIV-positive women have received relatively little attention in Zambia and information on this topic is still scanty. For example, available evidence from all the six DHSs in Zambia collected information from women age 15-49 about their preferred total number of children in their lifetime. Even though this information is based on a hypothetical situation, it provides two important measures. Firstly, for women who have not yet started a family, the data provides an idea of future fertility. Secondly, for older and high-parity women, the excess of past fertility over ideal family size provides a measure of unwanted fertility. Results in figure 1 indicate that in 1992 DHS the average number of desired children was highest while the average number of desired children remained the same between 1996 and 2018. On the other hand, figure 2 show the trend on the percentage of who want no children from the first ZDHS to the most recent one. Results show that women age 15-49 who want no more children increased from 24% in 1996 to 38% in 2018 [26].

Though Zambia recorded some improvements in reducing fertility desires among women over the two decades, investigating the influence of HIV status on the desire for children among women of reproductive ages in Zambia is critical to strengthen family planning. Therefore, this study assesses the fertility intentions among HIV-positive and HIV-negative women using evidence from latest Zambia Demographic Health Surveys, 2013-14 and 2018. Specifically, the study seeks to identify the socio-economic characteristics of the HIV-positive women and their fertility intentions, and finally, compares the fertility intentions between the infected and non-infected women of the reproductive ages.

Considering that Zambia's long-term vision (known as Vision 2030) is to become a prosperous middle-income nation by 2030, a research of this nature will be of great benefit, especially in the academic spheres and in the facet of reproductive health in the country as it is a crucial part of the general health. Additionally, the results of this study will contribute to update existing knowledge and inform the healthy policy makers and programmes to promote efforts for provision of safer and healthier reproductive options among HIV positive women in Zambia. It is also envisaged that the study would be relevant to HIV/AIDS programmes especially on interventions on preventing mother-to-child transmission (PMTCT) of the HIV virus and serve as a guide in designing possible interventions for people living with HIV in Zambia as well as enriching demographic literature on fertility intentions, contraceptive use and HIV/AIDS in Zambia and sub-Saharan Africa.

## 2. Data And Methods

The study used secondary data from the 2013-14 and 2018 Zambia Demographic and Health Surveys (DHS) that had linkable information on HIV testing and fertility preferences. The DHS studies used a multistage sampling design that first selected a random sample of enumeration areas and then selected a random sample of households systematically from a household listing of all households in the enumeration area. All eligible women in the sampled households were approached and asked to participate in the interview. The DHS is nationally representative survey which included a total sample of 16,411 women (15–49) in 2013-14 and 13,683 women in 2018. The respondents of this survey were interviewed from households using women's questionnaire [26]. This analysis only included 9,688 mothers of the reproductive age from the 2013-14 and 9,172 from 2018 surveys

respectively with linkable information on HIV status either positive or negative and were eligible to answer questions on fertility preferences while women who did not know their HIV status were excluded from analysis.

In terms of fertility preference, only those who reported having a child, wanting to have more children or do not want to more children were included in the study. However, because some of the eligible women did not consent to provide blood sample for HIV testing, the file for reproductive data does not exactly match with HIV files [25]. For this study, the non-matching cases were excluded from the analytical file during data analysis.

The outcome variable for this study is fertility intention which was measured using a question asked in the DHS on whether women wanted to have more children or not. Analysis was done at three levels: descriptive, bivariate, and multivariate regression analysis. Frequency and percent distributions of selected background characteristics were presented by HIV status. At bivariate level, cross-tabulations with Chi-square tests were used to analyze the association between dependent variables and the selected independent variables. Multivariate binary logistic regression analysis was conducted to assess the influence of HIV status on fertility intention. All the analysis was performed using Stata software version 14.0.

### 3. Results

#### 3.1 Descriptive Analysis

Table 1 contains a summary of information on the number of women from the 2013-14 and 2018 Zambia Demographic and Health Survey Datasets. The distribution show that a total of 16,411 women (15–49 years) were captured during the 2013-14 survey while 13,683 in the 2018 survey. Of the total number captured, 71% (11,683) and 67% (9,172) had linkable information on HIV status and fertility preferences, respectively. Further, results indicate that highest (n = 9,847 and n = 7,702) numbers of respondents of respectively were HIV-negative mothers with more than 15% of the HIV-positive mothers from each survey. Regarding contraceptive use, only 38% (n = 711 and n = 550 respectively) of the HIV positive women reported using contraceptives from each survey while the vast majority (85%) of their HIV negative counterparts indicated using contraceptive from both surveys.

Table 1  
Distribution on the number of women 15–49 years, DHS 2013-14 and 2018

	DHS 2013-14	DHS 2018
Total number of women captured in the surveys	16,411	13,683
Total number of women with linkable information on HIV and Fertility Preferences	11,683	9,172
Total number of HIV negative women	9,847	7,702
Total number of HIV positive women	1,836	1,470
Total number of HIV negative women using contraceptives	3,918	3,225
Total number of HIV positive women using contraceptives	711	550
*survey estimates are weighted		

Table 2 highlights descriptive statistics and is presented according to the 2013-14 and 2018 DHS and HIV status of women by selected demographic and socio-economic characteristics. Overall, results indicate that the vast majority of the women survey (83%) were HIV-negative with over 10% HIV-positive women from both surveys. Most (22% and 23% respectively) of the HIV-positive women in the study were 35–49 years while the highest proportion of HIV-negative (91% and 93% respectively) were 15–24 years. Further, results show that the proportion of HIV-positive women tended to increase by age compared to their HIV-negative counterparts in both surveys. The greater percentage (26% and 23%) of the HIV-positive women lived in urban place of residence while majority (89% in each survey) of HIV-negatives resided in rural areas. Results reveal that higher proportions of the HIV-positive women had attained secondary and tertiary education while their HIV-negative counterparts mostly attained primary education or no had education at all.

