

Evaluation of Patients' Knowledge and Acceptance of Dental Implants as a Treatment Option for Replacing Missing Teeth: A Multi-Centre Survey

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Abstract

Objectives: To evaluate the level of knowledge, source of information and level of acceptance in the use of dental implants among dental patients in replacement of missing tooth in two selected tertiary hospitals in South-West of Nigeria. **Methodology:** This was a descriptive cross-sectional study. A standardized, self-explanatory questionnaires were given to patients who presented at restorative clinics in the tertiary hospitals for the replacements of their missing teeth. Data were analyzed using frequencies and percentages for descriptive statistics. Binary logistic regression analysis was used to determine the factors associated with knowledge of dental implants; $p < 0.05$ was considered statistically significant for all the tests. **Results:** A total number of 201 participants were included in the study. More than half of participants had poor knowledge of tooth replacement methods and majority had poor knowledge of dental implants (80.6%). The majority of participants attained their information about dental implants from dentists (46.3%) as well as their knowledge of other prostheses (40.8%). Most (58.7%) considered dental implants as best treatment of choice. With increasing age, there were less odds of having good knowledge of dental implants (aOR = 0.963; CI = 0.932 - 0.994), Good knowledge of tooth replacement option increased the odds of having good knowledge of dental implants by 8 times (aOR = 7.858; CI = 3.011 - 20.510). **Conclusion:**

There is lack of knowledge about dental implants in this part of the world and the majority had their source of information about implants from dentists. Most of the participants considered implants as the best treatment of choice and they are willing to know more about implants.

Keywords

Evaluation, Knowledge, Dental Implants, Treatment Option, Tooth Replacement, Nigeria

1. Introduction

The teeth play numerous functional roles such as mastication and speech, and aesthetic which contribute to good appearance of someone. Missing teeth can be replaced by the means of removable prosthesis, fixed partial prosthesis and dental implants. Replacement of the missing teeth has helped in the improvements in mastication, speech and appearance of patients, which gives a good quality of life. Traditionally, missing teeth are replaced by removable partial dentures, fixed partial dentures (bridges) and complete dentures in complete edentulousness [1]. However, there has been a prompt exploration and advancement in the field of dental implants, particularly in advanced countries due to urgent need of tooth replacement with a near-natural successor [1].

There has been improved self-confidence and quality of life of patients by giving them masticatory comfort and a high level of satisfaction from implant-supported prosthesis [2]. These days, dental implants can be considered the treatment of choice from the viewpoint of occlusal support, preservation of adjacent teeth, and avoidance of a removable partial denture [3]. Presently, dental implants are widely acknowledged as a prosthetic treatment of completely or partially edentulous patients [2]. Recent systematic reviews have further emphasized the importance of patient-reported outcomes in implant dentistry, hereby concluded that implant therapy consistently improves patients' satisfaction with chewing ability, speech, comfort, esthetics, and overall quality of life [4]. There is a widespread acceptance and popularity of dental implants among the dental practitioners [5]. Regrettably, the same cannot be said of developing countries with poorer access to dental care [1].

The level of awareness of dental implant treatment varies among several studies in different countries. In a survey by Gupta *et al.* [6], the level of awareness about implants/implant reconstructions among the participants was very low (4.27%), however, a survey in an Indian metropolitan population recorded 53.6% level of awareness [7], in a Turkish study patients' implant awareness rate was 43.5% [8]. Some studies were carried out some years back in Nigeria regarding awareness of dental implants; only 28.9% of the participants had heard about implant as an option for replacing missing teeth in one of the studies [1] and 39.8% of the respondents have knowledge of dental implants as tooth replacement option in another study [9].

Previous studies have shown that high cost of dental implant is the main limiting factor in the acceptance of dental implants as the treatment option in which the participants expressed that the treatment was expensive and non-affordable; this was the major factor against the willingness of patients to go through this treatment [1] [5] [7] [10].

Adequate information on the use of dental implants as a treatment option and other prostheses for tooth replacement should be made reachable to guide patients properly in choosing the most appropriate option. This inadequate information is more significant in developing nations where there is lack of education and awareness amongst people about dental implants as treatment modality for replacing missing tooth [10].

Although a few studies have previously assessed the awareness of dental implants among dental patients in Nigeria, these studies were conducted several years ago and may no longer reflect current patient knowledge, attitudes, and treatment preferences in a rapidly evolving healthcare environment [1] [9]. The widespread adoption of the internet and social media has transformed how patients access and share oral health information, with digital platforms increasingly influencing public awareness, perceptions, and decision-making regarding dental implant treatment [11]. Furthermore, knowledge of dental implants does not necessarily translate into acceptance of implant therapy, as patients' decisions are influenced by multiple factors including treatment cost, perceived surgical risks, educational level, cultural beliefs, and confidence in available information [12].

Consequently, there is a need for updated, multi-centre evidence to determine the current level of patients' knowledge and acceptance of dental implants in Nigeria. Such evidence will help identify existing knowledge gaps, evaluate changes in awareness over time, and inform targeted patient education and policy initiatives aimed at improving informed decision-making and the uptake of implant therapy where appropriate. Therefore, the purpose of this study is to evaluate the level of knowledge and level of acceptance in the use of dental implants among dental patients in the replacement of missing tooth.

2. Materials and Methods

2.1. Study Design

This was a descriptive-based cross-sectional study to evaluate the level of knowledge, source of information and level of acceptance in the use of dental implants among dental patients in the replacement of missing tooth in two tertiary hospitals in South-West of Nigeria: Lagos State University Teaching Hospital, Ikeja and Federal Medical Centre, Ebute-Metta.

