Determinants of Immediate Postpartum Contraception among Parturient Women with HIV in the Eastern Cape, South Africa; A Prospective Cross-sectional Study

Oladele Vincent Adeniyi (✉ vincoladele@gmail.com)
Walter Sisulu University  https://orcid.org/0000-0003-0216-6701

Anthony Idowu Ajayi
African Population and Health Research Center

Oluwaseyi Dolapo Somefun
University of the Witwatersrand

John Shearer Lambert
University College Dublin

Research

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Abstract

**Background:** Universal access to contraception is an important strategy adopted by the South African government in order to reduce the rate of unintended pregnancies in women with HIV. In this article, we describe the choices of contraception and also, examine the influencing factors of the choices of contraception in the immediate postpartum period in parturient women with HIV in the Eastern Cape, South Africa.

**Methods:** In this prospective cross-sectional study, 1617 parturient women with HIV completed a survey on the choice of contraception received in the immediate postpartum period (within 72 hours) across three large maternity services in the Eastern Cape between September 2015 to May 2016. Additional information was extracted from their medical records. Choices of contraception were categorised as; short-acting, long-acting reversible and permanent contraception. Adjusted and unadjusted multinomial regression models were employed to determine the influencing factors of the choices of contraception received by the cohort.

**Results:** Participants were predominantly single (69.1%), unemployed (75.1%), had a grade 7-12 level of education (88.4%) and were HIV positive before their index pregnancy (81.3%).

The uptake rate of immediate postpartum contraception was high (n=1507; 93.2%) with injectables being the preferred choice in the majority of the participants (n= 1218; 75.3%). Caesarean delivery was associated with higher odds of initiating long-acting reversible (AOR: 7.79; 95% CI:4.04-15.04) and permanent contraception (AOR: 6.52; 95% CI: 3.48-12.22).

**Conclusions:** We found a high uptake of immediate postpartum contraception with a preference for injectables in the study setting. Long-term monitoring of this cohort will elucidate on the loss to follow-up and risk of unintended pregnancies in the region.

Plain English Summary

Contraception is an important strategy to reduce the rate of unplanned pregnancies at the population level. This strategy was adopted by the South African government with a vision of stemming the tide of unintended pregnancies among women living with HIV. In this study, the choices of contraception adopted by HIV-infected women following the delivery of their babies were explored. In addition, the study highlights the factors that predict these choices among women living with HIV.

Participants were asked the choice of contraception they had received prior to being discharged from the maternity centres where they had delivered their babies. The various types of contraception were then categorised by their duration of action. Three distinct groups emerged; short-acting injectables, long acting reversible and permanent methods.
Of the 1617 women included in the study, 1117 were single and 1314 knew their HIV status prior to the onset of the index pregnancy. Almost all the women (1507 out of 1617) received one form of contraception or the other prior to leaving the hospital. Many women (1218 out of 1617) chose injectable contraception (short-acting contraception) over the other types of contraception. Women who delivered their babies by operation (Caesarean section) were more likely to choose long-acting contraception and permanent method over the short-acting contraception.

In conclusion; Given the short duration of action of the predominant method adopted by these women, a long-term follow up of the study participants will provide more information on the continued use of contraception and risk for unintended pregnancies.

Background

Globally, about 36.9 million people are currently living with HIV/AIDS, 70% of them live in sub-Saharan Africa (SSA) [1, 2], and the majority of them are females in their reproductive age [3]. Approximately 1.5 million pregnancies occurred in women living with HIV in developing countries [4], and most of these pregnancies are unplanned or unintended [5-7]. Given the adverse impacts of unintended pregnancy such as increased levels of stress, decreased quality of life, late initiation of antenatal care, and maternal deaths [8-11], prevention of unintended pregnancy is a priority among women living with HIV.

Prevention of unintended pregnancies is among the WHO’s approaches to eliminating mother-to-child-transmission (MTCT) of HIV [12]. According to the WHO, family planning (FP) should be an integral component of existing maternal and child health services [13]. From an economic perspective, supporting women living with HIV (WLWH) to use contraception is a cost-effective approach for preventing MTCT of HIV [13, 14]. Even though substantial progress has been recorded in the prevention of mother-to-child transmission of HIV (PMTCT), a recent UNICEF report indicated that about 180,000 new HIV infections occurred among children [15]. Perinatal transmission of HIV is highest in sub-Saharan Africa [16] and could be reduced by addressing the high rate of unintended pregnancies among women living with HIV.