The distribution of women by religion was almost universal regardless of survey with most HIV-positives being either Catholic or Muslim followers while the HIV-negatives mostly protestant followers. Results show that slightly over one quarter of the HIV-positive women lived in rich (30%) and richest (27%) households from the 2013-14 survey. A similar distribution is observed among the HIV-positive women drawn from the 2018 survey with 28% living in rich household and 26% in richest households. Conversely, higher proportions of the HIV-negative women regardless of the survey drawn lived in the poorer and poor households with exceptions from those HIV-negatives drawn from the 2018 survey reporting living in households with middle wealth quintile (61%). Indications by the marital status of the respondents show that majority (over 30%) of them were currently married at the time of the surveys regardless of their HIV status. Interestingly, results show that the desire for children reduced among women regardless of the HIV status. In addition, it is shown that the distribution of by employment status was uniform by HIV status with most of the HIV-negatives being in employment from both surveys. Highest proportions of HIV-positive women were from Lusaka (24% and 26%) and Copperbelt provinces (24% from both surveys) respectively.

Table 2

Percent distribution of women (15–49) by selected Demographic and Socio-economic characteristics according to their HIV status, Zambia DHS 2013-14 and 2018.

Background Characteristics	2013-14		2018	
	HIV+ (n = 711)	HIV- (n = 3,918)	HIV+ (n = 1,470)	HIV- (n = 7,702)
<b>Age</b>				
15–24	9.4	90.6	7.3	92.7
25–34	17.5	82.5	17.4	82.6
35–49	22.5	77.5	23.4	76.4
<b>Place of Residence</b>				
Urban	25.8	74.2	23.4	76.4
Rural	11.0	89.0	10.6	89.4
<b>Education Level</b>				
No education	13.4	86.6	11.7	88.3
Primary	15.5	84.5	15.5	84.5
Secondary	21.1	78.9	20.7	79.3
Tertiary	19.0	81.0	20.1	79.9
<b>Religion</b>				
Catholic	18.8	81.2	16.4	83.6
Protestants	16.9	83.1	17.3	82.7
Muslim	17.6	82.4	13.2	86.8
Other	16.2	83.8	27.7	72.3
<b>Wealth quantile</b>				
Poorer	9.5	90.5	7.8	92.2
Poor	10.7	89.3	11.1	88.9
Middle	16.2	83.8	15.8	84.2
Rich	25.0	75.0	25.9	74.1
Richest	24.1	75.9	24.6	75.4
<b>Marital Status</b>				
Never Married	15.1	84.9	14.9	85.1
*Survey estimates are weighted				

Background Characteristics	2013-14		2018	
	HIV+	HIV-	HIV+	HIV-
	(n = 711)	(n = 3,918)	(n = 1,470)	(n = 7,702)
Currently Married	14.2	85.8	14.1	85.8
Formerly Married	33.4	66.6	34.9	65.1
<b>Parity</b>				
1-3	18.6	81.4	17.0	83.0
4-6	18.5	81.5	21.0	79.0
7+	11.0	89.0	9.8	90.2
<b>Employment Status</b>				
Employed	16.1	83.9	18.7	81.3
Unemployed	17.9	82.1	15.0	85.8
<b>Province</b>				
Central	16.7	83.3	19.1	80.9
Copperbelt	24.9	75.1	24.2	75.8
Eastern	12.1	87.9	11.6	88.4
Luapula	13.1	86.9	11.2	88.8
Lusaka	23.9	76.1	25.5	74.5
Muchinga	7.9	92.1	7.6	92.4
Northern	11.5	88.5	8.1	91.9
North-Western	7.9	92.1	10.7	89.3
Southern	16.5	83.5	18.5	81.5
Western	18.8	81.2	15.3	84.7
<b>Total</b>	<b>16.8</b>	<b>83.2</b>	<b>17.2</b>	<b>82.8</b>
*Survey estimates are weighted				

### 3.2 Bivariate Analysis of fertility Intentions and HIV status

Table 3 show results of women's HIV status and the association between selected independent variables and the outcome variable (fertility intention) without controlling for the effects of the respondents' selected characteristics in bivariate analysis. In bivariate analysis, the following factors were significantly associated with fertility intentions; age ( $p < 0.000$ ), education level ( $p < 0.003$ ), wealth index ( $p < 0.017$ ), marital status ( $p < 0.000$ ), parity ( $p < 0.000$ ) and employment status ( $p < 0.000$ ). Overall, results show that majority of the HIV-negative

women had intentions of having more children with 65% coming from 2013-14 and 60% from the 2018 DHS. Similarly, results indicate that over two-fifths of HIV-positive mothers from both surveys (50% and 45% respectively) wanted more children. Regarding age of the respondent, results reveal that fertility intentions tended to reduce by age with younger (15–24 years) women preferring to have more children regardless of their HIV status in both surveys. In terms of residence, most (53% and 47%) of HIV-positive women preferring more children resided in urban areas while over half of the HIV-negative women living in rural areas.

Regardless of HIV status and survey, it is shown that women with secondary and tertiary education comprised highest proportions of women wanting more children in future. Results in Table 3 also shows that majority (55% and 71% respectively) of both HIV-positive and HIV-negative women from 2013-14 DHS with fertility intentions were followers of other religions while their counterparts from 2018 DHS most of them were protestants by HIV status (46% and 61% respectively). Regarding wealth index, greatest percentage of HIV-positive women wanting more children lived in households with wealth index of rich and richest irrespective of the survey. Interestingly, higher proportions of the HIV-negative women with intentions of having more children lived households with poor or poorer wealth index.

The findings show glaring results on marital status by fertility intentions among women. Irrespective of the survey, HIV-positive women who are never in union have higher (76% and 68% respectively) fertility intentions for children than those who are either married or formerly married. Parity of the woman was also considered in this study as it may also determine whether to continue bearing children or not. Results indicate that fertility intentions among women either HIV-positive or HIV-negative reduced as the number of children increased. Further, results indicate that over half the HIV-positive with smaller (1 to 3) number of children constituted highest proportion of those more fertility intentions from both surveys. A similar observation is seen among HIV-negative women. Majority (56%) of the HIV-positive women who preferred having more children in the 2013-14 survey were not in employment while most (51%) of their HIV-positive counterparts from the 2018 survey were currently employed. According to the Province where respondents were drawn, most HIV-positive women preferring having more children (52%) in the 2013-14 survey were from Muchinga province while Northern province comprised more HIV-positive women wanting more children.

