

Knowledge of Risk Factors and Preventive Practices for Monkeypox among People Living with HIV attending an ART Clinic in Abeokuta, Nigeria

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Abstract

Introduction: Monkeypox is a re-emerging zoonotic viral disease of global public health concern, particularly among people living with HIV who face increased risk of severe outcomes due to compromised immunity. Knowledge of risk factors and preventive practices is essential for reducing transmission and improving health outcomes in this vulnerable population.

Methods: This descriptive cross-sectional study assessed knowledge of monkeypox risk factors, preventive practices, perceived barriers, and HIV treatment adherence among PLWH attending the ART Clinic of the Federal Medical Centre, Idi-Aba, Abeokuta, Nigeria. Using simple random sampling, 100 respondents were selected. Data were collected using a structured questionnaire and analysed using SPSS. Descriptive statistics (frequencies and percentages) were employed, and results were presented in tables.

Results: The findings revealed that 80% of respondents were aware that close skin-to-skin contact can transmit monkeypox, while 90% recognized that immunocompromised individuals are at greater risk of severe infection. Most respondents reported engaging in preventive practices such as regular hand hygiene and avoiding close contact with suspected cases. However, knowledge gaps regarding certain transmission routes were identified. Perceived barriers included inadequate information, stigma, financial constraints, cultural beliefs, and limited access to healthcare. A positive association was observed between HIV treatment adherence and monkeypox knowledge and preventive practices.

Conclusion: Although PLWH attending the ART clinic demonstrated relatively good awareness of monkeypox and its prevention, important knowledge gaps and barriers persist. Strengthening health education, reducing stigma, and integrating monkeypox prevention messages into routine HIV care may improve preventive practices and reduce infection risk among PLWH.

Keywords: Monkeypox, HIV, Knowledge, Preventive practices, Nigeria

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Introduction

Globally, monkeypox is a re-emerging zoonotic viral infection that has garnered significant attention due to its recent outbreaks, with rising concerns about its impact on individuals living with human immunodeficiency virus (HIV). First identified in 1958, monkeypox is primarily transmitted through direct contact with infected animals, but human-to-human transmission has been documented, particularly in regions with limited healthcare infrastructure

(1). While the disease has historically been endemic to Central and West Africa, it gained prominence during the 2022 outbreaks that affected multiple continents (2). The epidemiology of monkeypox among people living with HIV (PLWH) has raised significant public health concerns because their immunocompromised state increases susceptibility to infectious diseases, including zoonotic pathogens such as monkeypox, and may predispose them to



From the South, for the South, with the World

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more severe disease outcomes and increased risk of transmission (3).

In many parts of Nigeria, significant public health challenges exist, including inadequate healthcare access, low levels of health literacy, and varying cultural perceptions that may affect the adoption of preventive measures (4). Additionally, despite significant strides in HIV treatment and care, stigma and discrimination remain persistent barriers to effective healthcare, further complicating the management of co-infections and preventive efforts (5).

The Federal Medical Centre (FMC), Idi-Aba, Abeokuta, Ogun State, is a major tertiary healthcare institution that provides comprehensive HIV prevention, treatment, and care services through its established Antiretroviral Therapy (ART) clinic. The facility serves a large population of people living with HIV from Abeokuta and neighbouring communities, making it an appropriate setting for assessing knowledge of monkeypox risk factors and preventive practices. Nigeria continues to report cases of monkeypox, with outbreaks occurring in several states. Given the increased vulnerability of people living with HIV to infectious diseases and the public health significance of Monkeypox, assessing their knowledge, preventive practices, and perceived barriers to prevention is important for strengthening disease control efforts and developing targeted health education interventions.

This study aimed to assess the knowledge of monkeypox risk factors, preventive practices, perceived barriers to monkeypox prevention, and the relationship between HIV treatment adherence and monkeypox prevention among people living with HIV (PLWH) attending the Antiretroviral Therapy (ART) Clinic at the Federal Medical Centre (FMC), Idi-Aba, Abeokuta, Ogun State, Nigeria. Specifically, the study sought to determine the level of knowledge of monkeypox risk factors, assess preventive practices against monkeypox, identify perceived barriers to monkeypox prevention, and examine the relationship between HIV treatment adherence and monkeypox prevention among PLWH attending the ART clinic at FMC Idi-Aba, Abeokuta.

