

Full Length Research Paper

Factors determining adherence to follow-up care for the prevention of mother-to-child transmission of HIV among pregnant women in Cross River State, Nigeria

Iquo E. Okon^{1*}, Etanguno E. Owowo², Deborah E. Okon¹ and Grace O. Effiong³

¹Family Health International (FHI360), Nigeria.

²Department of Microbiology, Akwa Ibom State University, Mkpato Enin, Nigeria.

³Centre for Clinical Care and Research Nigeria (CCCRN), Nigeria.

Received 5 August, 2023; Accepted 13 November, 2023

Adherence to the prevention of mother-to-child transmission of HIV in developing countries faces several barriers. The aim of the study is to identify factors determining adherence to follow-up care in the prevention of mother-to-child transmission among pregnant women living with HIV in Cross River State, Nigeria. It is a cross-sectional study applying systematic sampling techniques among antenatal attendees living with HIV. A well-structured questionnaire was administered. The respondents who registered for Antenatal care (ANC) in the three selected health facilities between January 2017 and December 2018 were followed up for the first six months post-delivery due to feasibility and possible loss to follow-up. Follow-up data were collected from the facility database from the date of registration in ANC till delivery for adherence and non-adherence. Data were analyzed using SPSS version 25.0. At a 95% confidence interval, a p-value of <0.05 was considered statistically significant. A total of 199 participants, with a mean age of 31.09 ± 6.04 years, mostly aged 26 to 35 years (114, 57.3%), residing in urban areas (136, 68.3%), married (140, 79.4%), and having secondary education (116, 58.3%). The prevalence of adherence to PMTCT follow-up was 131 (65.8%). No significant association was observed between adherence and age, place of residence, and marital status ($p > 0.05$). The self-employed (2.84, 1.40-5.80) adhere to follow-up care more than the unemployed ($p < 0.05$). Women who did not face stigma and rejection (1.18, 0.62 - 2.24) adhere more than those who face rejection and stigmatization. The findings from this study are eye-openers to the real reasons why some clients in South-South Nigeria may not fully participate in the PMTCT program. All stakeholders should design sustainable interventions that will improve ART adherence to enhance the elimination of mother-to-child transmission of HIV.

Key words: Prevention of mother-to-child transmission, HIV, pregnancy, women.

INTRODUCTION

Globally, mother-to-child transmission (MTCT) accounts for 90% of HIV infections in children (UNAIDS, 2019).

Despite the implementation of PMTCT starting in Nigeria in 2001 with the goal of reducing HIV/AIDS transmission

*Corresponding author. E-mail: iquokon@gmail.com.

transmission from mother to child (NACA, 2019), a UNAIDS report in 2016 revealed that Nigeria has the highest number of new HIV infections among children in sub-Saharan Africa. According to Nigeria Spectrum (2016), the estimated number of pregnant women in the country in 2015 was 6,258,277, out of which 177,993 were HIV positive (NACA, 2019). In September 2015, the World Health Organization (WHO) released Option B+ guidelines, recommending that all pregnant women living with HIV be provided with lifelong antiretroviral drugs for the prevention of mother-to-child transmission, regardless of CD4 count. The implementation of Option B+ resulted in 91.0% of the 1.1 million women receiving antiretroviral (ARV) drugs as part of PMTCT services being offered lifelong ART in 2015 (UNAIDS, 2016).

Strategies such as provider-initiated HIV testing and counseling for pregnant women, health education on PMTCT during antenatal clinics, free healthcare services, and follow-up interventions for HIV-exposed children have been implemented to reduce the menace. Despite these interventions, mother-to-child transmission has been reduced to two percent in children whose mothers complied with the ART lifelong treatment schedule. However, even with the availability of these interventions, some HIV-positive pregnant women still default on the follow-up PMTCT schedule, resulting in increased new HIV transmissions, high maternal and infant morbidity and mortality, as well as economic waste (WHO, 2018). The National Agency for the Control of AIDS (NACA) defines mother-to-child transmission of HIV as the spread of HIV from an HIV-infected woman to her child during pregnancy, childbirth or breastfeeding. It is the most common way that children become infected with HIV (NACA, 2018). HIV-infected pregnant women receive antiretroviral drugs during pregnancy and childbirth to reduce the risk of mother-to-child transmission. Research showed that 42% of pregnant women in Nigeria received an HIV test in 2015, while 35% received an HIV test in 2017. Only 30% of those women diagnosed with HIV in 2017 accessed antiretroviral therapy (ART). In the same year, 36,000 children became HIV-positive, and the number has been rising since 2014 (Udofia et al., 2022). If a pregnant woman is living with HIV without treatment and effective follow-up, the likelihood of the virus passing from mother to child is 15 to 45%. However, antiretroviral therapy (ART) and other interventions can reduce this risk to below 5% (WHO, 2018). These interventions primarily involve antiretroviral drugs for the mother and the baby. They also include measures to prevent HIV transmission in pregnant women and promote appropriate breastfeeding practices. Evidence indicates that an undetectable viral load provides significant protection from HIV transmission. However, there have been cases of HIV transmission among breastfeeding women with an undetectable viral load. Defaulting early is more serious than later, as clients would have missed their ART and other interventions during labor and delivery, and more of the defaulting does happen at this time (Atalell et al.,

