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Factors associated with the dental service utilization by enrollees on the Lagos State health insurance scheme, Nigeria

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Abstract

Background Despite assumptions that insurance coverage would boost oral healthcare utilization in Nigeria, there is insufficient evidence supporting this claim. This study investigates the associations between residential location, awareness of the oral health insurance scheme, history of dental service utilization, and acceptance of oral health insurance among individuals benefiting from the *Ilera Eko* Scheme; a scheme that integrates preventive and curative oral health care into the state health insurance scheme.

Methods A cross-sectional survey was conducted from July to November 2023 recruiting from a database of 1520 enrollees aged of 18 and 72-years-old who had been on the scheme for at least three months. An interviewer-administered questionnaire was used to collect the data from participants living in five regions of Lagos State. The dependent variable was dental service utilization. The independent variables were awareness about *Ilera Eko* health insurance scheme, history of oral health problem, residential location of the respondents (Lagos Island, Badagry, Epe, Ikorodu and Ikeja), and perception about the scheme. The confounding variables were the age at last birthday, sex at birth (male or female), educational level (no education, primary, secondary, and tertiary education), level of income (< 50,000, 50,000–100,000, 150,000–200,000, > 200,000), employment status (employed, self-employed and unemployed), marital status (single, married, divorced, widow/widower) and duration on the scheme (< 6 months, 6–12 months, > 12 months). A binary logistic regression analysis was conducted to determine the associations between the dependent and independent variables, controlling for confounders.

Results The study recruited 485 participants of which 31 (6.4%) had used the oral health care services. Respondents with oral health problems had higher odds of using the scheme (AOR:21.065; $p < 0.001$). Residents in Ikeja had significantly lower odds of using the scheme when compared with residents in Lagos Island (AOR: 0.174; $p = 0.005$).

Conclusion Respondents with oral health problems had higher odds of using the oral health insurance scheme. Innovative approaches are needed to drive the utilization of free dental service packages on health insurance schemes in Lagos State, especially for preventive care.

Keywords Oral health, Dental healthcare, Insurance, Utilization, Enrollees, Lagos State, Nigeria

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Introduction

Voluntary social health insurance, an alternative health-care financing method, significantly contributes to enhancing equitable access to healthcare services particularly in low and middle-income countries [1–3]. It is a component of the health financing reform mechanism in Nigeria as it generates extra funds for health and expands access to a broader array of benefits for those in formal employment [4, 5]. It also enabled the decentralization of Nigeria's National Health Insurance Scheme due to the numerous challenges it faced such as poor enrolment from the informal sector (self-employed individuals, artisans, traders and unorganized sectors workers) and poor adoption of the scheme by the state governments [4, 6, 7].

Lagos State, one of the 36 states in Nigeria, introduced a social health insurance scheme known as the *Ilera Eko* Insurance Scheme in 2015 in a bid to facilitate access to healthcare for its residents [8]. The scheme offers basic primary and some secondary care services tailored to meet the needs of people working in the formal and informal sector in the state. The primary objective of the scheme is to enhance the quality of care and provide financial risk protection against exorbitant healthcare expenses that could lead to impoverishment or catastrophic outcomes for all residents of Lagos State [8].

Oral health is included in the *Ilera Eko* Insurance Scheme [9]. The *Ilera Eko* scheme operates on a publicly-funded model, where participating healthcare providers deliver essential services and receive reimbursement based on predetermined fees set by the State Government. This ensures that patients receive quality care without incurring additional out-of-pocket expenses [7]. Subscribers to the scheme are able to access preventive oral healthcare counselling, scaling and polishing, tooth extraction, dental X-ray and composite filling with the full cost paid [9]. Access to dental insurance coverage not only enhances the utilization of dental care but also enhances oral health status in high income countries like the United States [10, 11].