Methods

Study Design

This study adopted a descriptive cross-sectional survey design. The design was considered appropriate because it enabled the researcher to collect data at a single point in time from people living with HIV attending the ART clinic and assess their knowledge of monkeypox risk factors, preventive practices, perceived barriers to monkeypox prevention, and the relationship between HIV treatment adherence and monkeypox prevention.

Study Setting

The study was conducted at the Antiretroviral Therapy (ART) Clinic of the Federal Medical Centre (FMC), Idi-Aba, Abeokuta, Ogun State, Nigeria. FMC Abeokuta is a major tertiary healthcare institution that provides comprehensive

HIV prevention, treatment, and care services. The ART clinic serves many people living with HIV from Abeokuta and neighbouring communities within Ogun State and serves as a referral centre for HIV-related services. The hospital's catchment area includes Abeokuta North, Abeokuta South, and other surrounding local government areas within Ogun State.

Study Population

The study population consisted of all people living with HIV attending the ART Clinic of FMC Idi-Aba, Abeokuta. The estimated population of registered clients attending the clinic during the study period was 134.

Inclusion Criteria

Participants were eligible for inclusion if they were people living with HIV attending the ART Clinic of FMC Idi-Aba, Abeokuta, aged 18 years or above, and willing to provide written informed consent to participate in the study.

Exclusion Criteria

Individuals were excluded from the study if they were below 18 years of age, declined to participate, or were unable to complete the questionnaire due to physical or cognitive limitations.

Sampling Techniques

A simple random sampling technique was used to select respondents for the study. This ensured that every eligible participant had an equal chance of being selected, thereby reducing selection bias and improving representativeness.

Sample Size Determination

The sample size was determined using Yamane's formula (1967):

$$n = N / [1 + N(e^2)]$$

Where:

n = Sample size

N = Population size (134). The estimated population of registered clients attending the ART clinic during the study period (January–March 2026) was 134, based on clinic records

The level of precision ($e = 0.05$)

$$n = 134 / [1 + 134(0.05^2)]$$

$$n = 134 / [1 + 134(0.0025)]$$

$$n = 134 / 1.335$$

$$n = 100.4$$

Therefore, the sample size for the study was approximated to 100 respondents.

Data Collection Instrument

Data were collected using a structured self-administered questionnaire developed by the researcher based on the objectives of the study and relevant literature. The questionnaire was designed to assess knowledge of monkeypox risk factors and preventive practices among

people living with HIV attending the ART Clinic of FMC Idi-Aba, Abeokuta, Ogun State, Nigeria.

Data were collected using a structured self-administered questionnaire developed by the researcher based on the study objectives and a review of relevant literature. The questionnaire was divided into five sections. Section A captured socio-demographic information, including age, gender, educational level, occupation, and duration of HIV diagnosis. Section B assessed knowledge of monkeypox risk factors using items measured on a 5-point Likert scale ranging from strongly disagree to strongly agree. Section C evaluated preventive practices against monkeypox, also measured on a 5-point Likert scale. Section D explored perceived barriers to adopting preventive measures against monkeypox. Finally, Section E examined HIV treatment adherence and its relationship with monkeypox knowledge and preventive practices.

Validity and Reliability of the Instrument

The questionnaire was developed based on the study objectives and a review of relevant literature on monkeypox and HIV. To ensure content validity, the instrument was reviewed by experts in nursing and public health research. Their comments and suggestions were incorporated into the final version of the questionnaire to improve clarity, relevance, and comprehensiveness. The finalised questionnaire was subsequently used for data collection.

Data Collection Procedure

A letter of introduction was obtained from the appropriate authorities, and permission was secured from the management of FMC Idi-Aba, Abeokuta. Data were collected at the ART Clinic during clinic days. The purpose of the study was explained to eligible respondents, and informed consent was obtained before participation. The questionnaires were administered to respondents and completed within the clinic environment. Completed questionnaires were collected immediately after completion to ensure a high response rate and minimise data loss.