2018). The lack of progress in PMTCT in Nigeria has become a particular concern. HIV infection has placed women and children in the most vulnerable status, affecting family resilience and social well-being. The increasing record of non-adherence to comprehensive ART care by some HIV-positive pregnant women and the rising rate of mother-to-child transmission in Nigeria call for this study in South-South Nigeria, where there is limited data on the subject. The findings from this study are eye-openers to the real reasons why so many clients in South-South Nigeria may not fully participate in the PMTCT program. The main objective of this study is to identify factors determining adherence to follow-up care in the prevention of mother-to-child transmission among pregnant women living with HIV (Owowo and Itah, 2013).

METHODOLOGY

Study design and area

This study was conducted in three health facilities (tertiary, primary and private) where PMTCT programs are currently implemented in Calabar, Cross River State, South-South Nigeria. Calabar municipal council, where the study was conducted, has one tertiary institution and one secondary facility, while it has many private facilities. The selection of private health facilities for the research was done through random sampling.

Study population

Cross River State is located within the southeastern axis of Nigeria and is now a part of the South-South Geo-Political zone in Nigeria. The state has a landmass of 9,812 km², bordered to the north by Nasarawa State and to the west by Akwa Ibom State. The population of Cross River State is currently estimated at about 5.8 million, with a progressive average growth rate of about 3.5% per annum (NPC, 2011).

Ethical clearance

All aspects of the study were conducted in accordance with national ethics regulations and were approved by the Department of Research and Education Ethical Committee of the State Ministry of Health for collecting information from both government and private health facilities within the study area. Participants were informed about the study's purpose and their right to keep information confidential. Written consent was obtained from each participant, as well as from parents and guardians.

Collection of data

The study was conducted among HIV-positive pregnant mothers aged 15 to 49 years who registered for ANC in the three selected health facilities. Based on the number of registered antenatal attendees living with HIV between January 2017 and December 2018 in the health facilities, a total of 199 HIV pregnant women were enrolled, with 66 each from secondary and private facilities, while 67 participants were enrolled from the tertiary facility for the study. Women were followed up only to the first six months post-delivery due to feasibility and the potential for loss to follow-up of respondents. The questionnaire was tested for validity and reliability

Table 1. Sociodemographic characteristics of respondents.

Variable	Parameter	Frequency	Percent
Age category	16 - 25	42	21.1
	26 - 35	114	57.3
	36 -45	43	21.6
Resident	Urban	136	68.3
	Rural	63	31.7
Marital status	Married	140	70.4
	Single	59	29.6
Gravidity	1 - 3	178	89.4
	4 - 6	20	10.1
	≥7	1	0.5
Number of deliveries	1	82	41.2
	2-4	114	57.3
	5-6	3	1.5
Employment status	Employed	44	22.1
	Unemployed	47	23.6
	Self-employed	108	54.3
Education	No formal education	4	2.0
	Primary	33	16.6
	Secondary	116	58.3
	Tertiary	46	23.1
Income (month)	<18,000	120	60.3
	19,000 - 50,000	65	32.7
	51,000 - 100,000	13	6.5
	>100,000	1	0.5

with pregnant women from other facilities not included in the study. Follow-up data were collected from the facility database from the date of registration in ANC until delivery, considering both adherence and non-adherence (if participants returned to deliver in the hospital). Follow-up data on compliance for the mother were collected from the facility database from the child's 6 weeks of age until the child reached six months old. Clients who adhered and a corresponding sample of non-adherent clients to follow-up care were identified with the help of the information database of the hospitals and were subsequently interviewed.

Data analysis

The data were analyzed using IBM-SPSS software version 25. Chi-square tests were employed to compare socio-demographic characteristics between the two groups, with a significance level set at $P < 0.05$. Multiple logistic regression analysis was performed to assess the impact of clients' socio-demographic factors on their participation in the PMTCT program.

RESULTS

Socio-demographic information of respondents

A total of 199 participants underwent quantitative interviews in three distinct health facilities: A tertiary

health institution (facility A), a secondary facility (facility B, General Hospital), and a private hospital (facility C). The distribution of participants across these facilities was as follows: 160 (80.4%) from facility A, 23 (11.6%) from facility B, and 16 (8.0%) from facility C. Facility A represented the tertiary health institution, facility B the secondary facility, and facility C the private health facility. The participants had a mean age of 31.09 ± 6.04 years, with the most frequent age being 30. The age distribution revealed that 114 (57.3%) of the women were between 26 and 35 years old. Additionally, the majority were residents of urban areas (136 or 68.3%), married (140 or 70.4%), with a gravidity of 1 to 3 (178 or 89.4%) and 2 to 4 deliveries (114 or 57.3%). More than half of the participants (54.3%) were self-employed, 116 (58.3%) had a secondary education, and the majority (120 or 60.3%) earned less than 18,000.00 naira per month (Table 1).