**Table 3: Percent distribution of women's (15–49) Fertility Intentions by selected Demographic and Socio-economic characteristics according to women's HIV status, DHS 2013-14 and 2018**

Background Characteristics	2013-14				2018				P-value
	HIV + (n = 1,836)		HIV- (n = 9,847)		HIV+ (n = 1,654)		HIV- (n = 8,034)		
	Want More Children	Don't want							
<b>Age</b>									0.000*
15–24	86.9	13.1	92.6	7.4	87.2	12.8	88.0	12.0	
25–34	59.9	40.1	71.5	28.5	59.7	40.3	67.8	32.2	
35–49	25.5	74.5	20.5	79.5	22.2	77.8	20.8	29.2	
<b>Place of Residence</b>									0.110
Urban	52.6	53.6	66.8	33.2	47.1	52.9	61.1	38.8	
Rural	46.4	55.0	64.2	35.8	40.6	59.4	60.4	39.6	
<b>Education Level</b>									0.003*
No education	45.0	55.0	50.7	49.3	31.7	68.3	42.9	57.1	
Primary	45.0	55.0	59.6	40.3	37.1	62.9	54.8	45.2	
Secondary	55.6	44.4	76.5	23.5	53.7	46.3	71.1	28.9	
Tertiary	62.1	37.9	69.2	30.7	51.6	48.4	70.5	29.5	
<b>Religion</b>									0.965
Catholic	46.1	53.9	65.2	34.8	42.2	57.8	60.9	39.1	
Protestants	51.4	48.6	65.3	34.7	45.8	54.1	60.7	39.3	
Muslim	13.0	86.9	43.2	56.8	29.8	70.1	56.8	43.2	
Other	55.1	44.9	70.8	29.2	28.7	71.3	62.6	37.4	
<b>Wealth quantile</b>									0.017*
Poorer	51.6	48.4	64.0	36.0	41.9	58.1	61.9	38.1	
Poor	40.5	59.5	64.7	35.3	37.2	62.8	60.0	40.0	
Middle	47.4	52.6	61.5	38.5	42.5	57.5	57.4	42.6	
Rich	53.8	46.2	65.8	34.2	51.4	48.6	59.4	40.6	
Richest	51.9	48.1	70.3	29.7	42.8	57.2	64.7	35.3	

These estimates are weighted; \*Denotes statistical significance at  $p < 0.05$

<b>Table 3: Percent distribution of women's (15–49) Fertility Intentions by selected Demographic and Socio-economic characteristics according to women's HIV status, DHS 2013-14 and 2018</b>								
<b>Marital Status</b>								0.000*
Never Married	75.6	24.4	92.7	7.3	67.9	32.1	82.3	17.7
Currently Married	54.9	45.0	62.3	37.7	53.0	46.9	60.3	39.7
Formerly Married	27.2	72.8	33.2	66.8	19.7	80.3	26.9	73.1
<b>Parity</b>								0.000*
1–3	64.5	35.5	83.9	16.1	62.6	37.4	78.3	21.7
4–6	27.9	72.0	47.5	52.4	23.7	76.3	39.3	60.7
7+	13.3	86.7	15.5	84.5	3.8	97.1	12.1	87.9
<b>Employment Status</b>								0.000*
Employed	46.5	53.5	58.4	41.6	50.6	49.4	54.4	45.6
Unemployed	56.1	43.9	73.6	26.4	41.8	58.2	68.8	31.2
<b>Province</b>								0.425
Central	38.7	61.3	57.6	42.4	40.1	59.9	54.2	45.8
Copperbelt	43.7	56.3	55.4	44.6	38.6	61.4	53.2	46.8
Eastern	41.2	58.8	61.9	38.1	35.3	64.7	57.8	42.2
Luapula	50.9	49.1	56.8	43.2	53.8	46.2	53.2	46.8
Lusaka	49.8	50.2	60.3	39.7	40.9	59.1	52.9	47.1
Muchinga	51.6	48.4	55.5	44.5	33.3	66.7	59.2	40.8
Northern	43.4	56.6	55.4	44.6	52.7	47.3	59.2	40.8
North-Western	46.8	53.2	65.5	34.5	44.2	55.8	59.4	40.6
Southern	45.9	54.1	63.1	36.9	49.2	50.8	54.6	45.4
Western	50.9	49.1	65.1	34.9	45.1	54.9	53.9	46.1
<b>Total</b>	<b>50.2</b>	<b>49.8</b>	<b>65.2</b>	<b>34.8</b>	<b>44.9</b>	<b>55.1</b>	<b>60.7</b>	<b>39.3</b>
These estimates are weighted; *Denotes statistical significance at $p < 0.05$								

### 3.3 Bivariate Analysis with Chi-square tests of Contraceptive Use and HIV status

Table 4 presents the findings from the bivariate analysis with chi-square tests on contraceptive use according to selected variables by HIV status of the women. In this level of analysis, all the variables were significantly

associated at 95% with contraceptive use except for place of residence and religion ( $p > 0.05$ ). Results show that about two-fifths (40%) of the HIV-positive women from both 2013-14 and 2018 DHS were contraceptive users while slightly above 40% of their HIV-negative counterparts reported using contraceptives in each survey. Further, results indicate a slight drop (2%) in contraceptive use among the HIV-positive between the two surveys. On the other hand, results reveal that there was a 2.4% improvement in contraceptive use among HIV-negative women since 2013. Surprisingly, highest proportions of women using contraceptives were 25–34 of age regardless of the HIV status. As expected, most of the women from urban dwellings reported using contraceptives irrespective of their HIV status from both surveys. With regards to education, it is shown that contraceptive use among HIV-positive and HIV-negative women tended to increase with education level. Interestingly, over two in five (40%) of the HIV-positive women with secondary education used contraceptives from both surveys.