Despite the continued allusion that access to insurance coverage for oral health care in Nigeria will increase the use of oral health services [12, 13]. There is little evidence to support this. Oral healthcare utilization in Nigerian facilities is primarily driven by the demand for curative services [14], and oral health service provision is equally focused primarily on treatment and very little consideration is given to the prevention [15]. However, this approach, while addressing existing problems, often falls short of promoting overall quality healthcare, as it neglects the importance of prevention [15]. Yet, regular utilization of oral healthcare services is key to attaining optimal oral health [16]. Therefore, there is a need to understand what facilitates the use of the oral health care

services in Nigeria when there is insurance coverage for oral health care.

The uptake and utilization of free oral health care services may be influenced by various factors, including awareness about the free services, perception of the need for oral health services and the awareness of the insurance benefit package [17]. Patients who have a good understanding of the insurance benefit package are more likely to take up the services [18, 19]. Residential location may also create logistic challenges as distance to available dental facilities may affect its use even when the services are provided for free [20, 21]. Understanding factors that may promote the uptake and use of free oral health care services may help with the institution of programs to drive service uptake, thereby reducing the burden of advanced oral diseases and optimizing healthcare resources [22, 23].

The aim of this study, therefore, was to determine the association between dental service utilization by people who utilize the *Ilera Eko* Insurance Scheme in Lagos State, Nigeria and awareness about the oral health services offered by the scheme, the history of oral health problem, residential location of the respondents, and perception about the scheme.

Methods

Study design and setting

This study was a cross-sectional study that recruited a sample of participants among enrollees of Lagos State Health Management Insurance Scheme, tagged *Ilera Eko*. Lagos State is the State in Nigeria with the highest nominal Gross Domestic Product of USD 102 billion [24]. By the end of 2022, the scheme managed by the Lagos State Health Management Agency (established by the enabling law in 2015), had enrolled over 700,000 residents of Lagos State on the *Ilera Eko* health scheme [25].

Eligibility criteria

The study participants were individuals aged 14 years and above who had been enrolled into the scheme for at least three months and had given consent for study participation. There were no exclusion criteria.

Sample size

The sample size for the study was 460 enrollees in the *Ilera Eko* Scheme. This sample size was determined using the formula by Rachel Webb [26], considering an estimated population 700,000 scheme users, a margin of error of 5%, a confidence interval of 95%, and a response rate 50%.

Sampling procedure

The enrollees in the scheme were obtained from Lagos State Health Management Agency (LASHMA) database and were stratified into five divisions within Lagos State. Study participants were randomly selected from these divisions, with the sample size for each division dependent on the population of enrollees within that divisions.

A sampling frame was created by identifying respondents eligible for participation in the study. A total of 1,520 participants were deemed eligible. The distribution of the sampling frame was as follows: 684 from Ikeja, 304 from Lagos Island, 289 from Ikorodu, 152 from Badagry, and 91 from Epe. A proportionate sample of 460 participants was to be enrolled across the five divisions, with the following breakdown: 207 from Ikeja, 92 from Lagos Island, 87 from Ikorodu, 46 from Badagry, and 28 from Epe.

The names, sex, age at enrollment, and phone number of all eligible individuals were extracted from the database of the health insurance program's database. Eligible study volunteers were contacted by phone calls. Those who indicated interest in study participation were sent the informed consent form through email. Those with email access challenge gave verbal consent. Participants enrollment continued until the sample size for each division was achieved. For study participant who refused to participate, replacements of refusers were selected from the same region of the refuser.

Study instrument

The data was collected using a questionnaire that was developed from the review of literatures that explored patients satisfaction with service delivery and use of health insurance schemes [27–30]. The questionnaire consisted of four sections. Section A contained 10 questions on the participant's socio-demographic characteristics and nine questions on awareness and enrollment in the scheme. Section B contained three questions exploring participants' awareness of the availability of oral and dental care services in the scheme. Section C had six questions that explored the utilization of oral and dental care services under the scheme. Section D had six questions about respondents' perceptions of the oral and dental care services offered by the scheme.

The development of the questionnaire was done through an iterative process among the five team members using the Delphi method. The Delphi method is consensus-building method employed to ensure unbiased input and minimizing the impact of social desirability or power dynamics [31]. The team (ORA, ETA, MT, IE) developed the initial questionnaire. This was shared with 15 experts who were asked to rate the relevance of the questions to the research and provide comments.