Level of adherence to follow-up care with PMTCT among pregnant women in selected facilities in Cross River State, Nigeria

Out of the 199 HIV-positive pregnant women enrolled in

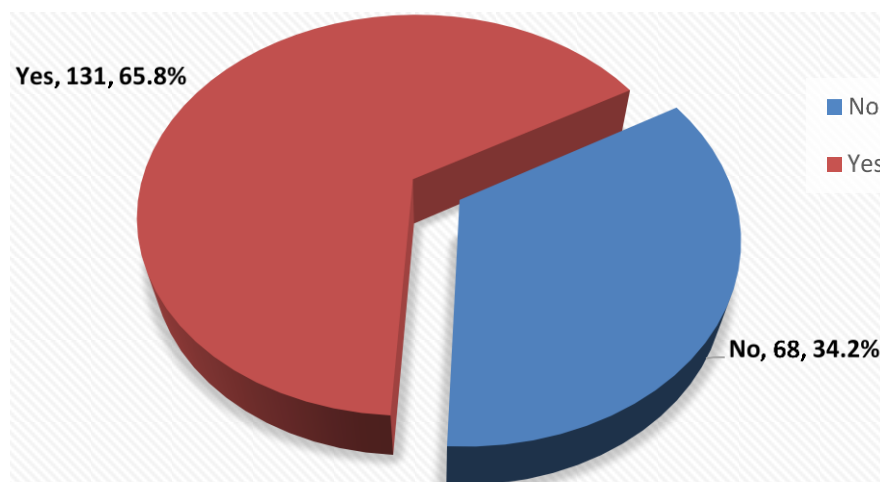


Figure 1. Adherence to follow-up care among HIV positive pregnant women.

Table 2. Demographic predictors of adherence to follow-up care among HIV positive pregnant women.

Predictors n (%)	Adherence to medication				P-value
	Parameter	Yes	No	OR (95%CI)	
Age category	16 - 25	27 (64.3)	15 (35.7)	Ref	0.826
	26 - 35	74 (64.9)	40 (35.7)	1.03 (0.49-2.15)	
	36 - 45	30 (69.8)	13 (30.2)	1.28 (0.51-3.17)	
Resident	Urban	90 (66.2)	46 (33.8)	1.05 (0.56-1.97)	0.879
	Rural	41 (65.1)	22 (34.9)	Ref	
Marital status	Married	96 (68.6)	44 (31.4)	1.50 (0.80-2.81)	0.209
	Single	35 (59.3)	24 (40.7)	Ref	
Gravidity	1 - 3	114 (64.0)	64 (36.0)	Ref	0.142
	4 and above	17 (81.0)	4 (19.0)	2.39 (0.77-7.40)	
No. of deliveries	1	55 (67.1)	27 (32.9)	1.02 (0.09-11.74)	0.951
	2 - 4	74 (64.9)	40 (35.1)	0.93 (0.08-10.52)	
	5 - 6	2 (66.7)	1 (33.3)	Ref	
Employment status	Employed	29 (65.9)	15 (34.1)	2.02 (0.87-4.70)	0.014*
	Self-employed	79 (73.1)	29 (26.9)	2.84 (1.40-5.80)	
	Unemployed	23 (48.9)	24 (51.1)	Ref	
Level of education	No formal/primary	24 (64.9)	13 (35.1)	1.08 (0.44-2.67)	0.871
	Secondary	78 (67.2)	38 (32.8)	1.20 (0.59 - 2.46)	
	Tertiary	29 (63.0)	17 (37.0)	Ref	
Monthly income	<18,000	78 (65.0)	42 (35.0)	1.39 (0.45-4.28)	0.659
	19,000 - 50,000	45 (69.2)	20 (30.8)	1.69 (0.52-5.50)	
	≥51,000	8 (51.7)	6 (42.9)	Ref	

the PMTCT program and included in the quantitative survey, 131 (65.8%) adhered to PMTCT follow-up care, while 68 (34.2%) did not (Figure 1). The influence of clients' demographic characteristics on adherence to follow-up care was examined, as shown in Table 2. There was no statistically significant difference across the age

groups, although there was a slight increase in adherence as age increased; from 64.3% for the age group 16 to 25 years to 69.8% for pregnant women within the age group 36 to 45 years ($p > 0.05$), and the odds of adherence slightly increased with age. The adherence level was also slightly but insignificantly higher among pregnant women

Table 3. Reinforcing factors involved in PMTCT.