Surprisingly, over half of the HIV-positive women regardless of their religious affiliation reported not using contraceptives when compared to their HIV-negative counterparts in each survey. In relation to the Wealth Index, the level of contraceptive use among women either HIV-positive or HIV-negative increased with household wealth index a woman lived. Most of the women currently married were contraceptive users compared to other marital categories. By parity, results show that over one in four (40%) of either HIV-positive or HIV-negative women with 4 to 6 children were contraceptives users. On the other hand, results show uniform distribution of contraceptive use among those employed and not employed regardless of the HIV status and the survey drawn. As similar distribution on province is observed among women by HIV status irrespective of the survey they come from.

**Table 4: Percent distribution of women's (15–49) Contraceptive use by selected Demographic and Socio-economic characteristics according to women's HIV status, DHS 2013-14 and 2018**

Background Characteristics	2013-14				2018				P-value
	HIV + (n = 1,836)		HIV- (n = 9,847)		HIV+ (n = 1,654)		HIV- (n = 8,034)		
	Using	Not using	Using	Not using	Using	Not using	Using	Not using	
<b>Age</b>									0.000*
15–24	37.9	62.1	29.6	70.4	31.8	68.2	34.6	65.4	
25–34	46.4	53.6	51.3	48.7	43.7	56.3	52.8	47.2	
35–49	35.5	64.5	41.4	58.6	35.6	64.4	41.6	58.4	
<b>Place of Residence</b>									0.919
Urban	41.7	58.3	45.0	65.8	39.6	60.4	44.0	56.0	
Rural	37.8	62.2	37.6	62.4	35.5	65.5	42.1	57.9	
<b>Education Level</b>									0.000*
No education	28.7	71.3	34.2	65.8	31.4	68.6	34.1	65.9	
Primary	37.6	62.4	41.3	58.7	34.3	65.7	44.5	55.5	
Secondary	44.0	56.0	39.7	60.3	42.9	57.1	43.3	56.7	
Tertiary	49.5	50.5	50.6	49.4	39.4	60.6	40.9	59.1	
<b>Religion</b>									0.216
Catholic	43.5	56.5	38.6	61.4	36.7	63.3	42.4	57.6	
Protestants	39.8	60.2	40.9	59.1	38.3	61.7	43.1	56.9	
Muslim	26.5	73.5	30.4	69.6	48.3	51.7	63.6	36.4	
Other	0	100.0	37.1	62.9	42.3	57.7	31.2	68.8	
<b>Wealth quantile</b>									0.000*
Poorer	31.6	68.7	33.8	66.2	30.7	69.3	38.7	61.3	
Poor	34.7	65.3	38.1	61.9	33.5	66.5	41.3	58.7	
Middle	39.5	60.5	42.8	57.2	36.8	63.2	47.9	52.1	
Rich	41.3	58.7	43.4	56.6	42.3	57.7	46.6	53.4	
Richest	45.7	54.3	44.5	55.5	38.5	61.5	41.1	58.9	
<b>Marital Status</b>									0.000*
Never Married	27.2	72.8	13.4	86.6	27.2	72.8	17.9	82.1	

These estimates are weighted; \*Denotes statistical significance at  $p < 0.05$

<b>Table 4: Percent distribution of women's (15–49) Contraceptive use by selected Demographic and Socio-economic characteristics according to women's HIV status, DHS 2013-14 and 2018</b>								
Currently Married	47.2	52.8	49.5	50.5	44.4	55.6	51.0	49.0
Formerly Married	29.1	70.9	22.9	77.1	28.0	72.0	28.5	71.5
<b>Parity</b>								0.000*
1–3	47.1	57.8	47.1	52.9	36.0	64.0	48.8	51.2
4–6	43.9	56.1	49.7	50.3	44.8	55.2	49.6	50.4
7+	39.3	60.7	43.3	56.7	39.0	61.0	45.6	54.4
<b>Employment Status</b>								0.000*
Employed	40.3	59.7	42.4	57.6	41.1	58.9	45.2	54.8
Unemployed	40.1	59.1	38.2	61.8	32.7	67.3	39.7	60.3
<b>Province</b>								0.000*
Central	37.5	62.5	43.4	56.6	45.5	54.5	47.1	52.9
Copperbelt	45.1	54.9	52.7	47.3	40.1	59.9	52.1	47.9
Eastern	43.4	56.6	51.4	48.6	39.3	60.7	53.5	46.5
Luapula	31.6	68.4	32.3	67.7	31.9	68.1	37.7	62.3
Lusaka	44.3	55.7	55.9	44.1	42.7	57.3	54.3	45.7
Muchinga	42.6	57.4	41.2	58.8	34.8	65.2	56.1	56.9
Northern	40.3	59.7	45.6	54.4	32.1	67.9	44.1	55.9
North-Western	39.2	60.8	37.1	62.9	32.1	67.9	46.5	53.5
Southern	51.6	48.4	52.6	47.4	41.5	58.5	45.1	54.9
Western	29.6	70.4	33.9	66.1	29.2	70.8	35.7	64.3
<b>Total</b>	<b>40.2</b>	<b>59.8</b>	<b>40.5</b>	<b>59.5</b>	<b>38.2</b>	<b>61.8</b>	<b>42.9</b>	<b>57.1</b>
These estimates are weighted; *Denotes statistical significance at $p < 0.05$								

### 3.4 Logistic Regression Analysis of fertility intentions and HIV status

To identify the major predictors of fertility intentions, use by HIV status, multivariate binary logistic regression was used. Results of the logistic regression presented in Table 5 show that HIV-positive women in the age categories of 25–34 [OR: 0.36, C.I: 0.23–0.55] and 35–49 [OR: 0.13, C.I: 0.08–0.22] from the 2013-14 DHS were significantly less likely to want more children compared to those between 15–24 years. Similarly, HIV-positive women from the 2018 DHS of the same age groups [OR:0.55, C.I: (0.45–0.67)] and [OR: 0.14, C.I: (0.11–0.17)] were less likely to fertility intentions compare to the 15–24 counterparts. A similar observation is seen among HIV-negative women from both surveys. Surprisingly, HIV-positive women residing in urban place of residence

coming the 2018 survey were 33% [OR: 1.33, C.I: (1.10–1.61)] more likely to have fertility intentions compared to HIV-negative counterparts. Though not statistically significant, results show that those HIV-positive from the 2013-14 survey residing from urban areas were 11% [OR: 0.89, C.I: (0.65–1.21)] less likely to have fertility intentions. Results show that the odds of wanting more children was around 1% [OR:1.01, C.I: (0.63–1.64)] to 23% [OR: 1.23, C.I: (0.84–1.80)] times higher among HIV-positive women with primary, secondary and tertiary education level regardless of the survey. Regarding religion, HIV-positive women and were Muslim followers in the 2013-14 survey were 2.5 times highly likely to prefer more children while those from 2018 survey, HIV-positive women and were protestants, their odds of wanting children were 2.1 times higher compared to their counterparts belonging to other religions.