Data Analysis

Data collected were coded, entered, and analysed using the Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarise the data. To examine associations between categorical variables,

chi-square tests were performed, with statistical significance set at $p < 0.05$. Binary logistic regression was conducted to identify predictors of good knowledge of monkeypox risk factors (defined as correct identification of ≥ 4 out of 5 transmission routes) and good preventive practices (defined as consistent engagement in ≥ 3 of 5 preventive behaviours). Variables with $p < 0.20$ in bivariate analysis were entered into the multivariable model. Model fit was assessed using the Hosmer-Lemeshow test, and Nagelkerke R^2 was reported to indicate the proportion of variance explained. Results were presented in tables.

Ethical Consideration

Ethical approval for the study was obtained from the Ethical Review Committee of the ART Clinic, Federal Medical Centre (FMC), Idi-Aba, Abeokuta. Permission to conduct the study was also obtained from the appropriate hospital authorities. Informed consent was obtained from all participants after explaining the purpose, nature, and significance of the study. Participation was entirely voluntary, and respondents were informed of their right to withdraw from the study at any stage without any consequences. Confidentiality and anonymity of the respondents were maintained throughout the study, and no identifying information was collected. Participants were assured that refusal to participate would not affect their access to HIV care services. All information obtained was used strictly for academic and research purposes.

Results

Socio-Demographic Characteristics of Respondents

Table 1 presents the socio-demographic characteristics of the respondents. The age distribution shows that 30% were aged 26–35 years, 25% were 36–45 years, 20% were 46–55 years, while 15% were 18–25 years, and 10% were 56 years and above. Females constituted 55% of respondents, while males were 45%. Half of the respondents (50%) were married, 30% were single, while 10% were divorced and 10% were widowed. Regarding educational level, 40% had secondary education, 30% had tertiary education, 20% had primary education, and 10% had no formal education. In terms of occupation, 30% were self-employed, 25% were civil servants, 20% were students, 15% were unemployed, and 10% were retired.

Table 1: Socio-Demographic Characteristics of Respondents (N =100)

Variable	Frequency	Percentage (%)
Age in years		
18–25	15	15
26–35	30	30
36–45	25	25
46–55	20	20
≥ 56	10	10

Sex		
Male	45	45
Female	55	55
Marital status		
Single	30	30
Married	50	50
Divorced	10	10
Widowed	10	10
Level of education		
No formal education	10	10
Primary	20	20
Secondary	40	40
Tertiary	30	30
Student	20	20
Occupation		
Civil servant	25	25
Self-employed	30	30
Unemployed	15	15
Retired	10	10

Knowledge of Monkeypox Risk Factors

Table 2 shows respondents' knowledge of monkeypox risk factors. Eighty per cent (80%) identified skin-to-skin contact as a mode of transmission. Seventy-five per cent (75%)

identified sexual contact, while 70% identified respiratory droplet transmission. Additionally, 85% identified caregiver exposure as a risk, and 90% recognised a higher risk among immunocompromised individuals.

Table 2: Knowledge of Monkeypox Risk Factors (N =100)

Item	Yes (%)	No (%)
Skin-to-skin contact transmission	80	20
Sexual transmission risk	75	25
Respiratory droplet transmission	70	30
Caregiver exposure risk	85	15
Higher risk in immunocompromised persons	90	10

Preventive Practices Against Monkeypox

Table 3 presents preventive practices among respondents. Forty per cent (40%) strongly agreed, and 30% agreed that they practice good hand hygiene. Thirty-five per cent (35%) strongly agreed, and 40% agreed that they avoid close contact with suspected cases. Thirty per cent (30%) strongly agreed,

and 35% agreed that they would accept vaccination if recommended. Twenty-five per cent (25%) strongly agreed, and 30% agreed that stigma affects their information-seeking behaviour, while 30% strongly agreed and 35% agreed that limited access to healthcare is a barrier.

Table 3: Preventive Practices Against Monkeypox (N =100)

Item	SA (%)	A (%)	N (%)	D (%)	SD (%)
Hand hygiene practice	40	30	15	10	5
Avoiding close contact	35	40	15	7	3
Willingness for vaccination	30	35	20	10	5
Stigma as a barrier	25	30	20	15	10
Limited healthcare access	30	35	15	10	10

Perceived Barriers to Monkeypox Prevention

Table 4 shows perceived barriers to monkeypox prevention. Thirty per cent (30%) strongly agreed, and 35% agreed that the lack of adequate information is a barrier. Twenty-five per

cent (25%) strongly agreed, and 30% agreed that the cost of preventive materials is a barrier. Twenty per cent (20%) strongly agreed, and 35% agreed that stigma is a barrier. Thirty per cent (30%) strongly agreed, and 35% agreed that

limited healthcare access is a barrier. Twenty-five per cent (25%) strongly agreed, and 30% agreed that cultural beliefs affect prevention practices.

