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Adherence to referral advice and its associated factors among community drug distributors and caregiver during SMC implementation in nine states

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Abstract

Background Malaria is a global public health problem that disproportionately affects under-five children in poor resource countries. Nigeria accounted for the highest burden of malaria in Western Africa. Thus, seasonal malaria chemoprevention (SMC) programmes have been recommended and have been implemented across 9 states (Bauchi, Borno, FCT, Kebbi, Kogi, Nasarawa, Plateau, Oyo and Sokoto) in Nigeria. The study aims to measure the adherence to referral protocol and its associated factors among community drug distributors (CDs) and caregivers during SMC implementation in nine states.

Methods The data of caregiver-child pairs that were identified with fever during the cycle one SMC implementation was extracted from the End-of-cycle (EoC) surveys carried out following cycles one SMC implementation in the study states. The surveys were completed within two weeks of the completion of SMC cycle one. Mixed-effects multivariable logistic regression models were fitted to explore the factors associated with adherence to referrals among caregivers-child pairs.

Results The socio-demographic characteristics of caregiver considered in the model were not found to be significantly associated with children down with fever taking to hospital for treatment, however the caregiver whose child was referred by CDs had significantly higher odds of seeking healthcare compared to those that were not referred (OR: 1.892, 95% CI 1.081–3.310, p = 0.025). There are higher odds of children seeking treatment among those that were referred by CDs.

Conclusion The study's findings shed light on the adherence to referral advice and the factors influencing caregiver behaviour during SMC implementation. Referral of sick child during SMC campaign appears to ensure health-seeking for malaria case management among caregivers-child peer in target communities.

Keywords Malaria, Seasonal malaria chemoprevention, Referrals, Under 5, Caregivers, Adherence

Background

Malaria continues to pose a significant health burden in Nigeria, particularly among children under the age of five [1–3]. In an effort to combat this disease, seasonal malaria chemoprevention (SMC) programmes have been

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implemented across selected states in Nigeria [4]. These programmes aim to provide preventive anti-malarial treatment to eligible children during the peak transmission season, reducing the incidence and severity of malaria cases [5, 6].

SMC campaign involved the monthly administration of anti-malarial medicines for a period of 4 or 5 months. Sulfadoxine/pyrimethamine plus amodiaquine (SPAQ) is the malaria medicine of choice during the SMC campaign [7, 8]. The campaign target children 3–59 months in eligible communities. During the campaign community drug distributors (CDs) visits to administer SPAQ by directly observed treatments (DOTS) after screening child for eligibility criteria to ensure the child is of the target age group and is not allergic to any of the therapeutic agents in SPAQ. Once the child or infant fulfill all eligibility criteria the CDs will proceed to administer SPAQ [7–9]. The administration is repeated every month for a period of 4 or 5 months [8]. Although the new World Health Organization (WHO) recommendation offers more flexibility in terms of duration, geographical area and age group for the implementation of SMC [10], the campaign is still implemented in Nigeria and other sub-Saharan countries by following the previous WHO recommendations [11].

WHO guideline on implementation of SMC stipulates that community distributors are required to refer feverish child(ren) to nearest health facility where they are tested for malaria using RDT (Rapid Diagnostic Test) [6]. If the test results are negative, children are given SP and first dose of AQ by health facility worker [8]. The remaining 2 doses of AQ should be given to caregiver over the next 2 days. If the results are positive, children are treated for malaria according to national treatment guidelines [12].

To ensure the successful implementation of SMC, a well-functioning referral protocol is crucial [8, 9]. CDs serve as the frontline healthcare providers in this process [8]. They are responsible for identifying and referring children suspected of having fever for further evaluation and appropriate care [8]. As part of their role, CDs are expected to fill a referral form and hand it over to the caregiver. The caregiver, in turn, is expected to take the child to the nearest health facility where SMC is implemented [8]. At the health facility, the designated in-charge conducts a malaria test on the referred child.

Adherence to the referral protocol among CDs plays a vital role in ensuring that children receive the necessary care based on their test results. If the test results indicate a negative malaria diagnosis, the child qualifies to receive SMC as a preventive measure. On the other hand, if the child tests positive for malaria, prompt treatment is initiated to address the infection [8].

A survey conducted in 2010 indicated that a majority of the CHWs reported that they consistently referred febrile children to the health facility for further test and did not give SMC treatment, less than 10 of them had treated febrile children while less than 20 neither referred nor treated the child [13]. Thus, suggesting the practice of referral of sick child or infants for malaria treatment and diagnosis during SMC campaigns.