The results show that the odds of wanting more children reduced among HIV-positive women from the 2013-14 survey. On the other hand, fertility intentions significantly reduced among HIV-positive women captured in the 2018 survey. For instance, those in the middle wealth index group [OR:0.73, C.I (0.59–0.89)] less likely to want more children when compared to those in the poorest category. Further, those in the richest category were 34% less likely to want more children compare to the poorest group. Results by marital status, show that HIV-positive in 2013-14 survey who were currently married were more likely [OR = 1.96; CI: (1.25–3.06)] to want more children regardless of the HIV status as compared to the never married women. Similar results are observed among those captured in the 2018 survey showing HIV-positive women having 3.4 times higher preference of more children. Regardless of the HIV status and survey, it is shown that women with more than 3 children were significantly less likely to want more children compared to those with less than 3 children. As expected, HIV-positive women in employment in both surveys were 1.2 and 1.1 times more likely to prefer more children, respectively. Results indicate that HIV-positive women in 2013-14 drawn from other provinces were more than 10% more likely to want children compare to those from Central province. Conversely, those form 2018 survey with exceptions from Luapula [OR:1.24, C.I: (0.93–1.65)] and Northern [OR: 1.20, C.I: 0.89–1.61)] provinces were less likely to want more children.

Table 5

Multiple Logistic Regression Analysis of the effect of HIV status on Fertility Intentions, ZDHS 2013-14 and 2018

Background Characteristics	2013-14				2018			
	HIV+		HIV-		HIV+		HIV-	
	Odds ratio [OR]	95% CI for OR	Odds ratio [OR]	95% CI for OR	Odds ratio [OR]	95% CI for OR	Odds ratio [OR]	95% CI for OR
<b>Age</b>								
15–24 (RC)	1							
25–34	0.36**	[0.234–0.545]	0.55**	[0.454–0.668]	0.55**	[0.453–0.674]	0.48**	[0.291–0.803]
35–49	0.13**	[0.083–0.216]	0.12**	[0.095–0.148]	0.14**	[0.110–0.174]	0.20**	[0.116–0.331]
<b>Place of Residence</b>								
Rural (RC)	1							
Urban	0.89	[0.649–1.216]	1.37**	[1.167–1.609]	1.33**	[1.103–1.613]	0.90	[0.597–1.347]
<b>Education Level</b>								
No education (RC)	1							
Primary	1.01	[0.625–1.639]	0.99	[0.820–1.199]	1.09	[0.880–1.348]	0.90	[0.500–1.606]
Secondary	1.01	[0.601–1.683]	0.91	[0.725–1.139]	1.18	[0.921–1.510]	0.82	[0.443–1.535]
Tertiary	0.99	[0.490–2.017]	0.83	[0.575–1.186]	1.23	[0.844–1.803]	1.40	[0.625–3.140]
<b>Religion</b>								
Catholic	0.99	[0.724–1.341]	1.02	[0.877–1.192]	1.10	[0.931–1.307]	0.86	[0.589–1.261]
Protestants	0.59	[0.121–2.916]	0.50	[0.213–1.184]	2.06	[0.815–5.190]	0.67	[0.097–4.000]
Muslim	2.48	[0.552–5.141]	1.96	[0.915–4.201]	1.08	[0.571–2.038]	1.01	[0.290–3.551]
Other (RC)	1							
<b>Wealth quantile</b>								
Poorer (RC)	1							

\*Denotes statistical significance at  $p < 0.05$ ; RC = Reference Category, OR = Odds Ratio & C. I = Confidence Interval

Background Characteristics	2013-14				2018			
	HIV+		HIV-		HIV+		HIV-	
	Odds ratio [OR]	95% CI for OR	Odds ratio [OR]	95% CI for OR	Odds ratio [OR]	95% CI for OR	Odds ratio [OR]	95% CI for OR
Poor	0.61	[0.376–1.003]	0.91	[0.760–1.089]	0.91	[0.750–1.307]	0.71	[0.398–1.254]
Middle	0.71	[0.446–1.136]	0.84	[0.694–1.019]	0.73**	[0.589–0.894]	0.71	[0.397–1.275]
Rich	0.72	[0.424–1.208]	0.82	[0.654–1.037]	0.63**	[0.480–0.818]	0.66	[0.347–1.259]
Richest	0.59	[0.333–1.508]	0.73	[0.549–0.974]	0.66**	[0.482–0.893]	0.45**	[0.224–0.915]
<b>Marital Status</b>								
Never Married (RC)	1							
Currently Married	1.96**	[1.254–3.060]	1.55**	[1.197–1.996]	3.41	[0.290–2.685]	2.52**	[1.493–4.249]
Formerly Married	0.51**	[0.319–0.820]	0.39**	[0.289–0.524]	0.58**	[0.430–0.773]	0.63	[0.357–1.109]
<b>Parity</b>								
1–3 (RC)	1							
4–6	0.25**	[0.188–0.324]	0.25**	[0.214–0.294]	0.24**	[0.207–0.290]	0.23**	[0.166–0.314]
7+	0.10**	[0.061–0.179]	0.09**	[0.070–0.108]	0.07**	[0.056–0.093]	0.05**	[0.020–0.105]
<b>Employment Status</b>								
Unemployed (RC)	1							
Employed	1.16	[0.899–1.499]	1.02	[0.902–1.060]	1.07	[0.933–1.220]	0.87	[0.649–1.176]
<b>Province</b>								
Central (RC)	1							
Copperbelt	1.12	[0.655–1.917]	0.85	[0.643–1.112]	0.91	[0.686–1.217]	0.86	[0.506–1.461]
Eastern	1.27	[0.744–2.175]	1.10	[0.846–1.424]	0.77	[0.585–1.022]	1.07	[0.583–1.947]