Their ratings and comments were used to modify the questionnaire. The updated version of the questionnaire underwent another round of rating and commenting in an iterative process that persisted until a consensus was reached on the content of the study questionnaire. The final questionnaire was pre-tested among 30 enrollees on the *Ilera Eko* health insurance scheme to ensure language and cultural appropriateness of the questionnaire. Feedback was used to further adjust the questionnaire. A copy of the study tool is available as Appendix A. The Cronbach alpha score for the study tool was 0.78.

The experts for the review of the study instrument were members of the Oral Health Initiative Study Group, a team of research experts focused on promoting research on integrated oral health in Nigeria. The experts have diverse disciplines (dental public health, general public health, paediatric dentistry, oral surgery, oral medicines, obstetrics and gynaecology, social sciences, microbiologists), diverse gender (9 females and 5 males), and had experiences with diverse cultural context within and outside Nigeria. The diversity of the disciplines of the experts was to ensure the data collected would ensure a holistic evaluation of clinical and public health oral health services. The diverse gender representation also promotes inclusivity, ensuring that the review captures insights that consider gender-related factors in health-care. Furthermore, their experience across different cultural contexts, both within and outside Nigeria, allows for a more culturally sensitive analysis, which is critical for understanding how cultural norms may influence health behaviors, service accessibility, and the effectiveness of interventions.

Data collection process

A 1-day training was carried out for eight research assistants who were already versed in the conduct of telephone interviews. Research assistants were trained on the study protocol, ethical conduct of research and effective communication skills. The data were collected over a period of three weeks in September 2023, and interviews were conducted through phone calls.

The collected data was uploaded to a secure server and stored encrypted on a European server in accordance with the General Data Protection Regulation 2016/679 (GDPR). All data was stored as de-identified data. The survey was conducted in English, with translations provided in Yoruba or Pidgin when necessary.

Study variables

The dependent variable was dental service utilization. This was measured by the participants response on the use of any dental packages in the scheme. The independent variables were awareness about *Ilera Eko*

health insurance scheme (yes/no), history of oral health problem, residential location of the respondents (Lagos Island, Badagry, Epe, Ikorodu and Ikeja), and perception about the integration of oral health service in the scheme (accepted/not accepted the integration of oral health into the scheme).

The confounding variables were the age at last birthday, sex at birth (male or female), educational level (no education, primary, secondary, and tertiary education), level of income (<50,000, 50,000–100,000, 150,000–200,000, >200,000), employment status (employed, self-employed and unemployed), marital status (single, married, divorced, widow/widower) and duration on the scheme (<6 months, 6–12 months, >12 months).

Statistical analysis

Analyses were performed using the SPSS program (version 23), with a P-value of 0.05 set as the threshold for statistical significance. Univariate analysis was conducted to determine the frequencies, percentages, mean, and standard deviation of the study variables. Study participants were divided into two groups: enrollees who utilized the oral health services provided by the scheme and enrollees who did not utilize the oral health services provided by the scheme. A binary logistic regression analysis was then conducted to determine the associations between the dependent and independent variables, controlling for confounders.

Ethical considerations

Ethical approval for the study was obtained from the Institutional Review Board, Nigerian Institute of Medical Research, Lagos Nigeria (IRB/23/052). Written permission was also obtained from the Lagos State Health Management Agency to use enrollees contact phone numbers. Informed consent was obtained from the participants, their parents and legally authorized representatives in this study. There was no financial reimbursement for study participation.

Results

Of the 1520 enrollees who were contacted, only 485 (31.9%) responded and agreed to participate in the study. Table 1 shows the profile of the 485 participants. Their age ranged from 18 to 72 years with the mean (standard deviation) age of 38.87(\pm 10.319) years. There were 248 (51.1%) females, 362 (74.6%) married participants, 358 (73.8%) with tertiary education, 310 (63.9%) who were employed and 188 (38.8%) participants who earned between 50,001–100,000 NGN (NGN 765 to 1 USD).