South Africa has a heavy burden of HIV [3, 17], and an estimated 12,000 children were newly infected with HIV due to MTCT in 2016 [1]. The majority of pregnancies among women living with HIV in the country are unintended, [5, 6] suggesting that prevention of unplanned and unwanted pregnancies could contribute to reducing MTCT of HIV. Family planning has been integrated into PMTCT programmes at all the primary health care centres in South Africa for over a decade in order to increase access to family planning service for people with HIV, reduce unplanned pregnancy, ensure optimal spacing of births and ultimately reduce MTCT of HIV. Services integration provides an opportunity for consolidating care for patients across the country. Clinicians in all primary health care clinics received training on the consolidated management of HIV, other sexually transmitted diseases (STDs), tuberculosis (TB), and family planning counselling and services. In practice, individuals accessing care for HIV are counselled about contraception and offered for free in all public health facilities across the country. Also, women are counselled during prenatal care to guide their choices of contraception in the postpartum period. A good
measure of the impact of prenatal counselling and PMTCT service integration is to assess the uptake of contraception in the immediate postpartum period and long-term follow-up of the cohort of parturient women.

While there are studies that have examined immediate postpartum contraceptive initiation in the global north [18-21], we did not come across any such studies in sub-Saharan Africa and especially in South Africa, a country with a high HIV prevalence. This study determines the rate of uptake and choices of immediate postpartum contraception among parturient women with HIV in the Eastern Cape, South Africa. In addition, the study further examines the influencing factors of the choices of immediate postpartum contraception in the cohort. We know from existing studies that women who gave birth via caesarean section are more likely to initiate long-acting and permanent contraception [18-21]. Our study will contribute to enhancing the understanding of family planning needs of women living with HIV and AIDS, which is important for improving services and reducing mother to child transmission of HIV in the resource constrained Eastern Cape Province of South Africa.

**Methods**

**Study design and setting**

Drawing from the baseline survey data of a larger study that evaluated the PMTCT outcomes in the Eastern Cape Province. The larger study aimed to examine PMTCT outcomes in the province and was conducted between September 2015 and May 2016. The full detail of the methodology has been published elsewhere [22]. Briefly, this study was conducted in the three largest maternity facilities in the Buffalo/Amathole districts of the Eastern Cape Province, South Africa. The facilities together serve over 1.6 million people from rural, semi-urban and urban areas of the province, delivers an average of 1150 parturient women monthly and receives referrals from regional hospitals, district hospitals as well as midwife obstetric units (MOUs) across the region.

**Participants recruitment and data collection procedures**

The study population comprises all HIV infected women who gave birth over the study period (September 2015 to May 2016). All parturient women with HIV who gave birth in the selected facilities over the study period were eligible for selection while all HIV negative women who gave birth over the study period were excluded. Participants were recruited serially at the postnatal wards of the maternity centres within 24 hours of vaginal delivery and 72 hours of caesarean section delivery. Trained research assistants, together with one research nurse per health facility, conducted a face-to-face interview with a structured questionnaire with each participant. Data obtained were captured using Android tablet with pre-installed datasheet linked to the electronic database created for this study. Participants were interviewed in private spaces provided by the health facilities for the study. Additional information on the clinical characteristics such as viral load, CD4 counts, date of antenatal booking and ART medication details were extracted from the medical records of each participant. The trained research assistants transferred clinical records to the electronic database. Missing data were coded separately.
To estimate the rate of uptake of immediate postpartum contraception, at a precision level of 2.5%, infinite population, 95% confidence interval and 10% possible attrition, a sample size of 1653 is required based on sample size formula for an observational study.

**Measurement**

The main outcome measure was uptake of immediate postpartum contraception within 72 hours of childbirth. Participants were asked whether they had initiated any type of contraception after delivery of their index pregnancy and if so, to state the choice of contraception received. We validated the participants’ report of contraception received and also, confirmed the specific method and category of contraception received by the participants from their medical records. There were no discrepancies between medical records and the self-reports of the participants. The participants’ methods of choice were later categorised into short-acting (Nuristerate and Depo Provera injectables), long-acting reversible (intrauterine device (IUD) and implants) and permanent methods (tubal ligation).

Based on our review of the previous studies, we considered the age, parity, abortion history, marital status, alcohol use, mode of child delivery and prenatal HIV status (status at booking) to be relevant independent variables in this study. We measured age as a continuous variable and later categorised into age 30 years and below, and age above 30 years. Participants were asked to state whether they were married, single or cohabiting. Also, they were asked to indicate whether they ever consume alcohol, and if they did so during pregnancy or had stopped drinking during pregnancy. Also, participants were asked to state the number of children they had ever delivered, including the index baby (parity). Participants were asked to indicate whether they had ever terminated a pregnancy and how many times they had done this in the past (number of abortions). Clinical characteristics of participants, such as the timing of initiation of antenatal care and mode of delivery were extracted from medical records.