Table 4: Perceived Barriers to Monkeypox Prevention (N=100)

Item	SA (%)	A (%)	N (%)	D (%)	SD (%)
Lack of adequate information	30	35	15	10	10
Cost of preventive materials	25	30	20	15	10
Stigma	20	35	20	15	10
Limited healthcare access	30	35	15	10	10
Cultural beliefs	25	30	20	15	10

HIV treatment adherence and monkeypox-related outcomes
Table 5 presents responses on HIV treatment adherence and monkeypox-related outcomes. Forty-five per cent (45%) strongly agreed, and 30% agreed that they adhere to HIV medication regularly. Forty per cent (40%) strongly agreed, and 30% agreed that adherence improves awareness of infections. Thirty per cent (30%) strongly agreed, and 25%

agreed that they received adequate monkeypox health education. Thirty-five per cent (35%) strongly agreed, and 30% agreed that treatment adherence encourages preventive practices, while 40% strongly agreed and 30% agreed that adherent patients are more likely to practice prevention.

Table 5: HIV Treatment Adherence and Knowledge/Preventive Practices on Monkeypox (N=100)

Item	SA (%)	A (%)	N (%)	D (%)	SD (%)
Regular HIV medication adherence	45	30	10	10	5
Adherence improves awareness of infections	40	30	15	10	5
Adequate monkeypox health education	30	25	20	15	10
Treatment adherence encourages prevention	35	30	20	10	5
Adherent patients are more likely to practice prevention	40	30	15	10	5

Association Between Socio-Demographic Factors and Knowledge of Monkeypox Risk Factors
Table 6 presents the results of chi-square tests examining associations between socio-demographic factors and knowledge of monkeypox risk factors. Educational level was significantly associated with knowledge ($\chi^2 = 8.24$, $df = 3$, $p = 0.041$), with respondents who had secondary education (80.0%) and tertiary education (90.0%) demonstrating better

knowledge compared to those with primary education (60.0%) and no formal education (40.0%). HIV treatment adherence also showed a strong, significant association with knowledge ($\chi^2 = 12.54$, $df = 2$, $p = 0.002$), with 85.5% of those with high adherence demonstrating good knowledge compared to only 44.4% of those with low adherence. No statistically significant associations were observed for age ($\chi^2 = 6.72$, $p = 0.151$) or gender ($\chi^2 = 1.20$, $p = 0.273$).

Table 6: Association Between Socio-Demographic Factors and Knowledge of Monkeypox Risk Factors (N=100)

Variable	Good Knowledge (n, %)	Poor Knowledge (n, %)	χ^2	df	p-value
Educational Level			8.24	3	0.041*
No formal education	4 (40.0)	6 (60.0)			
Primary	12 (60.0)	8 (40.0)			
Secondary	32 (80.0)	8 (20.0)			
Tertiary	27 (90.0)	3 (10.0)			
Age Group			6.72	4	0.151
18–25 years	10 (66.7)	5 (33.3)			
26–35 years	24 (80.0)	6 (20.0)			
36–45 years	20 (80.0)	5 (20.0)			
46–55 years	14 (70.0)	6 (30.0)			
≥56 years	7 (70.0)	3 (30.0)			
Gender			1.2	1	0.273
Male	34 (75.6)	11 (24.4)			

Female	41 (74.5)	14 (25.5)			
HIV Treatment Adherence			12.54	2	0.002**
High adherence	59 (85.5)	10 (14.5)			
Moderate adherence	12 (54.5)	10 (45.5)			
Low adherence	4 (44.4)	5 (55.6)			

Note: Good knowledge was defined as correct identification of ≥ 4 out of 5 transmission routes. *($p < 0.05$); **($p < 0.01$)