In addition, 302(62.3%) accepted the integration of oral health service in the scheme, 410 (84.5%) had no

awareness about the oral healthcare services offered under the scheme, and 31 (6.4%) had accessed oral health care under the scheme. Of the 31 who had accessed oral health care, 17(54.8%) had tooth extraction, 8 (25.8%) used the service for scaling and polishing and 3(9.7%) used the oral care counseling service.

Oral health-related problems

Of the 485 respondents, 164 (33.8%) had one or more dental complaints. Among those with dental complaints, the main complaint was toothache 78(47.5%) as shown in Fig. 1. Figure 1 also shows that of those that had dental complaints, 89(54.3%) did not use dental services because they had no access to dental services, while 53(32.3%) reported high cost of dental services kept them away from utilizing services.

Factors associated with oral health services utilization

Table 2 shows that after adjusting for confounders, enrollees with oral health problems had 21 times higher odds of utilizing the oral health services in the scheme than enrollees without oral health complaints with (AOR:21.065; 95% CI: 5.917–74.987; p <0.001). In addition, enrollees' resident in Ikeja division had significantly lower odds of utilizing oral health services (AOR: 0.174; 95% CI: 0.052–0.589; p =0.005) than those from Lagos Island. The perception about integration of oral health into the health scheme was not significantly associated with dental service utilization (p =0.071) neither was the awareness of the insurance scheme (p =0.645).

Discussion

This study provides additional evidence on the utilization of dental services available within a health insurance scheme in Nigeria. Despite the push for oral health service schemes as an important means for promoting access to oral health care, this study finds that about 1 in 15 persons enrolled on the Lagos State Health Insurance Scheme (*Ilera Eko*) that provides both curative and preventive dental care services, had ever used the dental services despite 1 in 3 people having a history of oral health problems. A history of oral health problems was a factor significantly associated with the use of dental services on the scheme. The residential location was also a factor that significantly increased the use of dental services.

One of the strengths of this study is that it is the one of the few studies that had assessed dental service utilization in a region where there was free access to services in the public health facilities in Nigeria. This study also provides evidence that can be used to strengthen policies and programs to promote access to oral health. The use of a non-probability sampling method

Table 1 Socio-demographic profile of respondents who are registered on the *Ilera Eko* health insurance scheme, Lagos State ($N=485$)

Characteristics	Responses	Frequency n (%) Total = 485
Age	Mean (SD)	38.87(±10.32)
Sex	Female	248(51.1)
	Male	237 (48.9)
Level of education	No education	1 (0.2)
	Primary	9 (1.9)
	Secondary	117 (24.1)
	Tertiary	358 (73.8)
Level of Income	Less than 50,000	118 (24.3)
	50,000—100,000	188(38.8)
	100,001- 150,000	109(22.5)
	150,001 – 200,000	44 (9.1)
	> 200,000	26 (5.4)
Employment Status	Employed	310 (63.9)
	Self-employed	139(28.7)
	Unemployed	36 (7.4)
Marital Status	Single	115 (23.7)
	Married	362 (74.6)
	Divorced	1 (0.2)
	Widow/Widower	7 (1.4)
Awareness about oral health care under scheme	Yes	75(15.6)
	No	410(84.5)
Services accessed on <i>Ilera-Eko</i> since enrolment	Dental care	31 (6.4)
	Eye care	15 (3.1)
	Hospital admission	47 (9.7)
	Maternity Services	43 (8.9)
	Outpatient	202 (41.6)
	Physiotherapy	2 (0.4)
	Surgery	2 (0.4)
	None	143(29.5)
	Do you use any oral healthcare services under <i>Ilera Eko</i> ?	Yes
No		454(93.6)
If you did, for what purpose do you visit the dentist?	Oral health care counseling	3(9.7)
	Scaling and polishing	8(25.8)
	Tooth extraction	17(54.8)
	Dental X-ray	2(6.5)
	Composite filling	1(3.2)
Respondent's residential location	Ikeja	224(46.2)
	Badagry	46(9.5)
	Lagos Island	95(19.6)
	Ikorodu	88(18.1)
	Epe	32(6.6)
Acceptance of the oral health service in the scheme	Yes	302(62.3)
	No	183(37.7)

enhances the generalizability of the study findings to Lagos State. However, this study was a cross-sectional study, and thus, cause-effect relationships cannot be established. In addition, participants who had been

enrolled in the scheme for less than 12 months may also not have had a reason to visit the dental clinic even for preventive dental care. This inadvertently include individuals who have not had sufficient time to utilize