**Data analysis**

Complete data were imported into the IBM Statistical Package for Social Sciences (Version 25) for Windows (SPSS Inc., Chicago, Illinois, USA). Data were cleaned to get rid of all data entry errors. All variables of interest were subjected to descriptive statistics. Mean and standard deviations were computed for continuous variables. Frequency count, chi-square statistics and multinomial regression were estimated for categorical variables. Given that the outcome measure is categorised into three levels; short-acting, long-acting reversible and permanent contraception, multinomial logistic regression is the most suitable for the bivariate and multivariable analysis of our data. We fitted unadjusted and adjusted multinomial regression models, at a 95% confidence interval, to determine the influencing factors of choice of contraception in the cohort. The variables included in our multivariable analysis was based on our review of the literature [18-21], [18-21], on factors associated with immediate postpartum contraception. About 90 participants did not complete the questions on contraception, as such, we performed a sensitivity analysis by comparing their demographic characteristics to those with complete responses.
Results

A total of 1617 participants who had complete responses to the main outcome measure were included in the final analysis. We compared the demographic characteristics of participants that did not respond to the question (n=90) on contraception to those that responded (n=1617) and found no significant difference. Most participants were single (69.1%), unemployed (75.1%), had a grade 7-12 level of education (88.4%) and were HIV positive before their index pregnancy (81.3%). Participants’ average age was 29.66 [standard deviation (SD)=6.18] years.

Rate of uptake of immediate postpartum contraception

The majority of the participants (93%) had initiated one form of contraception within three days’ post-delivery. Short-acting contraception (Nuristerate and Depo-Provera) was the predominant method received by the participants (n=1218; 75.3%). A small proportion of women initiated the long-acting reversible contraception (implants and IUD) (8.5%) and permanent method (tubal ligation) (8.2%) (Table 1).

Table 1: Demographical characteristics of respondents
| Variable             | Frequency (n-1617) | Percentages (%) |
|----------------------|--------------------|-----------------|
| Age                  |                    |                 |
| 20 and below         | 111                | 6.9             |
| 21-25                | 348                | 21.5            |
| 26-30                | 436                | 27.0            |
| 31-35                | 415                | 25.7            |
| 36-40                | 247                | 15.3            |
| Above 40 years above | 60                 | 3.7             |
| Marital status       |                    |                 |
| Married              | 299                | 18.5            |
| Single               | 1118               | 69.1            |
| Cohabiting           | 177                | 10.9            |
| Divorced/ separated  | 23                 | 1.4             |
| Educational Level    |                    |                 |
| No formal education  | 5                  | 0.3             |
| Grade 1-6            | 75                 | 4.7             |
| Grade 7-12           | 1406               | 88.4            |
| Tertiary             | 104                | 6.5             |
| Employment           |                    |                 |
| Unemployed           | 1204               | 75.1            |
| Employed             | 399                | 24.9            |
| Smoking status       |                    |                 |
| Smoked during pregnancy | 86             | 5.3             |
| Quit smoking during pregnancy | 76        | 4.7             |
| Never smoked         | 1455               | 89.7            |
| Alcohol use          |                    |                 |
| Drank during pregnancy | 212             | 13.1            |
| Stopped drinking during pregnancy | 416 | 25.7 |
| Never drank alcohol  | 988                | 61.1            |
| Prenatal HIV status  |                    |                 |
| Positive             | 1303               | 81.3            |
| Negative             | 82                 | 5.1             |
| Unknown              | 217                | 13.5            |
| Abortion history     |                    |                 |
| Never had abortion   | 1310               | 81.0            |
| Ever terminated a pregnancy | 307        | 19.0            |
| Parity               |                    |                 |
| 1                    | 485                | 30.0            |
| 2 and 3              | 916                | 56.6            |
| 4 and above          | 216                | 13.4            |

**Significant determinants of uptake of immediate postpartum contraception**

In the chi-square test; age, place of residence, educational status, employment, parity and abortion history were not significantly associated with the uptake of immediate postpartum contraception. Only alcohol
use, being married and unknown/negative status at first antenatal care were negatively associated with the uptake of immediate postpartum contraception (Table 2).