This manuscript focuses on investigating the factors associated with adherence to the referral advice among CDs and caregiver during the implementation of SMC in nine states of Nigeria. By examining these factors, the aim is to identify the challenges and facilitators that influence adherence to the referral process. Understanding the factors affecting adherence to referral advice is essential for optimizing the effectiveness of SMC programs. This understanding enables the development of targeted strategies and interventions to address the barriers faced by CDs, caregivers, and health facility in-charges throughout the referral pathway.

Methods

Study design and data source

This is a cross-sectional analysis based on comprehensive end-of-cycle 1 household surveys conducted in nine states where SMC was delivered in Nigeria in 2023. The states include; Kogi, Kebbi, Sokoto, Bauchi, Borno, Nasarawa, Oyo, Plateau, and the Federal Capital Territory. Data were extracted from End of Cycle Survey (ECS) conducted after first cycle of SMC implementation. This survey utilized a cross-sectional approach employing Lot Quality Assurance Sampling (LQAS), a method that entails selecting a small random sample from each "lot" of an item or from smaller functional areas known as "Supervision Areas" (SAs). Subsequently, these samples were tested to determine whether they met predetermined quality standards. The survey employed a multi-stage sampling process. In each state, all Local Government Areas (LGAs) where SMC was implemented and wards were chosen. The first stage involved selecting one health facility per ward. The second stage entailed selecting three communities within the catchment area of each selected health facility. Finally, the last stage involved the selection of 25 eligible caregivers from the three chosen communities [11, 12].

The data collector compiled a list of all eligible households with at least one child aged 3–59 months and used a simple random number method to select 8 households in 2 selected communities and 9 households in the last selected community. At the household level, a list of all children under 10 years old was created. From this list, one child aged 3–59 months was randomly selected using the SurveyCTO application, and the caregiver of the selected child was interviewed.

The outcome measure, full caregiver adherence referral advice, was defined as caregiver of identified child with fever visited health facility for treatment; this was operationalized as a binary variable. Variables considered as possible predictors of adherence to referral advice included variables related to socio-demographic characteristics of caregivers, and their awareness and knowledge of SMC. Covariates considered for inclusion in the regression model included Community Distributor (CD) refer the child to the hospital (yes/no), child age (1 year age bands from age 0 to 4 years), caregiver literacy status (based on caregiver self-reports of being able read and write and any language, yes/no), caregiver employment status (unemployed, retired or out of the workforce/paid or unpaid agricultural work/paid or unpaid manual work, skilled manual or service work/clerical, technical, professional and managerial work), caregiver awareness of SMC (yes/no), caregiver knowledge of the purpose of SMC (yes/no), and knowledge of the reason for administration of Day 2 and Day 3 AQ (yes/no). Caregivers were considered to know the purpose of SMC if they spontaneously responded that SMC is intended to protect children from malaria (or similar response).

Study area and population

The Philanthropic funding implemented SMC in nine Nigeria states which include Bauchi, Borno, FCT, Kebbi, Kogi, Nasarawa, Oyo, Plateau and Sokoto (Fig. 1). The cycle 1 ECS sampled 41,100 household and 377 household reported their eligible children had a fever during household visits by CDs. This household constitute analysed sample size.

Sampling and data collection process

Surveys were carried out after the first cycle monthly SMC cycle by independent evaluators using the method described in 2021 and 2022 SMC coverage reports [11, 12]. A multistage cluster sampling technique was used to select households with SMC-eligible children aged 3–59 months. Surveys were intended to achieve a representative sample of the target population of eligible children at country level, state, LGA and supervision area levels [11, 12, 14]. Data were collected using structured questionnaires administered electronically via the SurveyCTO platform.

The outcome of interest was defined as whether the child had sought treatment at a health facility for fever, other variables include if Community Distributor (CD) refer the child to the hospital, caregiver characteristics (age, gender, age, level of education, employment status). The study required a minimum sample size of 310 caregiver-child pairs to be powered to 80%, at the 95% confidence level using a two-tailed test, to estimate the level of adherence of caregiver seeking healthcare for their children suspected of fever during CD visit to the household. This assumed suspected fever cases during CD visit of 20% among children visited by CD, based on evidence from routine programme data [11, 12].