A support system to HIV positive woman	Response category (%)			
	Strongly agree	Agree	Disagree	Strongly disagree
My health care worker reminds me of clinic days	6 (3.0)	13 (6.5)	55 (27.6)	125 (62.8)
You spent long time in the hospital to collect drugs	50 (25.1)	57 (28.6)	36 (18.1)	56 (28.1)
Stigma and rejection from family and friends is discouraging	33 (16.6)	27 (13.6)	45 (22.6)	94 (47.2)
Hospital staff asked you to pay money before providing HIV services to you	98 (49.2)	57 (28.6)	25 (12.6)	19 (9.5)
Health providers attended to HIV negative women before attending to you.	90 (45.2)	68 (34.2)	16 (8.0)	25 (12.6)
Health care providers are hostile to me	93 (46.7)	51 (25.6)	22 (11.1)	33 (16.6)
Treatment supporter assist to collect ART for me	44 (22.1)	51 (25.6)	37 (18.6)	67 (33.7)

residing in urban settlements (66.2%) compared to those from rural areas (65.1%) ($p>0.05$). Similar to the place of residence, the level of adherence was higher but statistically insignificant among married pregnant women (68.6%) than among singles (34.9%) ($p>0.05$). Adherence also increased with an increase in gravidity among pregnant women, rising from 64.0% for those with 1 to 3 gravidities to 100.0% for those with at least seven gravidities. Women with 4 or more gravidities are 2.4 (0.77 to 7.40) times more likely to adhere than those with 1 to 3 gravidities. Employment status was significantly associated with adherence to follow-up care among pregnant women enrolled in the PMTCT program. Adherence was highest among self-employed respondents (women engaged in personal business and paying themselves from there) (73.1%), while it was significantly lower among unemployed pregnant women (48.9%) ($p<0.05$). Self-employed pregnant women are 2.84 (1.40-5.80) times more likely to adhere to follow-up care than the unemployed, while the odds of adherence for those who are employed are 2.02 (0.87 to 4.70) times higher than for the unemployed ($p<0.05$). Women who work under an organization and receive a monthly salary of fifty thousand Naira or more have the financial means to cover expenses such as transportation to the hospital, purchasing drugs, and other required costs.

Although not statistically significant ($p>0.05$), the adherence level was higher among pregnant women who attained primary school (1.08, 0.44-2.67) and secondary school (1.20, 0.59 to 2.46) compared to those with tertiary education. The adherence level was also higher among HIV-positive women earning less than N50,000.00 than those earning above N50,000.00 per month ($p>0.659$).

Levels of reinforcing factors involved with adherence to follow-up care for PMTCT of HIV among HIV positive pregnant women in Cross River State

Table 3 illustrates the reinforcing factors influencing adherence to follow-up care for PMTCT of HIV among respondents. A significant majority, 180 (90.5%),

disagreed or strongly disagreed that healthcare workers reminded them of clinic days. Additionally, 107 (53.8%) spent a long time in hospitals to collect drugs, 155 (77.9%) were asked to pay a certain amount before receiving HIV services, 158 (79.4%) reported that health providers attended to HIV-negative women before them, and 144 (72.4%) experienced hostility from healthcare providers. Less than fifty percent, 95 (47.7%), stated that treatment supporters assisted in collecting ART for them, and 139 (69.8%) faced stigma and rejection from family and friends. In Table 4, the multivariate analysis of reinforcing factors influencing adherence to follow-up care for PMTCT of HIV among HIV pregnant women in this study is presented. Women who did not face stigma and rejection from family and friends were 1.18 (0.62 to 2.24) times more likely to adhere to follow-up care than those who faced rejection and stigmatization. The odds of adherence for HIV-positive pregnant women, for whom hospital staff did not ask for payment before providing HIV services, were 3.43 [(1.44 to 8.19), $p = 0.005$] compared to those who were asked to pay. The level of adherence was also higher among women who were attended to by health providers before HIV-negative individuals (1.15, 0.55 to 2.40) and those who received assistance from treatment supporters to collect ART (1.25, 0.69 to 2.24).

Predisposing, reinforcing and enabling factors that most significantly predict adherence to follow-up care for PMTCT of HIV among respondents

Table 5 and 6 present the predisposing, reinforcing, and enabling factors that most significantly predict adherence to follow-up care for PMTCT of HIV among respondents in this study. In Table 5, it is observed that the majority of the respondents (87.4%) did not disclose their HIV status to their family members, and only 18 (9.0%) ever forgot to take the prescribed drugs for their conditions.

The analysis reveals that respondents who did not forget to take the prescribed drugs had an odds ratio of 1.84 [(1.00 to 3.36), $p = 0.048$]. Those who did not miss medication for 2 or more days in a row were 4.43 [(2.36

Table 4. Multivariate analysis of reinforcing factors involved with adherence to follow-up care for PMTCT of HIV among respondents.