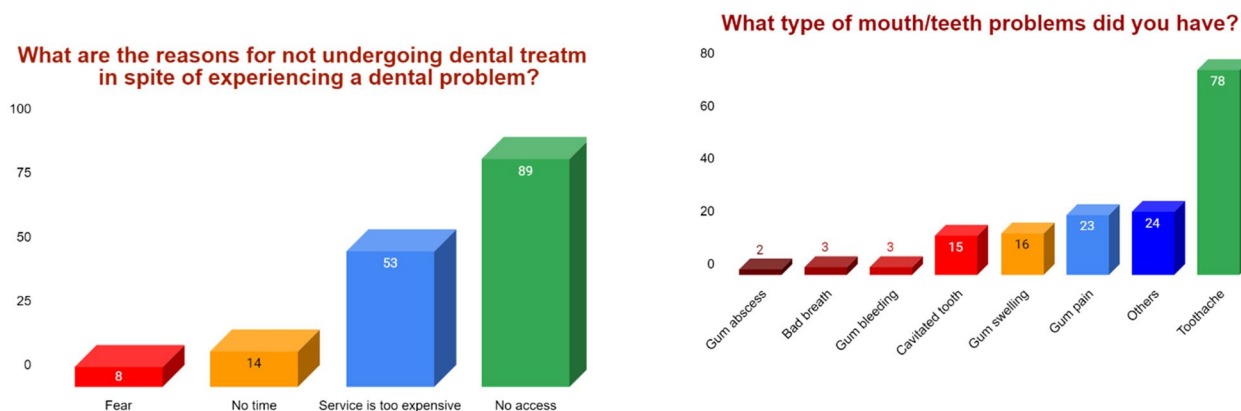


Fig. 1 Dental problems of respondents and reasons for not seeking dental treatment

Table 2 Factors associated with Oral health services utilization on the *Ilera Eko* Health Scheme, Lagos State (N=485)

Variables	Category	Crude OR 95% CI(Lower-Upper)	p-value	Adjusted OR 95% CI(Lower-Upper)	p-value
Geographical Location	Lagos Island	Ref		Ref	
	Badagry	0.154(0.019–1.221)	0.076	0.228 (0.025–2.064)	0.188
	Epe	0.000 (0.000-0.000)	0.998	0.001 (0.000-0.000)	0.998
	Ikorodu	1.309 (0.569–3.008)	<0.001	2.209 (0.840–5.804)	0.108
	Ikeja	0.126 (0.039–0.401)	<0.001	0.174 (0.052–0.589)	0.005
Awareness of the Insurance Scheme	No	Ref		Ref	
	Yes	2.405 (1.061–5.451)	0.036	1.261 (0.470–3.385)	0.645
History of oral health problem	No	Ref		Ref	
	Yes	21.824(6.524–73.001)	<0.001	21.065(5.917–74.987)	<0.001
Acceptance of the oral health service in the scheme	No	Ref		Ref	
	Yes	4.394(1.512–12.768)	0.007	2.936(0.912–9.456)	0.071

the dental services, even for preventive care. This introduces temporal bias to the study. Despite these limitations, the study highlights a few pertinent findings.

Firstly, even when dental services are offered for free, the rate of utilization remains low. This was also observed in Rivers State of Nigeria where only 5.0% of the population had accessed dental care services, despite these services being covered by a health insurance scheme [32]. In Enugu State only 1.9% of respondents utilized the health insurance scheme to pay for dental treatment [13]. The low use of oral health services on the scheme is not reflective of the level of health insurance scheme utilization in these state as usage of schemes for health care ranges from 63.9% in this study to 83.1% in River State [32]. In Iran, usage of the oral health insurance scheme is as high as 54.1% [33].