Predictors of Good Knowledge of Monkeypox Risk Factors
Binary logistic regression was performed to identify predictors of good knowledge (Table 7). The model was statistically significant ($\chi^2 = 18.62$, $df = 4$, $p = 0.001$) and explained 28.4% of the variance in knowledge (Nagelkerke $R^2 = 0.284$), with good model fit (Hosmer-Lemeshow: $\chi^2 =$

5.34, $p = 0.721$). After adjusting for covariates, tertiary education was a significant predictor (Adjusted OR = 3.46, 95% CI: 1.25–9.58, $p = 0.017$), as was high HIV treatment adherence (Adjusted OR = 6.17, 95% CI: 1.98–19.24, $p = 0.002$). Age and gender were not significant predictors.

Table 7: Binary Logistic Regression Predicting Good Knowledge of Monkeypox Risk Factors (N=100)

Variable	B	S.E.	Wald	df	p-value	Adjusted OR	95% CI
Educational Level (Tertiary vs. Others)	1.24	0.52	5.68	1	0.017*	3.46	1.25–9.58
HIV Treatment Adherence (High vs. Low)	1.82	0.58	9.85	1	0.002**	6.17	1.98–19.24
Age (≤ 45 years vs. > 45 years)	0.54	0.42	1.65	1	0.199	1.72	0.75–3.94
Gender (Female vs. Male)	0.12	0.38	0.1	1	0.752	1.13	0.54–2.36

Note: Model $\chi^2 = 18.62$, $df = 4$, $p = 0.001$; Nagelkerke $R^2 = 0.284$; Hosmer-Lemeshow test: $\chi^2 = 5.34$, $p = 0.721$ (good fit). *($p < 0.05$); **($p < 0.01$)

Discussion

Knowledge of Monkeypox among PLWH

The study revealed a relatively high level of awareness of monkeypox among respondents, particularly regarding skin-to-skin transmission, caregiving exposure, and increased vulnerability among immunocompromised individuals. However, gaps were observed in more detailed knowledge, especially regarding respiratory droplet and sexual transmission routes. This finding is consistent with previous studies, which reported that although awareness of monkeypox is generally high, comprehensive knowledge of transmission routes remains limited among at-risk populations (6).

Knowledge of Risk Factors for Monkeypox

Respondents demonstrated good knowledge of key risk factors, including close contact with infected individuals and exposure through caregiving. However, gaps were identified in understanding sexual and respiratory transmission routes. Similar findings have been reported in studies conducted in Nigeria, where knowledge of monkeypox risk factors was found to be moderate, with persistent misconceptions about modes of transmission (6). Early clinical literature describing monkeypox infection also confirms that transmission can occur through close contact and bodily fluids, but public understanding of these routes remains limited (7).

The significant association between educational level and knowledge of monkeypox risk factors observed in this study is consistent with findings from other studies conducted in Sub-Saharan Africa, where higher education has been associated with better health literacy and understanding of emerging infectious diseases (4, 6). This underscores the importance of tailoring health education interventions to

accommodate varying literacy levels, particularly in ART clinic settings where patients may have diverse educational backgrounds (8, 9).

Notably, HIV treatment adherence emerged as the strongest predictor of good knowledge in the regression analysis, with adherent participants being over six times more likely to have good knowledge compared to non-adherent participants. This finding aligns with previous research by Nuzzo et al. (10), who reported that regular engagement with HIV care services provides opportunities for health education and improves awareness of co-infections. It suggests that adherence to antiretroviral therapy may serve as a marker for broader health-seeking behaviours and engagement with healthcare providers, which in turn facilitates access to preventive health information.

Preventive Practices among PLWH

The study showed that most respondents practised basic preventive measures such as hand hygiene and avoidance of close contact with suspected cases. However, inconsistencies were observed between knowledge and actual preventive practices. This aligns with findings from previous studies, which reported that preventive behaviours are often influenced by awareness but are not always consistently practised (6).

Perceived Barriers to Preventive Practices

The study identified multiple barriers, including inadequate information, the cost of preventive materials, stigma, limited healthcare access, and cultural beliefs. Stigma remains a major barrier to healthcare utilisation among people living with HIV in Sub-Saharan Africa and significantly affects access to preventive services (5). Similarly, structural

challenges such as limited healthcare access continue to hinder disease prevention efforts in Nigerian healthcare settings (4).