A support system to HIV positive woman	Event	CHR (95%)	P-value
My health care worker reminds me of clinic days	Strongly agree/agree - 19	0.80 (0.33 - 2.35)	0.796
	Strongly disagree/disagree - 180	1	
You spent a long time in the hospital to collect drugs	Strongly agree/agree - 107	1	0.640
	Strongly disagree/disagree - 92	0.87 (0.48 - 1.56)	
Stigma and rejection from family and friends are discouraging	Strongly agree/agree - 60	1	0.625
	Strongly disagree/disagree - 139	1.18 (0.62 - 2.24)	
Hospital staff asked you to pay money before providing HIV services to you	Strongly agree/agree - 155	1	0.005*
	Strongly disagree/disagree - 44	3.43 (1.44 - 8.19)	
Health providers attended to HIV negative women before attending to you	Strongly agree/agree - 158	1	0.709
	Strongly disagree/disagree - 41	1.15 (0.55 - 2.40)	
Health care providers are hostile to me	Strongly agree/agree - 144	1	0.687
	Strongly disagree/disagree - 55	0.86 (0.46 0 1.68)	
Treatment supporter assist to collect ART for me	Strongly agree/agree - 95	1.25 (0.69 - 2.24)	0.462
	Strongly disagree/disagree - 104	1	

Table 5. Factors determining the adherence to PMTCT program by mothers.

Adherence to PMTCT protocol	Response category (%)			
	None of the time	Some of the time	Most of the time	All of the time
Disclosed HIV status to family members	147 (73.9)	27 (13.6)	8 (4.0)	17 (8.5)
I forget to take the drugs prescribed for my condition	127 (63.8)	54 (27.1)	16 (8.0)	2 (1.0)
The ART I take for HIV will have a positive effect on my health and prevent baby from contracting HIV	73 (36.7)	31 (15.6)	18 (9.0)	77 (38.7)
if you do not take the medication for HIV exactly as directed, the HIV in your body will become resistant to the medications	89 (44.7)	34 (17.1)	24 (12.1)	52 (26.1)
In the period of my ANC, I missed taking medication for 2 or more days in a row	108 (54.3)	66 (33.2)	19 (9.5)	6 (3.0)
I have decided not to take my drugs because I feel better	150 (75.4)	34 (17.1)	10 (5.0)	5 (2.5)
I often stop my medicines because I experience side effects of the drugs	147 (73.9)	40 (20.1)	10 (5.0)	2 (1.0)
I did not want others to notice I am taking medicine	75 (37.7)	58 (29.1)	28 (14.1)	38 (19.1)
Have Had a problem taking pills at specific times (e.g. with or without meals or on an empty stomach)	92 (46.2)	74 (37.2)	21 (10.6)	12 (6.0)
I do refill my prescription when it is finished	26 (13.1)	31 (15.6)	37 (18.6)	105 (52.8)
I do forget to meet a scheduled clinic appointment with my healthcare giver for follow-up	61 (30.7)	77 (38.7)	42 (21.1)	19 (9.5)
I normally substitute traditional medicines for the drugs given to me at the clinic	138 (69.3)	39 (19.6)	12 (6.0)	10 (5.0)

Table 6. Multivariate analysis of the factors determining the adherence to PMTCT program by mothers.

Adherence to PMTCT protocol	Event	CHR (95%)	P-value	AHR (%)
Disclosed HIV status to family members	Yes - 147	1	0.152	
	No - 52	1.61 (0.84-3.09)		
I forget to take the drugs prescribed for my condition	Yes - 72	1	0.048*	0.65 (0.29 - 1.47)
	No - 127	1.84 (1.00 – 3.36)		
The ART I take for HIV will have a positive effect on my health and prevent baby from contracting HIV	Yes - 126	0.82 (0.45 – 1.50)	0.524	
	No - 73	1		
if you do not take the medication for HIV exactly as directed, the HIV in your body will become resistant to the medications	Yes - 110	1.14 (0.63 – 2.05)	0.671	
	No - 89	1		
In the period of my ANC, I missed taking medication for 2 or more days in a row	Yes - 91	1	0.000*	5.06 (2.14 - 11.97)
	No - 108	4.43 (2.36 – 8.30)		
I have decided not to take my drugs because I feel better	Yes - 49	1	0.032*	0.78 (0.35 - 1.76)
	No - 150	2.06 (1.06 – 4.00)		
I often stop my medicines because I experience side effects of the drugs	Yes - 52	1	0.015*	1.37 (0.64 - 2.95)
	No - 147	2.24 (1.17 – 4.29)		
I did not want others to notice I am taking medicine.	Yes - 124	1	0.020*	1.16 (0.50 - 2.72)
	No - 75	2.14 (1.13 – 4.06)		
Have Had a problem taking pills at specific times (e.g. with or without meals or on an empty stomach)	Yes - 107	1	0.012*	1.01 (0.46 - 2.20)
	No - 92	2.18 (1.18 – 4.00)		
I do refill my prescription when it is finished.	Yes - 173	0.54 (0.21 – 1.41)	0.206	
	No - 26	1		
I do forget to meet scheduled clinic appointments with my healthcare giver for follow-up	Yes - 138	1	0.005*	1.62 (0.71 - 3.71)
	No - 61	2.8 (1.36 0 5.71)		
I normally substitute traditional medicines for the drugs given to me at the clinic.	Yes - 61	1	0.047*	1.79 (0.82 - 3.89)
	No - 61	1.88 (1.01 – 3.50)		