A few reasons can be deduced from this. Firstly, the many individuals remain unaware of the dental services offered under the scheme. Several reasons can explain

the lack of engagement with dental services under the scheme. A significant number of individuals remain unaware of the available dental services, leading to underutilization. In many cases, people may not know that they are eligible for dental care through the scheme or how to access it as indicated by the number of people who needed oral health care but consider finance as a limiting factor for service access. In addition, there may be a general lack of emphasis on oral health in public health campaigns, resulting in a lower priority placed on dental care by individuals, which may contribute to low engagement. Furthermore, cultural factors and misconceptions about dental care can play a role making people may only seek dental services in cases of severe pain or emergency, neglecting preventive care. This reactive approach, combined with limited awareness about the oral health scheme, means that individuals do not take full advantage of the services provided under the scheme. Finally, logistical barriers such as accessibility to dental clinics,

long waiting times, and cost considerations—even if partially covered—can further deter people from utilizing the dental services.

The prevalence of oral diseases in Nigeria is also low, one of the lowest in Africa [34]. In Africa, the country has the 7th lowest percentage change in untreated dental caries in primary dentition and the 20th lowest percentage change in untreated dental caries in permanent dentition between 1990 and 2017. However, it ranks 11th highest in the percentage change in the prevalence of severe periodontitis during the same period. Overall, the country is ranked 20th among African nations with the lowest percentage change in the prevalence of oral diseases from 1990 to 2017 [34]. For a population who seeks oral health care primarily for curative purposes [14], the use of the oral healthcare services could, therefore, be low. Promoting the uptake and utilization of preventive oral health care services is crucial, especially when this need is emphasized for overall health care purposes [35, 36]. Oral healthcare access can be promoted through outreach services that facilitates access to services outside the clinic. Members of the African community are more suited to receiving community-based rather than facility-based care [37]. Outreach services can also help to increase awareness about the scheme [38], although in the current study awareness about the scheme was not associated with dental service utilization. This suggests that additional factors such as perceived need, accessibility, and cultural attitudes toward oral health, may play a more significant role in driving oral health service uptake in this community [39, 40]. It highlights the need for a multifaceted approach that goes beyond awareness to address underlying barriers to utilization. Furthermore, most of the enrollees on the scheme are young people, with tertiary education and employed, and may be able to afford basic dental care services without health insurance. Studies are needed to explore these postulations about reasons for the poor utilization of dental health insurance schemes.

Second, enrollees residing in Ikeja division seem less likely to utilize dental care services than those residing in Lagos Island. For this study, residential location was used as a proxy to determine if geographical access to dental facilities influenced the utilization of oral health services. Geographical access can be influenced by factors such as distance to the nearest facility, availability of transportation, infrastructure quality, and the concentration of dental care providers the area [41]. Lagos Island is more urbanized than the Ikeja division, characterized by a higher density of commercial activities and infrastructure. Ikeja is considered a highbrow area with a higher

income profile and with easier access to private and primary, secondary and tertiary oral health care services compared to Badagry, Epe and Ikorodu. There is, therefore, no obvious reason why the use of dental services in Ikeja should be significantly less than Lagos Island when other poorer regions in Lagos state showed no significant difference. The finding needs to be explored further.

Poor perceptions of oral health as a threat can contribute to low uptake of oral health services. When the perceived threat is low, individuals tend to disregard it and take no preventive measures. On the other hand, when efficacy is low or nonexistent, even if individuals recognize the threat of dental disease, they may engage in behaviors aimed at reducing their fear, rather than addressing the actual risk of the disease itself [42]. In many communities like Nigeria, oral health is often deprioritized compared to other aspects of physical health, with dental visits seen as necessary only in emergency situations, such as pain or infection [43]. Preventive care, which could be covered under the insurance scheme, is often overlooked, leading to underutilization of the services available. Despite these possibilities, the current study did not find an association between the perception of participants with respect to acceptance of the oral health service in the scheme, and dental service utilization.