\*Denotes statistical significance at  $p < 0.05$ ; RC = Reference Category, OR = Odds Ratio & C. I = Confidence Interval

Background Characteristics	2013-14				2018			
	HIV+		HIV-		HIV+		HIV-	
	Odds ratio [OR]	95% CI for OR	Odds ratio [OR]	95% CI for OR	Odds ratio [OR]	95% CI for OR	Odds ratio [OR]	95% CI for OR
Luapula	1.50	[0.854–2.627]	1.12	[0.856–1.464]	1.24	[0.930–1.648]	1.98	[1.035–3.798]
Lusaka	1.36	[0.813–2.290]	0.96	[0.730–1.265]	0.82	[0.623–1.087]	0.96	[0.576–1.589]
Muchinga	1.91	[0.993–3.683]	0.97	[0.737–1.269]	0.99	[0.737–1.320]	1.04	[0.515–2.872]
Northern	1.17	[0.657–2.068]	0.95	[0.726–1.239]	1.20	[0.898–1.609]	1.38	[0.663–2.102]
North-Western	1.82	[0.961–3.451]	1.47**	[1.118–1.941]	0.97	[0.710–1.329]	0.91	[0.416–2.008]
Southern	1.22	[0.714–2.099]	1.29	[0.989–1.692]	0.95	[0.707–1.268]	0.79	[0.443–1.418]
Western	1.51	[0.891–2.561]	1.20	[0.897–1.599]	0.78	[0.572–1.055]	1.48	[0.796–2.737]
<b>Constant</b>	<b>4.98**</b>	<b>[2.025–6.246]</b>	<b>7.28**</b>	<b>[1.599–9.200]</b>	<b>2.78**</b>	<b>[1.779–4.343]</b>	<b>1.48</b>	<b>[0.796–2.017]</b>
*Denotes statistical significance at $p < 0.05$ ; RC = Reference Category, OR = Odds Ratio & C. I = Confidence Interval								

### 3.5 Logistic Regression Analysis of Contraceptive use and HIV status

The results in Table 6 presents multivariate binary logistic regression on effects of the HIV status on contraceptive use and are the net effects of selected independent variables from the 2013-14 and 2018 DHS. Results show that women 35–49 have lower odds of using contraceptives compared to women 15–24 regardless of the HIV status; and this difference is statistically significant ( $p < 0.05$ ) from both surveys. Interesting, it is shown that the odds using of using contraceptives increased significantly from [OR:0.42; 95%, CI: (0.29–0.61)] to [OR:0.54;95% (0.34–0.87)] among HIV-positive women 35–49 between 2013 and 2018 when to compared to their HIV-negative counterparts respectively. In terms of education level, results indicate that the odds of using contraceptives among women increased by educational level with women having tertiary education highest odds ratios. Though not statistically significant, HIV-positive from the 2013-14 DHS were 2.5 times more likely to use contraceptives those in other religion category while those from the 2018 DHS, HIV-positive women who were protestants were 2.4 times more likely to use contraceptives.

Women in the poor, middle and rich groups were more likely to use contraceptive compared to those in the poorer group irrespective of their HIV status with those in the 2013-14 being significant where compare to their 2018 counterparts. Further, results in Table 6 show that the odds of using contraceptives among HIV-positive married women in 2013 DHS were 2.2 times higher compared to the never married. In contrast, the odds of using

contraceptives for HIV-positive women from 2018 DHS were 1.4 more likely using contraceptives when compared to the never married women. Equally, HIV-negative married women were more than 2 times likely to using contraceptives when compared to their never married counterparts.

During analysis, women with zero parity were dropped in the study as it only considered women with one or more children. In this regard, results show that HIV-positive women with more than 3 children (4–6 and 7+) are significantly more likely to use contraceptives compared those having 1 to 3 children. A similar observation is evident among the HIV-negative women in both surveys. Regardless of the HIV status, women with more than 6 children are the most likely to use contraceptives. By employment status, women in employment were more likely to use contraceptives compared to the unemployed ones. Additionally, results indicate that HIV-positive women from Luapula and Muchinga in 2013-14 DHS were less likely to use contraceptives compared to those from Central while those drawn from 2018 DHS, only those from Southern province were more likely to use contraceptives. On the contrary, HIV-negative women from Western, Luapula and North-Western were less likely to use contraceptives in the 2013-14 DHS. Interestingly, HIV-negative women from Lusaka, Copperbelt, Eastern and Muchinga were more likely to use contraceptives in the 2018 DHS.

Table 6  
Multiple Logistic Regression on the effect of HIV status on Contraceptive use, ZDHS 2013-18

Background Characteristics	2013-14				2018			
	HIV+		HIV-		HIV+		HIV-	
	Odds ratio	95% CI						
	[OR]		[OR]		[OR]		[OR]	
<b>Age</b>								
15–24 (RC)	1							
25–34	0.77	[0.556–1.070]	1.00	[0.872–1.144]	0.92	[0.596–1.416]	1.02	[0.880–1.180]
35–49	0.42*	[0.290–0.609]	0.63*	[0.528–0.753]	0.54*	[0.340–0.871]	0.55*	[0.444–0.650]
<b>Place of Residence</b>								
Rural (RC)	1							
Urban	1.06	[0.803–1.387]	0.74*	[0.653–0.839]	0.85	[0.606–1.199]	0.88	[0.754–1.023]
<b>Education Level</b>								
No education (RC)	1							
Primary	1.57*	[1.015–2.413]	1.37*	[1.165–1.601]	1.01	[0.608–1.663]	1.53*	[1.282–1.821]
Secondary	2.19*	[1.384–3.476]	1.91*	[1.589–2.299]	1.41	[0.826–2.408]	1.82*	[1.489–2.228]
Tertiary	2.37*	[1.246–4.523]	2.16*	[1.594–2.919]	1.54	[0.745–3.169]	1.48*	[1.075–2.039]
<b>Religion</b>								