Table 2: Relationship between demographic characteristics and uptake of immediate postpartum contraception by chi-square test
| Variable                          | Yes         | No          | P-value |
|----------------------------------|-------------|-------------|---------|
| Age                              |             |             |         |
| 20 and below                     | 98 (88.3)   | 13 (11.7)   | 0.365   |
| 21-25                            | 324 (93.1)  | 24 (6.9)    |         |
| 26-30                            | 410 (94.0)  | 26 (6.0)    |         |
| 31-35                            | 387 (93.3)  | 28 (6.7)    |         |
| 36-40                            | 233 (94.3)  | 14 (5.7)    |         |
| Above 40 years above             | 55 (91.7)   | 5 (8.3)     |         |
| Marital status                   |             |             |         |
| Married                          | 273 (91.3)  | 26 (8.7)    | 0.011   |
| Single                           | 1054 (94.3)| 64 (5.7)    |         |
| Cohabitating                     | 157 (88.7)  | 20 (11.3)   |         |
| Divorced/separated               | 23 (100.0)  | 0 (0.0)     |         |
| Area                             |             |             |         |
| Rural                            | 494 (93.7)  | 33 (6.3)    | 0.646   |
| Semi-Urban                       | 706 (93.6)  | 48 (6.4)    |         |
| Urban                            | 284 (92.2)  | 24 (7.8)    |         |
| Educational Level                |             |             |         |
| No formal education              | 4 (80.0)    | 1 (20.0)    | 0.628   |
| Grade 1-6                        | 71 (94.7)   | 4 (5.3)     |         |
| Grade 7-12                       | 1310 (93.2)| 96 (6.8)    |         |
| Tertiary                         | 96 (92.3)   | 8 (7.7)     |         |
| Employment                       |             |             |         |
| Unemployed                       | 1126 (93.5)| 78 (6.5)    | 0.218   |
| Employed                         | 368 (92.2)  | 31 (7.8)    |         |
| Alcohol use                      |             |             |         |
| Drank during pregnancy           | 193 (91.0)  | 19 (9.0)    | 0.045   |
| Stopped drinking during pregnancy| 380 (91.3)  | 36 (8.7)    |         |
| Never drank alcohol              | 934 (94.4)  | 55 (5.6)    |         |
| HIV status at first antenatal booking |             |             |         |
| Positive                         | 1233 (94.6)| 70 (5.4)    | <0.001  |
| Negative                         | 69 (84.1)   | 13 (15.9)   |         |
| Unknown                          | 190 (87.6)  | 27 (12.4)   |         |
| Abortion history                 |             |             |         |
| Never had abortion               | 1217 (92.9)| 93 (7.1)    | 0.199   |
| Ever terminated a pregnancy      | 290 (94.5)  | 17 (5.5)    |         |
| Parity                           |             |             |         |
| 1                                | 448 (92.4)  | 37 (7.6)    | 0.216   |
| 2 and 3                          | 862 (94.1)  | 54 (5.9)    |         |
| 4 and more                       | 197 (91.2)  | 19 (8.8)    |         |
In the unadjusted regression analysis (Table 3), negative/unknown HIV status at first antenatal care booking and caesarean section delivery were associated with lower odds of initiating short-acting contraception. However, single status, never drank alcohol, and having two and three children were associated with higher odds of initiating short-acting method. The direction and magnitude of effects remain for the significant variables after adjusting for all covariates (Table 4).

In both the unadjusted and adjusted regression analyses (Table 3 and 4), the magnitude and direction of effect remain the same for the significant variables; having a negative/unknown HIV status at booking was associated with lower odds of receiving long-acting reversible contraception. However, the odds of receiving long-acting contraception were higher among those who had caesarean section delivery. Though, having two to three was significant in the unadjusted model for the long-acting reversible contraception, this effect was lost after adjusting for covariates in the adjusted model (Table 4).

**Table 3: Unadjusted multinomial logistic regression model showing odds for using different categories of contraception**
### Variables