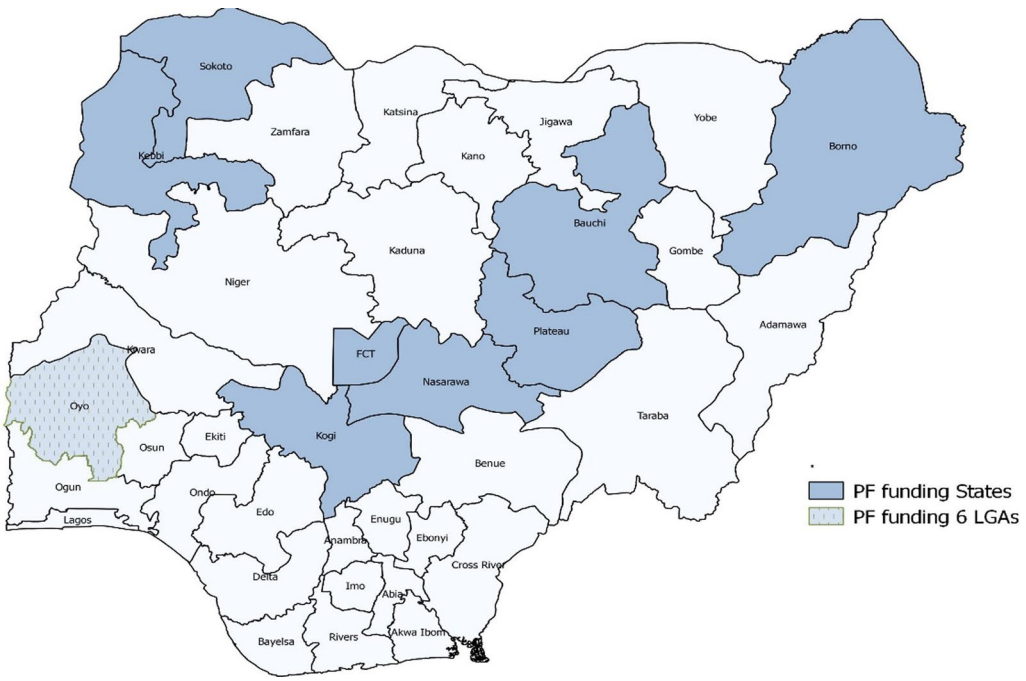

Fig. 1 Map of Nigeria indicating the nine states represented in this study

Statistical analysis

Descriptive statistics were used to summarize the data, by presenting the distributions of independent variables by the outcome variable. The distributions were expressed as frequencies and percentages for categorical variables and means and their standard deviations for continuous variables. Bivariate analyses were used to examine the crude association between each independent variable and children with suspected case of fever who visited the health facility for treatment. Mixed-effects multivariable logistic regression was used to identify predictors of seeking care at the health facility by examining the adjusted association between the outcome variable and through mutual adjustment. Given the hierarchical nature of the data and to account for the clustering effect, a mixed-effects logistic regression approach was used in fitting the model, with random intercepts for cluster units (wards). The variables of interest are the key SMC coverage and quality indicators described in the 2022 SMC implementation report [12]. Measures of association were presented as odds ratios (OR) with their corresponding 95% confidence intervals (CI), with statistical significance considered at $p < 0.05$. We used the Akaike information criterion (AIC) to assess the goodness-of-fit of the model [15]. Data analysis was performed using Stata statistical software (Version 16).

Results

Socio-demographic characteristics of caregivers and adherence to referral advice

Table 1 presents the characteristics of participants and adherence to referral advice: the proportion of children down with fever that was referred by CDs was 45.6, and the proportion of children down with fever and was taken to hospital was 72.4 from the proportion referred by CDs. 77.7 of female caregivers took their child to the HF after referral while only 22.3 of male caregivers did the same after referrals, also about 74.0 of literate women took their children to hospital after a sign of fever, compared to 26.0 illiterate woman. Among women who seek treatment for their children who were down with fever, 54.2 were not currently employed, 86.1 of them heard of SMC.

Caregivers' knowledge of SMC and adherence to referral advice

Table 2 presents the caregiver's knowledge of SMC and adherent to referral advice: among caregivers who did not visit an HF, 24.0% had not heard about SMC compared to 13.9% of those who visited, showing a statistically significant difference. Similarly, 32.9% of non-visiting caregivers did not know the purpose of SMC, while only 17.4% of visiting caregivers lacked this knowledge. Awareness of SMC eligibility was also lower among non-visitors (34.2%) compared to visitors (18.3%). Furthermore, 59.5% of non-visiting caregivers did not know the importance of age eligibility versus 33.2% of visitors. The importance of completing SMC doses was unknown to 44.3% of non-visiting caregivers, while only 23.4% of visiting caregivers were unaware. Confidence in SMC effectiveness was high in both groups, with 91.1% of non-visitors and 93.2% of visitors expressing confidence, showing no significant difference. Lastly, 50.6% of non-visiting caregivers did not know what to do during adverse reactions, compared to 26.8% of visiting caregivers, indicating a significant disparity in this area.