\*Denotes statistical significance at  $p < 0.05$ ; RC = Reference Category, OR = Odds Ratio & C. I = Confidence Interval

Background Characteristics	2013-14				2018			
	HIV+		HIV-		HIV+		HIV-	
	Odds ratio	95% CI						
	[OR]		[OR]		[OR]		[OR]	
Catholic	0.99	[0.724–1.257]	1.03	[0.908–1.159]	0.99	[0.712–1.373]	0.96	[0.839–1.101]
Protestants	0.59*	[0.121–0.869]	0.36	[0.165–0.784]	2.42	[0.390–5.029]	1.22	[0.597–2.510]
Muslim	2.48	[0.552–4.257]	1.03	[0.561–1.880]	0.95	[0.341–2.659]	0.71	[0.415–1.205]
<b>Other (RC)</b>	1							
<b>Wealth quantile</b>								
<b>Poorer (RC)</b>	1							
Poor	1.36	[0.883–2.091]	1.11	[0.968–1.281]	1.22	[0.749–1.984]	1.13	[0.973–1.306]
Middle	1.41	[0.931–2.139]	1.33*	[1.147–1.547]	1.20	[0.737–1.969]	1.42*	[1.206–1.671]
Rich	1.47	[0.931–2.330]	1.31*	[1.095–1.571]	1.21	[0.701–2.097]	1.42*	[1.151–1.753]
Richest	1.74*	[1.046–2.901]	1.29*	[1.030–1.618]	1.33	[0.732–2.418]	1.35*	[1.055–1.739]
<b>Marital Status</b>								
<b>Never Married (RC)</b>	1							
Currently Married	2.17*	[1.443–3.261]	2.59*	[2.137–3.128]	1.40	[0.855–2.279]	2.25*	[1.827–2.765]
Formerly Married	1.02	[0.654–1.593]	0.87	[0.684–1.116]	0.64	[0.379–1.096]	0.86	[0.662–1.114]
<b>Parity</b>								
<b>1–3 (RC)</b>	1							
4–6	1.75**	[1.361–2.255]	1.36**	[1.192–1.553]	2.30**	[1.712–3.088]	1.37*	[1.179–1.582]
7+	1.95**	[1.321–2.871]	1.46**	[1.217–1.749]	2.57**	[1.612–4.089]	1.54*	[1.259–1.883]
<b>Employment Status</b>								

\*Denotes statistical significance at  $p < 0.05$ ; RC = Reference Category, OR = Odds Ratio & C. I = Confidence Interval

Background Characteristics	2013-14				2018			
	HIV+		HIV-		HIV+		HIV-	
	Odds ratio	95% CI						
	[OR]		[OR]		[OR]		[OR]	
<b>Unemployed (RC)</b>	1							
Employed	1.033	[0.829–1.288]	1.06	[0.9601.170]	1.148**	[1.370–1.775]	1.057*	[1.032–1.277]
<b>Province</b>								
<b>Central (RC)</b>	1							
Copperbelt	1.17	[0.734–1.855]	1.12	[0.901–1.396]	0.82	[0.522–1.294]	1.11	[0.881–1.386]
Eastern	1.75**	[1.097–2.777]	1.62**	[1.322–1.986]	0.99	[0.595–1.647]	1.39*	[1.121–1.733]
Luapula	0.78	[0.477–1.279]	0.72**	[0.581–0.893]	0.70	[0.404–1.202]	0.74*	[0.591–0.926]
Lusaka	1.36	[0.871–2.139]	1.48**	[1.190–1.842]	0.86	[0.555–1.333]	1.27*	[1.012–1.582]
Muchinga	0.94	[0.535–1.649]	1.12	[0.903–1.383]	0.73	[0.396–1.351]	1.58*	[1.264–1.986]
Northern	1.04	[0.639–1.709]	1.15	[0.932–1.422]	0.67	[0.362–1.259]	0.91	[0.725–1.142]
North-Western	1.11	[0.632–1.948]	0.85	[0.681–1.050]	0.40	[0.197–0.821]	0.95	[0.740–1.214]
Southern	1.62**	[1.022–2.582]	1.40**	[1.149–1.728]	1.01	[0.621–1.648]	0.87	[0.692–1.093]
Western	1.01	[0.627–1.601]	0.96	[0.761–1.205]	0.56	[0.320–0.980]	0.72*	[0.562–0.926]
<b>Constant</b>	<b>0.19</b>	<b>[0.085–0.419]</b>	<b>0.22</b>	<b>[0.155–0.304]</b>	<b>0.40</b>	<b>[0.154–1.053]</b>	<b>0.20</b>	<b>[0.796–0.388]</b>
*Denotes statistical significance at p < 0.05; RC = Reference Category, OR = Odds Ratio & C. I = Confidence Interval								

## 4. Discussion

This study aimed at assessing fertility intentions of HIV-positive and HIV negative mothers in Zambia. The study also sought to answer research questions on whether the HIV status and contraceptive use among women of reproductive age any influence on fertility intentions has considering that the growing availability of ART may

change the relationship. The predictors of fertility intention are discussed around identified major variables in the study. Correspondingly, details of factors associated with contraceptive use among HIV-positive and HIV negative mothers is also explained among the major determinants.