|                      | Unadjusted model |                      |                      |
|----------------------|------------------|----------------------|----------------------|
|                      | Short-acting     | Long-acting          | Permanent method     |
|                      | contraception   | contraception       |                     |
|                      | UOR (CI)         | UOR (CI)             | UOR (CI)             |
| **Age**              |                  |                      |                      |
| Above 30             | 0.89 (0.60-1.33) | 1.06 (0.64-1.76)     | 9.56 (5.01-18.24)***|
| 30 and below (ref)   |                  |                      |                      |
| **HIV Status at first antenal care booking** | | | |
| Negative or Unknown  | 0.40 (0.26-0.61)*** | 0.32 (0.18-0.59)*** | 0.18 (0.09-0.36)***  |
| Positive (ref)       |                  |                      |                      |
| **Alcohol Use**      |                  |                      |                      |
| Never Drank (ref)    | 1.75 (1.18-2.59)* | 1.14 (0.69-1.89)     | 1.24 (0.75-2.06)     |
| **Marital Status**   |                  |                      |                      |
| Single               | 1.72 (1.07-2.79)* | 1.17 (0.63-2.16)     | 0.91 (0.49-1.70)     |
| Cohabiting           | 0.73 (0.39-1.37)  | 0.78 (0.34-1.78)     | 0.81 (0.36-1.82)     |
| Divorced/separated   | N/A              | N/A                  | N/A                  |
| Married (ref)        |                  |                      |                      |
| **Abortion of history** |                |                      |                      |
| Never had abortion   | 0.85 (0.50-1.46) | 0.71 (0.37-1.38)     | 0.38 (0.20-0.71)*    |
| Ever terminated a pregnancy (ref) | | | |
| **Parity**           |                  |                      |                      |
| 1                    | 1.63 (0.91-2.94) | 1.50 (0.65-3.47)     | 0.03 (0.01-0.10)***  |
| 2 and 3              | 1.93 (1.11-3.37)* | 2.33 (1.06-5.09)*   | 0.46 (0.25-0.86)***  |
| 4 and above (ref)    |                  |                      |                      |
| **Mode of Delivery** |                  |                      |                      |
| Caesarean section delivery | 0.65 (0.44-0.97)* | 7.72 (4.05-14.70)*** | 4.58 (2.56-8.20)***  |
| Vaginal delivery (ref) |                  |                      |                      |

*** The p-value <0.001; * p-value <0.05; ref: reference; UOR: Unadjusted Odds Ratio; CI: Confidence Interval; *The reference category is: not using contraception

In both the unadjusted and adjusted regression analyses (Table 3 and 4), the magnitude and direction of effect remain the same for the significant variables; age above 30 years and caesarean section delivery were associated with higher odds of initiating a permanent contraception. Similarly, having a negative/unknown HIV status at booking and one to three children were associated with lower odds of initiating a permanent contraception. In the unadjusted model, abortion was significantly associated with the lower odds of receiving permanent contraception but became insignificant after adjusting for confounding factors.
Table 4: Adjusted multinomial logistic regression model showing odds for using different categories of contraception

| Variables                              | Short-acting contraceptive method UOR (CI) | Long-acting contraceptive method UOR (CI) | Permanent method UOR (CI) |
|----------------------------------------|-------------------------------------------|-------------------------------------------|---------------------------|
| Age                                    |                                            |                                           |                           |
| Above 30                               | 0.78 (0.49-1.24)                          | 0.88 (0.49-1.58)                          | 4.83 (2.34-9.97)***       |
| 30 and below (ref)                     |                                           |                                           |                           |
| HIV Status at first antenatal care booking |                                    |                                           |                           |
| Negative or Unknown                     | 0.38 (0.25-0.60)***                       | 0.31 (0.16-0.58)***                       | 0.27 (0.12-0.59)*         |
| Positive (ref)                         |                                           |                                           |                           |
| Alcohol Use                            |                                            |                                           |                           |
| Never                                  | 1.61 (1.07-2.43)*                         | 1.13 (0.67-1.93)                         | 1.12 (0.64-1.97)          |
| Drank (ref)                            |                                           |                                           |                           |
| Marital Status                         |                                            |                                           |                           |
| Single                                 | 1.76 (1.04-2.97)*                         | 1.16 (0.59-2.26)                         | 1.54 (0.77-3.09)          |
| Cohabiting                             | 0.84 (0.43-1.61)                          | 0.74 (0.31-1.78)                         | 1.02 (0.42-2.50)          |
| Divorced/separated                     | N/A                                       | N/A                                       | N/A                       |
| Married (ref)                          |                                           |                                           |                           |
| Abortion of history                    |                                            |                                           |                           |
| Never had abortion                     | 0.79 (0.45-1.39)                          | 0.81 (0.40-1.62)                         | 0.52 (0.26-1.03)          |
| Ever terminated a pregnancy (ref)      |                                           |                                           |                           |
| Parity                                 |                                            |                                           |                           |
| 1                                      | 1.46 (0.72-2.95)                          | 0.93 (0.35-2.42)                         | 0.04 (0.10-0.16)***       |
| 2 and 3                                | 1.94 (1.05-3.59)*                         | 1.64 (0.70-3.84)                         | 0.45 (0.22-0.93)*         |
| 4 and above (ref)                      |                                           |                                           |                           |
| Mode of Delivery                       |                                            |                                           |                           |
| Caesarean section delivery             | 0.65 (0.43-0.98)*                         | 7.79 (4.04-15.04)***                     | 6.52 (3.48-12.22)***      |
| Vagina delivery                        |                                           |                                           |                           |