Factors associated with the adherence to referral advice

Figure 2 present results of adjusted odds ratios across various caregiver social-demographic characteristics in the mixed-effects multivariable logistic regression model. The socio-demographic characteristics of caregiver considered in the model were not found to be significantly associated with children down with fever taken to hospital for treatment, however the caregiver whose child was referred by CD had significantly higher odds of seeking healthcare compared to those that were not referred (OR: 1.89, 95% CI 1.08–3.31).

Discussion

The study provides valuable insights into the effectiveness of referral protocols within the context of seasonal malaria chemoprevention (SMC) programmes. The results highlight key findings regarding the proportion of children referred by Community Drug Distributors (CDs), caregiver behavior in seeking medical care for children with fever, and the factors associated with this behavior.

One of the central findings of this study is the referral rate by CDs, with approximately 45.6 of children with fever being referred. This indicates the utilization of the referral system within the SMC program. Furthermore, the encouraging proportion of children (72.4) who were actually taken to the hospital after being referred underscores the importance of effective referral mechanisms in the context of malaria prevention. This is in contrast to the general underutilization of the health care referral systems [16] which is caused by a number of factors ranging from; inadequate knowledge of referral process among health care workers, poor road network and poor awareness of available health facilities [17–19]. Thus, findings from this study suggests that these factors may not be a barrier to referrals within the SMC programme as caregivers participating in the SMC interventions are responsive to the recommendations made by CDs, which is a positive outcome for the programme's objectives.

Table 1 Socio-demography characteristics of participants and adherence to referral advice

Variables	Did not visit HF 104 (%)	Visited HF 273 (%)	Total	p-value
All children with Fever	104 (27.5)	273 (72.4)		
CD filled out Referral Form for				< 0.001
No	77 (74.0)	128 (46.9)	205 (54.4)	
Yes	27 (26.0)	145 (53.1)	172 (45.6)	
Gender of 's primary caregiver				0.20
Female	87 (83.7)	212 (77.7)	299 (79.3)	
Male	17 (16.3)	61 (22.3)	78 (20.7)	
Age of the caregiver				0.74
Under 20 years	6 (5.8)	24 (8.8)	30 (8)	
20–29 years	41 (39.4)	118 (43.2)	159 (42.2)	
30–39 years	46 (44.2)	101 (37.0)	147 (39)	
40–49 years	8 (7.7)	23 (8.4)	31 (8.2)	
50–59 years	2 (1.9)	6 (2.2)	8 (2.1)	
60 or more years	1 (1.0)	1 (0.4)	2 (0.5)	
Caregiver literate				0.011
No	41 (39.4)	71 (26.0)	112 (29.7)	
Yes	63 (60.6)	202 (74.0)	265 (70.3)	
Highest level of education of caregiver				0.057
None	26 (25.0)	103 (37.7)	129 (34.2)	
Informal or religious education	24 (23.1)	42 (15.4)	66 (17.5)	
Primary school	20 (19.2)	48 (17.6)	68 (18)	
Secondary school	31 (29.8)	63 (23.1)	94 (24.9)	
Higher education	3 (2.9)	17 (6.2)	20 (5.3)	
Occupation of the caregiver				0.028
Unemployed	35 (36.8)	142 (54.2)	177 (49.6)	
Agriculture	26 (27.4)	50 (19.1)	76 (21.3)	
Unskilled/Skilled manual work	9 (9.5)	14 (5.3)	23 (6.4)	
Sales/professional work	25 (26.3)	56 (21.4)	81 (22.7)	
Caregiver marital status				0.76
Married/in a partnership	100 (96.2)	260 (95.2)	360 (95.5)	
Single/unpartnered	1 (1.0)	6 (2.2)	7 (1.9)	
Divorced	1 (1.0)	1 (0.4)	2 (0.5)	
Widowed	2 (1.9)	6 (2.2)	8 (2.1)	