to 8.30), $p=0.000$] more likely to adhere than those who missed, with the adjusted odds ratio being 5.06 (2.14 to 11.97). The odds of those who did not stop taking drugs because they felt better were 2.06 [(1.06 to 4.00), $p = 0.032$]. The odds of

those who did not stop taking drugs because of side effects were 2.24 (1.17 to 4.29) compared to those who stopped due to side effects of the drugs. Those who did not care whether other people saw them taking HIV drugs or not were

2.14 [(1.13 to 4.06), $p = 0.020$] times more likely to adhere to follow-up care than those who did not want people to see them taking the drugs. Those who did not have a problem taking pills at specific times (e.g. with or without meals or on an empty

stomach) were 2.18 [(1.18 to 4.00), $p = 0.012$] more likely to adhere than those who had problems taking their drugs. Similarly, those who did not forget to meet scheduled clinic appointments with healthcare givers for follow-up were approximately three times more likely to adhere, with an odds ratio of 2.8 (1.36 to 5.71), than those who forget their appointment days (Table 6).

DISCUSSION

Level of adherence to follow-up care with PMTCT among pregnant women in selected facilities in Cross River State, Nigeria

This study aims to identify the factors determining adherence to follow-up care for the prevention of mother-to-child transmission of HIV among pregnant women in selected facilities in Cross River State, Nigeria. The research quantitatively evaluates the levels and correlates of non-adherence, as well as reasons for non-adherence to follow-up care for PMTCT among 199 pregnant women infected with HIV in three different facilities in Cross River State, Nigeria. The adherence rate to follow-up care with PMTCT among pregnant women in this study was 65.8%. The non-adherence level among HIV-positive pregnant women in Cross River State, Nigeria, is high (31.0%) and warrants urgent interventions to achieve the aim of PMTCT of HIV in Nigeria and reduce the risk of mother-to-child transmission of HIV. This value is similar to the high adherence proportion of 69.0% reported in a similar study in South Africa in 2018 (Adeniyi et al., 2018) but lower than the 89.2% reported in Ebonyi state, Nigeria, in 2018 (Agboeze et al., 2018). This proportion is higher than the 47% seen in a previous study conducted in Ibadan, South West, Nigeria (Oginni et al., 2018), as well as the 43.3% adherence rate reported in another African country, Tanzania, in 2019 (Zacharius et al., 2019). The proportion of adherence in this study slightly increased with an increase in the age of the respondents and was slightly higher among pregnant women living in urban areas than those in rural areas. This finding is in line with the previous report in Nigeria (Omonaiye et al., 2019) but contradicts the report of Adeniyi et al. (2018), who found that the proportion of adherence was higher among young pregnant women than older ones. Marital status, gravidity, education, and monthly income did not significantly determine the adherence of the women to follow-up care, but the level of adherence was found to be significantly higher among self-employed respondents (73.1%). Self-employed women were found to be three times more likely to adhere to follow-up care than the unemployed, and the employed were 2 times more likely to adhere than the unemployed ($p < 0.05$). This is in agreement with the findings of Adeniyi et al. (2018), Agboeze et al. (2018) and Oginni et al. (2018) but

contradicts the report of Omonaiye et al. (2019) and Zacharius et al. (2019). The high non-adherence rate seen among unemployed pregnant women might be due to the lack of funds to pay for service charges as well as transport fare, as reported among pregnant women. This corroborates the findings from in-depth interviews, which revealed that the majority of the women often lack transport fare, money to pay for service charges, and food. It might also be a result of a lack of support (discrimination) experienced by pregnant women.

Levels of reinforcing factors involved with adherence to follow-up care for PMTCT of HIV among HIV positive pregnant women in Port Harcourt

Nine out of every ten women who participated in the survey stated that their healthcare workers did not remind them of clinic days, and the majority spent a long time in hospitals to collect drugs.

Almost four out of every five stated that they paid a certain amount before getting HIV services from hospital staff, and health providers would rather attend to HIV-negative women before attending to them. Over seventy percent stated that healthcare providers were hostile to them, and less than fifty percent stated that treatment supporters usually assist them in collecting ART, while (69.8%) faced stigma and rejection from family and friends. The multivariate analysis revealed that women who did not face stigma and rejection from family and friends are 1.18 times more likely to adhere to follow-up care than those who face rejection and stigmatization. Additionally, those who did not pay hospital staff money before being attended to are 3 times more likely to adhere to follow-up care than those who were asked to pay before receiving treatment. Despite the poor support received from caregivers, it was still better than the support received from the community, family, and friends, as found during the in-depth interviews. Previous studies have reported similar findings in various parts of the world, including Nigeria. For instance, the negative attitude of health care providers has been identified as one of the major factors of non-adherence to follow-up care among HIV positive pregnant women in Nigeria (Oginni et al., 2018). Additionally, health facility factors, stigma, and discrimination were among the major reasons for non-adherence to follow-up care among HIV positive women (Kalembo and Zgambo, 2012). Lubogo et al. (2015) confirmed that clients who received family support accessed HIV services more than those without family support.