*** The p-value <0.001; * p-value <0.05; ref: reference
*The reference category is: not using contraceptives
Discussion

This study determines the rate of uptake and describes the choices of immediate postpartum contraception in the context of family planning and HIV services’ integration in the Eastern Cape, South Africa. In addition, the study elucidates the influencing factors of the choices of contraception received by parturient women with HIV in the immediate postpartum period. The uptake rate of immediate postpartum contraception of 93.2% in this cohort is very commendable. This finding provides evidence of the effectiveness of family planning and HIV services’ integration policy which aims to promote universal access to contraception in every maternity facility in the country.

The high uptake rate reported here should be interpreted with caution for two reasons. Given the high rate of unplanned pregnancies in women living with HIV in the region [5, 6], a long-term follow up of this cohort is therefore recommended in order to gain broader understanding of contraception in women living with HIV in the region. Another plausible explanation could be that large proportion of women in need of contraception were accessible in the hospital in the immediate postpartum period. Perhaps, the decision to receive contraception at the time could have been influenced by subtle peer pressure from other parturient women or coercion by clinicians is unclear in the present study. Future studies should examine the effect of providers’ bias and coercion on the choices of contraception in the region, given South Africa’s history and a body of literature establishing contraceptive coercion [23, 24].

Consistent with previous studies [25-28], our study showed that short-acting methods were the preferred choices of contraception by the parturient women with HIV. It is important to note that high uptake of short-acting contraception may not guarantee continuous use beyond the postpartum period. Long-term follow up of this cohort to monitor retention in care and continuity of contraception including method will enhance our understanding of family planning needs of women in the region. A study previously reported that method convenience and health care providers’ recommendations often influence the choice of contraception of women [7]. It is vital to educate women further on the advantages of long-acting reversible methods and encourage them to use these methods. Long-acting reversible methods are highly effective and would nearly eliminate the chances of unplanned pregnancies, given that they are less prone to human errors.

Our study showed that women previously diagnosed with HIV before their index pregnancy were more likely to use short-acting, long-acting and permanent contraceptive methods compared to women diagnosed during their index pregnancy. This finding suggests that women with longer duration of infection (diagnosed before the index pregnancy) may have had time to consider their fertility intentions and possibly consider the index pregnancy to be their last pregnancy. Those diagnosed with HIV during the index pregnancy may still be reflecting on their fertility intentions and the impact of HIV infection on future pregnancies.

Our study showed that women who gave birth via caesarean section had a higher likelihood of initiating a long-acting reversible and permanent method relative to those who delivered per vagina. Studies have shown that women with HIV are more likely to use postpartum tubal ligation [29-31]. A study conducted
among women who had been living with HIV for an average of 9.2 years showed that about half of them had been sterilised and expressed sterilisation regret [18]. However, a more recent study observed that the use of tubal ligation (3%) had reduced among women with HIV due to the increased availability of antiretroviral therapy (ART) [32]. Nonetheless, it is evident that caesarean section delivery is the primary facilitator of postpartum tubal ligation. Tubal ligation during caesarean section means that mothers do not have to present for another surgery. The choice of tubal ligation is also influenced by older age and having more than three children, which again established that these women do not want to have more children and used the opportunity of caesarean section to ensure their desire to limit childbirth is achieved.

Another important finding of this study is that parity is a significant determinant of choices of contraception in women with HIV. While women with three or fewer children are more likely to use short-acting contraception, women who have four or more children are significantly more likely to use an irreversible contraception. This finding is consistent with previous studies [19-21]. Given that parity of four or more is far more than the fertility rate in South Africa [33], one could infer that the desire to limit childbearing motivated women’s decision to initiate a long-acting and permanent contraception.

**Study limitations**

Given that there is a dearth of information on the immediate postpartum contraception among women in South Africa, this study specifically adds value to the existing knowledge on the topic. However, the limitations of the study cannot be ignored. The cross-sectional nature of the study means that any association reported cannot be interpreted as causation. Nonetheless, the large sample size ensures that the findings are reliable and representative of women with HIV in the Eastern Cape Province. The findings of this study further identify areas for further studies; such as the influence of prior contraception, providers’ bias and coercion, and informed counselling and choice on immediate postpartum contraception.