A notable disparity emerges when considering the level of education among caregivers. The study reveals that literate women exhibit a significantly higher tendency (74.0) to take their children to the hospital upon the onset of fever, compared to illiterate women (26.0). This stark contrast underscores the critical role of health literacy in healthcare-seeking behaviour. Similarly, studies has shown the association between caregiver health literacy and positive health outcome and behaviours in children, suggesting the importance of caregiver literacy in positive health care seeking of under 5 children [20–22]. Additionally, higher community level literacy have also been found to be associated with more positive childhood health care-seeking behaviours [23]. Therefore, it is imperative to address this disparity by implementing targeted health education initiatives aimed at improving awareness and understanding of healthcare options among illiterate caregivers which may further promote positive health seeking behaviours for under 5 children like completing the referral process during SMC intervention.

Additionally, the study indicates that employment status may influence caregiver behavior. Among women who sought treatment for their children with fever, a majority (54.2) were not currently employed. This suggests that economic factors, such as the ability to take

Table 2 Caregivers' knowledge of SMC and adherence to referral advice

Variables	Did not visit HF 104 (%)	Visited HF 273 (%)	Total	p-value
Caregiver heard about SMC				0.019
No	25 (24.0)	38 (13.9)	63 (16.7)	
Yes	79 (76.0)	235 (86.1)	314 (83.3)	
Caregiver known the purpose of SMC				0.004
No	26 (32.9)	41 (17.4)	67 (21.3)	
Yes	53 (67.1)	194 (82.6)	247 (78.7)	
Caregiver known SMC eligible				0.003
No	27 (34.2)	43 (18.3)	70 (22.3)	
Yes	52 (65.8)	192 (81.7)	244 (77.7)	
Caregiver known important of age eligibility				< 0.001
No	47 (59.5)	78 (33.2)	125 (39.8)	
Yes	32 (40.5)	157 (66.8)	189 (60.2)	
Caregiver known important of completing SMC doses				< 0.001
No	35 (44.3)	55 (23.4)	90 (28.7)	
Yes	44 (55.7)	180 (76.6)	224 (71.3)	
Caregiver confidence in SMC effective				0.54
No	7 (8.9)	16 (6.8)	23 (7.3)	
Yes	72 (91.1)	219 (93.2)	291 (92.7)	
Caregiver known what to do when a child experience adverse reaction				< 0.001
No	40 (50.6)	63 (26.8)	103 (32.8)	
Yes	39 (49.4)	172 (73.2)	211 (67.2)	

time off work, may play a role in healthcare-seeking behavior. The finding aligns with a study of health-seeking behavior in sub-Saharan Africa where working mothers were likely to seek medical care for their children for fever or cough [24]. Alternatively, this may be connected with the literacy or educational levels of the mothers, since working mothers are more likely to be educated [25]. Identifying and addressing economic barriers to seeking healthcare, such as income loss due to seeking medical care, should be considered in programme interventions.

The high levels of awareness and knowledge about SMC among caregivers, as highlighted by the study, are commendable. Eighty six percent having heard of SMC, 82.6 understood its purpose, 81.7 knew the eligibility criteria, 66.8 recognized the importance of age eligibility, and 76.6 understood the importance of completing SMC doses. From the study, it is evident that awareness campaigns and education efforts related to the programme may have been effective. This underscores the importance of ongoing community engagement and health education initiatives to maintain and further improve this level of awareness.

Interestingly, the study found that caregivers' sociodemographic factors were not significant predictors of children seeking healthcare for fever. However, the likelihood of children seeking treatment was significantly higher when CDs referred them. This highlights the pivotal role played by CDs in driving healthcare-seeking behavior and emphasizes the importance of training and capacity-building for these frontline healthcare providers.

In conclusion, the study's findings shed light on the adherence to referral advice and the factors influencing caregiver behavior during SMC implementation. These insights can inform targeted interventions to enhance referral adherence, particularly among illiterate caregivers, and strengthen the SMC programme's impact on malaria prevention in the nine states under study. This