Lingala and Ghany (2016) reported that pregnant women had negative experiences while interacting with the PMTCT program staff. Ademola (2016) also reported that improved levels of adherence to ART among pregnant women are hampered by the fear of stigmatization and the fear of being rejected by partners if

they disclose their status. It has also been reported that the main contributing factor to poor adherence is the fear of being identified as HIV positive (Adeniyi et al., 2018). This is because discrimination and stigmatization against People Living With HIV/AIDS (PLWHA) are common in our society and remain important factors militating against adherence to treatment and quality HIV care.

Predisposing, reinforcing and enabling factors that most significantly predict adherence to follow-up care for PMTCT of HIV among respondents

About one in every ten HIV-positive pregnant women who participated in this study disclosed their HIV status to their family members. Among those who disclosed their status to their family members, they mostly disclosed to their husbands, and only a few disclosed to other family members such as mothers and sisters. It has been reported that disclosure of HIV status as a means of improving the levels of adherence to ART is hampered by the fear of social stigma and fear of being blamed by partners (Ademola, 2016). Studies have shown that HIV-positive women who did not disclose their status at home usually find it hard to give the child medication in front of family members, to avoid disclosure of their HIV status and they stopped treatment (Owowo, 2012).

However, only 20% of those who participated in in-depth interviews received support from their husbands without any form of discrimination. In Malawi, it was reported that the lack of emotional and financial support from the husband, inadequate counseling, and internal migration were the reported reasons for non-adherence to ART among pregnant women infected with HIV (Adeniyi et al., 2018). Previous studies have documented that many HIV-positive women were afraid of disclosing their status to their husbands and other family members, leading them to stop treatment because they felt unable to explain why they were on medication or might be experiencing side effects (Okoli and Lansdown, 2014). The level of support received from the community and other family members apart from husbands was very low, but stigmatization and discrimination from the community need more attention. Less than 20% usually forget to take the prescribed drugs for their conditions, and those who did not forget to take their drugs were approximately 2 times more likely to adhere to follow-up care than those who usually forget. A high level of adherence was also associated with not missing medications for more than two days, not stopping medication because of feeling better, and not stopping medication because of the side effects of the drugs. Also, those who did not care whether other people see them taking HIV drugs were 2 times more likely to adhere to follow-up care than those who care. Those who did not have a problem taking pills at specific times (e.g., with or without meals or on an empty stomach) were 2 times more likely to adhere than those

who had problems taking their drugs. Also, the majority of those who participated in in-depth interviews mentioned the lack of food as one of the major reasons for non-adherence to follow-up care.

Similarly, those who did not forget to meet scheduled clinic appointments with healthcare givers for follow-up were 3 times more likely to adhere to follow-up care than those who forget their appointment days. Factors such as high pill-burden, high cost of transport fares, religion, medical side-effects (Ekama et al., 2012), stigma and discrimination, attitude, and poor education were associated with poor adherence to ARV drugs among HIV positive pregnant women (Agboeze et al., 2018; Olowookere et al., 2012). It was reported in Uganda that the main factors associated with access to HIV care services included the distance of clients' residence to a facility, clients' place of residence (urban or rural), and having a supportive family (Owowo, 2012). Other factors identified in previous studies include the fear of swallowing antiretroviral drugs, HIV-related stigma and discrimination, inadequate facilitation of peer educators, long patient waiting time, and lack of transportation to the health facilities (Owowo and Itah, 2013).

Conclusion

The proportion of HIV positive pregnant women who were adherent to follow-up care with PMTCT in this study was low. Factors related to unemployment, lack of funds for transportation and service charges, not disclosing HIV status to someone, fear of stigmatization and discrimination, feeling better while taking ART, laziness, forgetfulness, long distance from the hospital, preference for traditional medicine, religious belief, and the perception that HIV is a spiritual attack were significantly associated with non-adherence. Non-adherence of some women resulted in a high proportion of HIV-positive status among children whose mothers did not adhere to follow-up care with PMTCT. It is, therefore, crucial for all stakeholders to design a sustainable policy or intervention that will improve ART adherence among HIV positive pregnant women in Nigeria; this will position the country correctly for the elimination of mother-to-child transmission of HIV. The increasing record of non-adherence to ART and new cases of mother-to-child transmission in Cross River State calls for government initiatives to create awareness on stigmatization and implement more decisive policies for adherence.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