**Conclusion**

We observed a high rate of uptake of immediate postpartum contraception among parturient women living with HIV in our study setting, which is a strong indicator of the effectiveness of PMTCT and FP services’ integration. In addition, we observed a high uptake rate of short-acting contraception among the parturient women living with HIV. Long-term follow up of this cohort to monitor retention in care and continuity of contraception including method switches will enhance our understanding of family planning needs of the study population. Innovative strategies to promote and enhance acceptance of long-acting contraception should be adopted to further mitigate the high rate of unplanned pregnancies in the region.

**Abbreviations**

FP- Family planning
LAPM- Long-acting permanent method

MTCT- Mother to child transmission of HIV

PMTCT- Prevention of mother to child transmission of HIV

WLWH- Women living with HIV

**Declarations**

**Ethics approval and consent to participate**

The Walter Sisulu University Ethical Review Committee (Reference: 098/2014) approved the study protocol. Also, the management of each of the hospitals and clinic granted permission for the study to take place in their facility. Participation was voluntary and all participants gave written consent. No parental consent was obtained as all the participants were competent to give informed consent. The rights of the participants to anonymity, confidentiality and privacy were protected throughout and after the study.

**Consent for publication**

Not applicable for this paper

**Availability of data and materials**

All data will be made available by the corresponding author upon reasonable request.

**Competing interests**

The authors declare no competing interests.

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**Authors’ contribution**

OVA, AIA and JSL conceptualised and designed the study. AIA, OVA and ODS drafted the manuscript. AIA performed the data analysis. All authors read, revised and approved the final version of the manuscript.

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References

1. Global HIV & AIDS statistics — 2018 fact sheet
   [http://www.unaids.org/sites/default/files/media_asset/UNAIDS_FactSheet_en.pdf]
2. WHO: Number of people (all ages) living with HIV Estimates by WHO region. In.; 2018.
3. Kharsany ABM, Karim QA: HIV infection and AIDS in Sub-Saharan Africa: current status, challenges and opportunities. The open AIDS journal 2016, 10:34.
4. WHO: Global health sector response to HIV, 2000-2015: focus on innovations in Africa: progress report. In. 20 Avenue Appia, 1211 Geneva 27, Switzerland World Health Organization; 2015.
5. Adeniyi OV, Ajayi AI, Moyaki MG, Ter Goon D, Avramovic G, Lambert J: High rate of unplanned pregnancy in the context of integrated family planning and HIV care services in South Africa. BMC health services research 2018, 18(1):140.
6. Schwartz SR, Rees H, Mehta S, Venter WDF, Taha TE, Black V: High incidence of unplanned pregnancy after antiretroviral therapy initiation: findings from a prospective cohort study in South Africa. PloS one 2012, 7(4):e36039.
7. Credé S, Hoke T, Constant D, Green MS, Moodley J, Harries J: Factors impacting knowledge and use of long acting and permanent contraceptive methods by postpartum HIV positive and negative women in Cape Town, South Africa: a cross-sectional study. BMC public health 2012, 12(1):197.
8. Cheng D, Schwarz EB, Douglas E, Horon I: Unintended pregnancy and associated maternal preconception, prenatal and postpartum behaviors. Contraception 2009, 79(3):194-198.
9. Yanikkerem E, Ay S, Piro N: Planned and unplanned pregnancy: effects on health practice and depression during pregnancy. Journal of Obstetrics and Gynaecology Research 2013, 39(1):180-187.
10. Karaçam Z, Önel K, Gerçek E: Effects of unplanned pregnancy on maternal health in Turkey. Midwifery 2011, 27(2):288-293.
11. Eggleston E: Unintended pregnancy and women’s use of prenatal care in Ecuador. Social science & medicine 2000, 51(7):1011-1018.
12. WHO: Strategic Considerations for Strengthening the Linkages between Family Planning and HIV/AIDS Policies, Programs, and Service. In. 20 Avenue Appia, 1211 Geneva 27, Switzerland: World Health Organization 2009.
13. WHO: Programming strategies for postpartum family planning. In. 20 Avenue Appia, 1211 Geneva 27, Switzerland: World Health Organization; 2013.
14. Govender T, Coovadia H: Eliminating mother to child transmission of HIV-1 and keeping mothers alive: recent progress. Journal of Infection 2014, 68:S57-S62.
15. UNICEF: Elimination of mother-to-child transmission. In.; 2018.
16. Drake AL, Wagner A, Richardson B, John-Stewart G: **Incident HIV during pregnancy and postpartum and risk of mother-to-child HIV transmission: a systematic review and meta-analysis.** *PLoS medicine* 2014, **11**(2):e1001608.