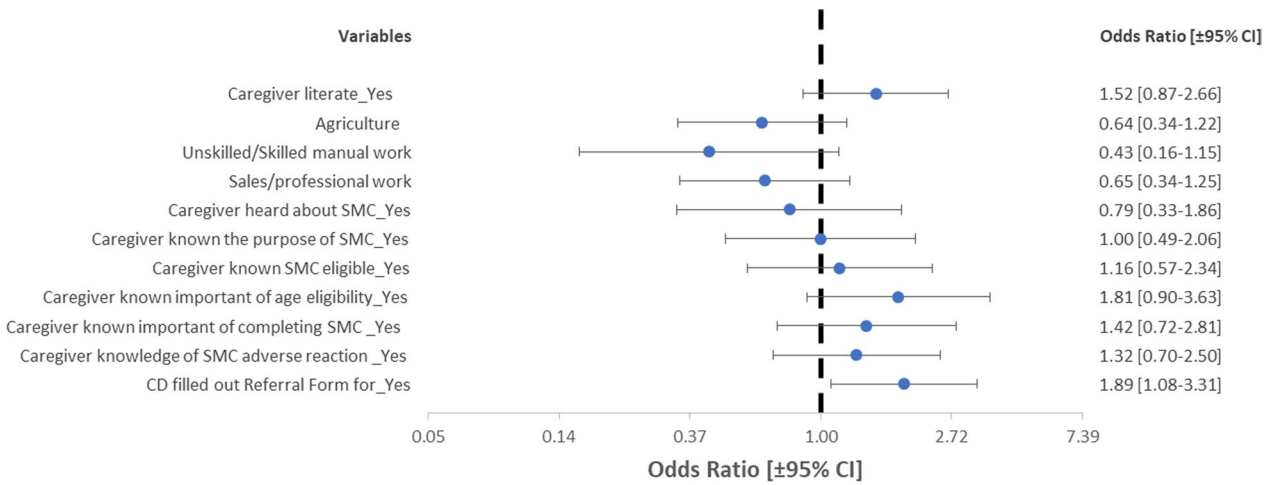

Fig. 2 Forest plot of adjusted odds ratios of factors considered in the multivariable regression model

may include strengthening the referral process by building the capacity of CDs in delivering effective referral messages to caregivers. Effective collaboration between healthcare providers, community distributors, and caregivers remains crucial to achieving the programme's objectives and reducing the burden of malaria in the region. Efforts should focus on further improving health literacy, addressing economic barriers, and supporting community distributors in their vital roles.

Strengths and limitations

Strengths of this study include its use of independent surveys conducted by external investigators not affiliated with SMC programmes, its large analytic sample, and its inclusion of nine states allowing broader view of the study. The nine states included in this study were not selected randomly limiting their usefulness in generalizability to other states. The study is also a secondary data analysis, some useful information which more offer more perspective were not collected for the study. Other limitations include reliance on self-reporting by caregivers, particularly for variables such as caregiver literacy which may have been subject to social desirability bias.

Conclusions

The study emphasizes the potential role of CDs in promoting malaria health-seeking behaviors among caregivers of children eligible for SMC. This suggests the important roles played by the CDs during the SMC campaigns in ensuring malaria case management among children under 5.

Abbreviations

CI	Confidence interval
DOTs	Directly observed therapy
FCT	Federal Capital Territory
KOICA	Korea International Cooperation Agency
LGA	Local Government Area
LQAS	Lot quality assurance sampling
NHREC	National Health Research Ethics Committee
OR	Odd ratio
SMC	Seasonal malaria chemoprevention
SPAQ	Sulfadoxine/Pyrimethamine + Amodiaquine
WHO	World Health Organization

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Author contributions

Taiwo Ibinaiye and Kunle Rotimi co-conceived the study, coordinated data collection, conducted the statistical analyses, and drafted the manuscript. Ayodeji Balogun, Emmanuel Salifu, Benjamin Amao, Emmanuel Musa, Daniel Emeto, Samuel Ayoola, Usman Hussaini, Chibuzo Oguoma, Abdullahi Abdulrazak, Zechariah Maleeks, Kunle Rotimi, Olabisi Ogunmola supported coordination of data collection, writing and reviewed the final manuscript. Chibuzo Oguoma, Kunle Rotimi and Olusola Oresanya reviewed the final manuscript. Kunle Rotimi and Taiwo Ibinaiye co-conceived the study, designed the surveys, prepared the data, and provided overall supervision. All authors approved the final version of the manuscript and contributed substantively to its intellectual content.

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Availability of data and materials

Data employed in this study are available from the authors upon reasonable request.

Declarations

Ethics approval and consent to participate

Ethical approval for the surveys was granted by the National Health Research Ethics Committee in Nigeria (NHREC Approval Number NHREC/01/01/2007-27/06/2023). Data were used in accordance with the NHREC's ethics standards. Informed consent was obtained from all survey participants before data collection.

Consent for publication

Consent participation and publication was received from all participants whose data appears in this study.

Competing interests

The authors declare no competing interests.

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