The study findings elicit that providing oral health insurance scheme does not automatically translate to increased uptake in oral care services in Lagos state. This underscores the complexity of health behavior and the multiple factors that influence whether individuals utilize available healthcare services. Contributory factors to the poor uptake of oral care services in Lagos state may be a lack of awareness and understanding about the insurance scheme itself. If people are unaware of the services covered by the scheme or do not understand how to access them, they are less likely to seek out oral care, regardless of their eligibility [7]. In addition, logistical and infrastructural challenges such as the availability of dental clinics, transportation barriers, long waiting times, or inadequate healthcare personnel, could limit access to services even for those covered under the scheme [44]. For many in rural or underserved areas, access to oral care providers may be difficult [44], reducing their ability to take advantage of the scheme's benefits. Furthermore, socioeconomic factors like co-payment requirements or hidden costs associated with dental care, even when insured, can still be deterrents for people with limited financial resources. Therefore, financial barriers may persist despite the existence of an insurance scheme.

The findings of this study should be regarded as preliminary, as further investigation is needed to understand the underlying reasons for the results and to identify ways to remove barriers to oral health care utilization for those in need. In addition, efforts to encourage the use of oral health services for preventive care should be prioritized. Future research should also assess the role of cultural factors as potential barriers and explore how these can be leveraged to promote the use of dental services for both preventive and curative care. In addition, for a country where the prevalence of dental caries is low and where the need for preventive care services is high [45], innovative strategic approaches are needed to drive the uptake of preventive oral health care. Civil society organizations can drive such innovative behavior change engagement with community members. The engagement of civil society organizations with oral health advocacy in Nigeria is currently low and may be a potential area to explore in making a difference with population use of oral care services and driving up the use of health insurance. Future research can explore this further.

Conclusions

This study reveals that only a small proportion of enrollees in an insurance health scheme that offers access to preventive, primary, and secondary oral health care have utilized dental services, despite nearly one-third of respondents reporting a history of oral health problems. Among those who did access oral healthcare services through *Ilera Eko*, the focus was primarily on curative procedures, such as tooth extraction. While a history of oral health problems was a significant factor associated with the utilization of the scheme, over half of the participants with such issues did not seek care. Geographical residential location was also associated with dental service utilization by respondents on the health scheme. The findings from this study challenge the assumption that free access to dental services through health insurance translates to increased dental service utilization. The discrepancy in uptake of the scheme between residents in Ikeja and Lagos Island warrants further exploration.

Abbreviations

IRB	Institutional Review Board
GDPR	General Data Protection Regulation
NGN	Nigerian Naira
USD	United States Dollar

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12913-024-12177-4>.

Supplementary Material 1.

Acknowledgements

Not applicable.

Declarations

This study was conducted according to the World Medical Association Declaration of Helsinki. Ethical approval for the study was obtained from the Institutional Review Board, Nigerian Institute of Medical Research, Lagos Nigeria (IRB/23/052). Informed consent has been obtained from the participants, their parents and legally authorized representatives in this study.

Authors' contributions

ORA: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Visualization, Writing-original draft, Resources Writing- review & editing; ETA: Conceptualization, Methodology, Project administration, Supervision, Writing- review & editing, Writing-original draft; IE: Project administration, Supervision, Writing- review & editing; MT: Data curation, Formal analysis, investigation, Methodology, Project administration; CE: Data curation, Investigation, Methodology; IO: Data curation, Investigation, Methodology, Resources; EZ: Project administration, Writing – review & editing, Validation; TG: Data curation, Methodology, Project administration, Supervision, Visualization, Writing-original draft, Resources, Writing- review & editing; FT: Data curation, Formal analysis, investigation, Methodology, Project administration, Supervision, Visualization, Validation, Resources, Writing- review & editing; GE: Investigation, Validation, Visualization, Writing – review & editing; ME: Data curation, Methodology, Investigation, Validation, Visualization, Writing – review & editing; OE: Data curation, Investigation, Validation, Visualization, Writing – review & editing; MOF: Data curation, Methodology, Investigation, Validation, Visualization, Writing – review & editing. All authors made intellectual contributions, read and approved the published version of the manuscript.

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Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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