17. Mitchell HS, Stephens E: **Contraception choice for HIV positive women.** *Sexually transmitted infections* 2004, **80**(3):167-173.

18. Stanwood NL, Cohn SE, Heiser JR, Pugliese M: **Contraception and fertility plans in a cohort of HIV-positive women in care.** *Contraception* 2007, **75**(4):294-298.

19. Polis CB, Gray RH, Lutalo T, Nalugoda F, Kagaayi J, Kigozi G, Kiwanuka N, Serwadda D, Wawer MJ: **Trends and correlates of hormonal contraceptive use among HIV-infected women in Rakai, Uganda, 1994–2006.** *Contraception* 2011, **83**(6):549-555.

20. Asfaw HM, Gashe FE: **Contraceptive use and method preference among HIV positive women in Addis Ababa, Ethiopia: a cross sectional survey.** *BMC Public Health* 2014, **14**(1):566.

21. Ajayi AI, Adeniyi OV, Akpan W: **Use of traditional and modern contraceptives among childbearing women: findings from a mixed methods study in two southwestern Nigerian states.** *BMC public health* 2018, **18**(1):604.

22. Adeniyi OV, Ajayi AI, Selanto-Chairman N, Ter Goon D, Boon G, Fuentes YO, Hofmeyr GJ, Avramovic G, Carty C, Lambert J: **Demographic, clinical and behavioural determinants of HIV serostatus non-disclosure to sex partners among HIV-infected pregnant women in the Eastern Cape, South Africa.** *PloS one* 2017, **12**(8):e0181730.

23. Senderowicz L: **“I was obligated to accept”: A qualitative exploration of contraceptive coercion.** *Social Science & Medicine* 2019, **239**:112531.

24. Essack Z, Strode A: **“I feel like half a woman all the time”: The impacts of coerced and forced sterilisations on HIV-positive women in South Africa.** *Agenda* 2012, **26**(2):24-34.

25. Warren CE, Abuya T, Askew I: **Family planning practices and pregnancy intentions among HIV-positive and HIV-negative postpartum women in Swaziland: a cross sectional survey.** *BMC pregnancy and childbirth* 2013, **13**(1):150.

26. McCoy SI, Buzdugan R, Ralph LJ, Mushavi A, Mahomva A, Hakobyan A, Watadzaushe C, Dirawo J, Cowan FM, Padian NS: **Unmet need for family planning, contraceptive failure, and unintended pregnancy among HIV-infected and HIV-uninfected women in Zimbabwe.** *PLoS One* 2014, **9**(8):e105320.

27. Teshome FT, Hailu AG, Teklehaymanot AN: **Prevalence of unintended pregnancy and associated factors among married pregnant women in Ganji woreda, west Wollega Oromia region, Ethiopia.** *Sci J Public Health* 2014, **2**(2):92-101.

28. Kaida A, Laher F, Strathdee SA, Money D, Janssen PA, Hogg RS, Gray G: **Contraceptive use and method preference among women in Soweto, South Africa: the influence of expanding access to HIV care and treatment services.** *PloS one* 2010, **5**(11):e13868.

29. Tuuli MG, Duong TH, Yost NP, Ellis J, Burke CV, Basanta-Henry PL, Lindsay M: **Postpartum contraceptive preferences of HIV-infected women in the era of highly active antiretroviral therapy**
(HAART) and scheduled cesarean deliveries. Contraception 2011, 84(2):150-154.

30. Barbosa RM, da Silva Cabral C, do Lago TdG, de Araujo Pinho A: Differences in the access to sterilization between women living and not living with HIV: results from the GENIH study, Brazil. PloS one 2016, 11(11):e0164887.

31. Luster JE, Turner AN, Alkhalaileh D, Gallo MF: Contraceptive method and self-reported HIV status among women in Malawi. Contraception 2017, 95(6):558-563.

32. Ezeanolue EE, Stumpf PG, Soliman E, Fernandez G, Jack I: Contraception choices in a cohort of HIV+ women in the era of highly active antiretroviral therapy. Contraception 2011, 84(1):94-97.

33. Casterline JB, Agyei-Mensah S: Fertility desires and the course of fertility decline in sub-Saharan Africa. Population and Development Review 2017, 43:84-111.

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