Ademola E (2016). Barriers to uptake of prevention of mother-to-child

- transmission of HIV services among mothers of vertically infected HIV-seropositive infants in Nigeria. *Patient Preference and Adherence* pp. 57-72.
- Adeniyi ON, Ayayi AI, Goon DT, Owolabi EO, Eboh O, Lambert J (2018). Factors affecting adherence to antiretroviral therapy among pregnant women in the Eastern Cape, South Africa. *BMC Infectious Disease* 18:175.
- Agboeze J, Adedokun B, Adeoye I, Nwali M (2018). Determinants of adherence to antiretroviral therapy among women accessing prevention of mother to child transmission services in Ebonyi State, Nigeria. *Pan African Medical Journal Conference Proceedings* 2:248-253.
- Atalell KA, Birhan TN, Ekubagewargies DT (2018). Survival and predictors of mortality among children co-infected with tuberculosis and human immunodeficiency virus at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia. A retrospective follow-up study. *PLoS one* 13(5):e0197145.
- Ekama S, Herbertson EC, Addeh EJ, Gad-Okafor CV, Onwujekwe DI, Tayo F, Ezechi OC (2012). Pattern and determinants of antiretroviral drugs adherence among Nigerian pregnant women. *Journal of Pregnancy* 3:21-30.
- Lubogo M, Bangure D, Lucas G, Sasita S, Justin M, Herilinda T, Theophil CM, Naod B (2014). Ebola virus disease outbreak; the role of field epidemiology training programme in the fight against the epidemic, Liberia, 2014. *The Pan African Medical Journal* 22(Suppl 1):5.
- National Agency for Control of AIDS (NACA) (2018) Preventing Mother to child transmission of HIV in Nigeria. National Agency for Control of AIDS. <https://naca.gov.ng>.
- National Agency for Control of AIDS (NACA) (2019). Revised National HIV and AIDS. <https://naca.gov.ng/wp-content/uploads/2019/03/NATIONAL-HIV-AND-AIDS-STRATEGIC-FRAMEWORK-1.pdf>
- National Population Commission (NPC) (2011). National Population Commission of Nigeria (Web). The Population Projection. <https://www.citypopulation.de>
- Kalembo FW, Zgambo M (2012). Loss to followup: a major challenge to successful implementation of prevention of mother-to-child transmission of HIV-1 programs in sub-Saharan Africa. *International Scholarly Research Notices* 2012, Article ID 589817, 10 pages doi:10.5402/2012/589817
- Oginni MO, Aremu OO, Olowokere AE, Ayamolowo SJ, Komolafe AO (2018). Adherence to HIV care among HIV-positive pregnant women in Nigeria. *African Journal of Midwifery and Women's Health* 12(1):28-34.
- Okoli JC, Lansdown GE (2014). Barriers to successful implementation of prevention-of-mother-to-child-transmission (PMTCT) of HIV programmes in Malawi and Nigeria: a critical literature review study. *Pan African Medical Journal* 19(1).
- Olowookere SA, Fatiregun AA, Adewole IF (2012). Knowledge and attitudes regarding HIV/AIDS and antiretroviral therapy among patients at a Nigerian treatment clinic. *The Journal of Infection in Developing Countries* 6(11):809-816.
- Omonaiye O, Kusljic S, Nicholson P, Mohebbi M, Manias E (2019). Post Option B+ implementation programme in Nigeria: Determinants of adherence of antiretroviral therapy among pregnant women with HIV. *International Journal of Infectious Diseases* 81:225-230.
- Owowo EE (2012). *Treponema pallidum* (Syphilis)-HIV/AIDS co-infections among Antenatal Women in South-South Region of Nigeria. *International Journal of Natural and Applied Sciences* 6(5):199-210.
- Owowo EE, Itah AY (2013). Prevalence of Enteric Fever-HIV/AIDS co-infections in Akwa Ibom State, Nigeria. *World Journal of Natural and Applied Sciences* 5(1):6-15.
- Lingala SM, Ghany MGM (2016). Implementation Research for the prevention of Mother to Child HIV transmission in Sub-Saharan: Existing Evidence. *Current Gaps and New opportunities* 23(3):289-313.
- Udofia LE, Udoh NB, Edohoabasi BG, Owowo EE (2022). Antimalarial Activity of *Bambusa vulgaris* on *Plasmodium berghei* in mice. *Nigerian Journal of Parasitology* 43(2):286-292.
- UNAIDS (2016). 2015-Prevention Gap Report, 76-80.
- UNAIDS (2019). AIDS info. <https://aidsinfo.unaids.org/>
- WHO (2018). Knowing Your Status- Then and Now Table of World Health Organisation, December.
- Zacharius KM, Basinda N, Marwa K, Mtui EH, Kalolo A, Kapesa A (2019). Low adherence to Option B+ antiretroviral therapy among pregnant women and lactating mothers in Eastern Tanzania. *PLoS ONE* 14(2):1-12.