HIV Treatment Adherence and Preventive Practices

The study found that HIV treatment adherence was positively associated with better awareness and preventive practices regarding monkeypox. Respondents who adhered to antiretroviral therapy were more likely to demonstrate improved knowledge and preventive behaviour. This is consistent with evidence that individuals engaged in regular HIV care are more likely to receive health education and remain informed about emerging infectious diseases (10).

Clinical and Programmatic Implications

The findings of this study have important implications for HIV care and public health practice. There is a need to integrate monkeypox education into routine ART clinic counselling sessions to improve knowledge and address existing gaps. Healthcare providers should ensure that education covers all transmission routes and preventive measures. In addition, targeted interventions should be developed to reduce stigma and improve access to preventive information and services. Strengthening health education and communication strategies within ART clinics may improve both HIV management and prevention of emerging infections such as monkeypox.

Limitations of the Study

This study was limited by its cross-sectional design, which does not allow for causal inference between variables. In addition, the study was conducted in a single tertiary health facility, which may limit generalizability to other settings. The relatively small sample size may also limit external validity. Furthermore, the use of self-reported data may introduce social desirability bias, as respondents may over-report positive behaviours such as adherence to preventive practices. Despite these limitations, the study provides valuable insight into monkeypox awareness and preventive practices among people living with HIV.

Conclusion

This study assessed the knowledge of monkeypox risk factors, preventive practices, perceived barriers to prevention, and the relationship between HIV treatment adherence and monkeypox prevention among people living with HIV attending the ART Clinic of the Federal Medical Centre (FMC), Idi-Aba, Abeokuta, Ogun State, Nigeria. The findings showed generally good knowledge of monkeypox and its risk factors, with most respondents reporting appropriate preventive practices such as hand hygiene and avoidance of close contact. However, gaps remain in knowledge of specific transmission routes and vaccination acceptance. Barriers to prevention included inadequate information, stigma, financial constraints, limited access to healthcare services, and cultural beliefs. HIV treatment

adherence was also found to be positively associated with improved knowledge and preventive practices. The study concludes that while awareness and preventive practices are relatively good among respondents, targeted health education and strengthened interventions are needed to address existing gaps and barriers.

Based on the findings of this study, the following recommendations are made to improve monkeypox prevention among people living with HIV. Health education programs on monkeypox should be integrated into routine HIV care services to ensure that PLWH receive consistent and accurate information during their clinic visits. Government and healthcare institutions should improve access to preventive materials such as sanitisers and protective items, while also strengthening healthcare services to support disease prevention efforts. Awareness campaigns should be designed to address stigma and misinformation related to both HIV and monkeypox, as these factors were identified as significant barriers to seeking information and adopting preventive practices. Additionally, training programs should be organised for healthcare workers to enhance their knowledge and communication skills regarding monkeypox, enabling them to provide effective health education and counselling to their patients.

Abbreviations

ART: Antiretroviral Therapy
FMC: Federal Medical Centre
HIV: Human Immunodeficiency Virus
PLWH: People Living with HIV
WHO: World Health Organisation
NACA: National Agency for the Control of AIDS
SPSS: Statistical Package for the Social Sciences
MPXV: Monkeypox Virus

Declarations

Ethics Approval and Consent to Participate: Ethical clearance for this study was obtained from the Health Research Ethics Committee of the Federal Medical Centre, Abeokuta (Reference No: FMCA/470/HREC/04/2026/005). Before data collection, written informed consent was secured from each participant. The study was conducted in accordance with the principles of the Declaration of Helsinki. Participation was entirely voluntary, and all respondents were explicitly informed of their right to withdraw at any time without penalty. Strict measures were implemented to ensure the confidentiality and anonymity of all participants' data throughout the research process.

Data Availability: The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request.

Competing Interests: The authors declare no competing interests.

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Author contributions: OOO and ORO conceptualised the study and designed the methodology. OOO led the investigation, curated the data, and drafted the original manuscript. ORO administered the project and managed resources, while OOO provided supervision and validation of the findings. Both authors (OOO and ORO) contributed to the visualisation, reviewed and edited the manuscript, and approved the final version for submission.

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