Fertility data in Zambia for the period 1992 to 2018 show that women generally have been having high preference for more children. For instance, the ZDHSs show that the average number of desired children ranges from 4 to 5 over from 1996 to 2018. Moreover, women living in rural areas preferred to have more children than those living in urban areas. This shows that the demand for large family size is higher in rural settings compared to urban settings [16]. The findings of this study reveal that the prevalence of fertility intentions of HIV-negative women in 2018 is higher than that of HIV-positive (61% compared to 45%). These results are in a way consistent with studies from South Africa but higher than reports from Uganda (29% and 24%) respectively [1, 7, 22]. The findings of this study show the fertility intention of HIV-positive women in Zambia is higher than those from other countries. However, the observed differences in fertility intention might be related to study sites, time, and study subject difference. The other probable difference could be associated that being HIV positive did not remove childbearing intentions rather there exist diversity. Despite higher proportion of HIV-positive intending to have children in future, this study has shown a 16% significant difference ( $p < 0.05$ ) in fertility intentions between HIV-negative (61%) and HIV-positive (45%) women. The proportion of HIV-positive women reporting more intentions for children in future could be accompanied with reasons such as; presence of ART, improvement of health conditions, influence of husbands, advice of health workers and to attain ideal family size. These findings may be suggesting a continuation in integrating target oriented and individualised counseling along with comprehensive care and supporting activities among women living with HIV.

This secondary analysis of the 2013-14 and 2018 DHS reveals that education and parity are the strongest predictors of fertility intentions among HIV positive and HIV negative women. For instance, the fertility intentions for not wanting more children were increasing as education level increased. This entails that as one gets more educated there is a chance that knowledge of HIV also increases which may result into removal of the fertility desires and intentions for children especially after knowing the HIV status. These findings are in tandem with a study conducted by Myer in 2017 and friends in South Africa and Ethiopia [15]. They also conform to Harriers' et al (2007) findings in Kenya who used DHS data from several countries in SSA to assess fertility desires and intentions among HIV-infected individuals. The results also show that women with higher parity (above 3 children) are more likely to stop childbearing after learning their HIV status.

The study also examined the relationship between contraceptive use and fertility preference among HIV positive and HIV negative women. The prevalence of contraceptive use among HIV infected women was 40% in 2013-14 and 38% in 2018. This finding is lower than the reported overall prevalence of contraceptive use (49%) in 2013-14 and (50%) in 2018 among women of reproductive age in Zambia. It is also lower than that reported in the studies conducted in South Africa (53%) and Addis Ababa, Ethiopia (78%) [15]. The lower prevalence of contraceptive among HIV positive women in Zambia might be explained by the high levels of intention for more children (53%) among the married women. The other possible reason for the low prevalence of contraceptive use among HIV-positive women could be due to unavailability or lack of the preferred types of contraceptive methods at clinics offering ART.

The finding that the majority of HIV-positive women not using contraceptives in Zambia translates into high levels of HIV infected women. The situation is worrying considering that a number of family planning

programmes in Zambia have been implemented not only to reduce fertility rate but also to help slow down the transmission of HIV. Moreover, strengthened family planning program efforts are cost effective points for HIV prevention (Feldman & Maposhere, 2003). However, the results may be reflecting the fact that HIV-positive women are expecting more children in future. Further, this evidence in Zambia is different from what Dube (2012) and friends found in Malawi [5]. In multivariate analysis, education level, marital status, parity were found to have more influence on contraceptive use. HIV-positive women with primary, secondary, and higher education were more than two (2) times likely to use contraceptives compared to those with no education. These results may in a way suggesting the influence of education on contraception and level of knowledge one would have acquired. Further, they are in line with the reported fertility intentions of HIV-positive women in this study which indicates that as education levels increase, the fertility intention reduces.

The study has revealed that even though HIV-negative women have higher fertility preference compared to HIV-positive women, the proportion of HIV positive women who prefer more children is unexpectedly high in Zambia. In terms of policy implication for PMTCT service provisions, the findings may be pointing out the need for strengthening the support for HIV prevention services especially for this group of women considering their high demand for children.

## **5. Conclusion**

This study has examined fertility intentions of mothers in Zambia in the context of HIV pandemic. Although most HIV prevention programmes seem to focus on prevention of pregnancy among HIV-positive women, this study has demonstrated that the intention to have additional children among this group of women cannot be disregarded and ignored. Based on the findings of this study, the major predictors of fertility intentions among HIV- positive women include; age, education level, marital status, parity, and type of contraceptive method in Zambia. The study has found out to some extent that availability of ART and other prevention services can still raise hopes for women living with HIV and they can believe to have a normal birth. The study concludes that use of contraceptive among these women of reproductive group is driven by marital status, parity, ethnicity, age and education. The study may have confirmed to some extent that availability of ART and other prevention services can still raise hopes for individuals living with HIV and they can believe to have a normal birth. It has been noted that the prevalence of contraceptive use among HIV-positive women is still low. It has been noted that the demand for additional children was lower among HIV-positive mothers compared HIV-negative mothers. This is an indication that maternal and child health care programmes focusing prevention of mother to child transmission are effectively working in disseminating health education information to women of reproductive age.

## **Declarations**

### **Competing Interests**

The Authors declare that they have no competing interests.

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## Authors' Contributions

This work was successfully done through efforts from all authors who provided input into drafts and approved the final draft of the manuscript. Specifically, DM conceptualized the study, data acquisition, data analysis and interpretation; MP and NM contributed to the conceptualization of the study, data analyses and interpretation; MP discussed the study findings and conclusion; and NM contributed to the data analyses and interpretation reviews, and provide statistical expertise and technical reviews. All authors read and approved the final version of the document.

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## Figures

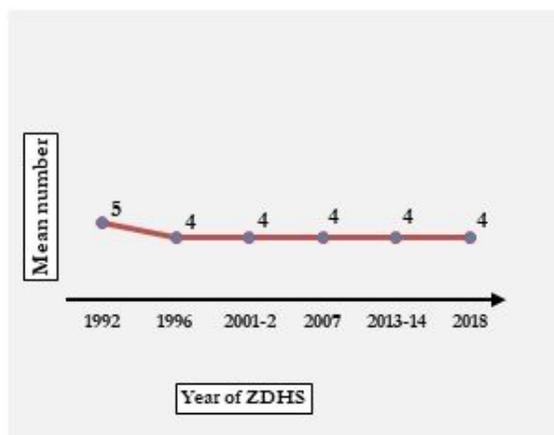


Figure 1

Trend in the average number of desired children



Figure 2

Percentage of women who want no more children