2.2. Study Population

The population selected for this study were patients that presented at Restorative clinics for the replacements of their missing teeth at Lagos State University Teaching Hospital, Ikeja (n = 109) and Federal Medical Centre, Ebute-Metta (n = 92).

Inclusion criteria

Patients aged 18 years or older with missing tooth/teeth and gave their consent to participate in the study were included in the study.

Exclusion criteria

Patients who were below 18 years or those with cognitive disorders/difficulty in hearing or speaking were excluded.

2.3. Sample Size Determination

$$n = Z^2 \frac{P(1-P)}{d^2}$$

where;

n = Sample size;

Z = Statistic for a level of significance at 95% confidence interval = 1.96;

P = Expected prevalence or proportion (84.6% = 0.846) [1];

d = Level of precision (5% = 0.05).

Therefore;

$$n = \frac{1.96^2 \times 0.846 \times (1 - 0.846)}{(0.05)^2}$$

$$n = \frac{3.842 \times 0.846 \times 0.154}{0.0025}$$

n = 200.22 giving approximately 200.

2.4. Data Collection Tools and Collection Technique

Ethical approval was obtained from the Health Research and Ethics Committee of Lagos State University Teaching Hospital (LREC/06/10/2451).

A self-explanatory questionnaire was administered to patients who presented at Restorative clinics for the replacements of their missing teeth using convenience sampling method. The questionnaire was adapted from a previous study performed by Al-Johany *et al.* [5]. The questionnaire was again validated by ten subject experts that also served as pretest and were not included in the study for understanding, logic, and grammar. Cronbach's alpha reliability for knowledge of implants was 0.72 and 0.52 for knowledge of tooth replacement options which can be considered acceptable due to the low number of items on the scale (<10) according to Hinton PR *et al.* [13]. After selection of participants in accordance to the inclusion criteria, a written consent was administered. Among the 220 patients, a total number of 201 agreed to participate in the study. The research was conducted for a period of 6 months, but participants were only required during the duration of filling the questionnaire and they were assisted by dentist in the patient's understandable language in filling the questionnaires to prevent errors.

The questionnaire was in five sections. The first section comprised of socio-demographic characteristics of the participants, the second section, level of information about option of replacing missing teeth and the third section, level of

knowledge about dental implant. The fourth section included source of information regarding dental implants and other prostheses, while the fifth section, level of acceptance of dental implants among patients.

A set of 3 questions testing for knowledge of tooth replacement options, and 4 testing for knowledge of dental implants were used. A scoring system was developed with each correct answer earning 1 mark and each incorrect answer earning 0 marks, participants that scored 2 out of 3 and above were graded good knowledge of tooth replacement options while those who scored 2 out of 4 and above were graded good knowledge of dental implants.

2.5. Data Analysis

Data were entered into IBM SPSS 27 software and analyzed using frequencies and percentages in tables and charts for descriptive statistics such as socio-demographics, responses to knowledge of tooth replacement options, knowledge of dental implants, source of information and acceptance of dental implants.

Binary logistic regression analysis was then used to determine the factors associated with knowledge of dental implants; $p < 0.05$ was considered statistically significant for all the tests. The predictors in the model were selected using the Hosmer-Lemeshow purposeful selection algorithm with an initial univariate screening ($p < 0.25$), model testing with backward elimination and checking for confounders while retaining conceptually relevant predictors [14]. Sparse categories (<10) such as educational level, ... and were collapsed into conceptually similar categories to avoid model instability.

3. Results

The study was performed amongst a group of 201 patients who had missing teeth visiting LASUTH and FMC Ebute-metta dental clinics. The mean age was 51.33 ± 15.808 with more than half of the participants being females (57.2%) and mostly married (55.7%). The majority of participants were employed (40.8%), most having tertiary level of education (75.6%). Greater than half of the participants were from the Yoruba Tribe (60.7%). About half the participants had lost one or more teeth for more than 10 years (49.8%), most of which were posterior teeth (71.1%). The most common cause of tooth loss was dental caries (54.7%) (Table 1).

The majority of participants were familiar with removable dentures (72.6%). Less than half of the participants knew about dental implants (48.3%), and even fewer knew about fixed partial dentures (31.8%) (Table 2). More than half of the participants had poor knowledge of tooth replacement methods (54.7%) (Figure 1).

The majority of participants (54.7%) did not know where dental implants were placed, 21.9% thought it was placed in the gum. About two-thirds of the participants (72.6%) were unaware about how long dental implants last, 11.4% of the participants thought it could last for more than 20 years. The majority of partici-

pants also did not know why implants fail (63.2%), 13.4% considered failure might be due to the implant type and quality. The majority of participants did not know about maintenance of dental implants (48.8%), 26.9% considered that it requires more care than normal teeth (**Table 2**). The vast majority of participants had poor knowledge of dental implants (80.6%) (**Figure 2**).

Table 1. Sociodemographic characteristics & history of tooth loss.

Variable	Frequency (n = 201)	Percentage (%)
Mean Age $\pm$ SD	51.33 $\pm$ 15.808	
Gender	Male	86
	Female	115
Marital Status	Single	50
	Married	112
	Widowed	31
	Separated	3
	Divorced	5
		2.5
Occupational Status	Unemployed	18
	Employed	82
	Retired	37
	Self employed	64
Level of Education	No formal education	8
	Primary	7
	Secondary	34
	Tertiary	152
Ethnicity	Yoruba	122
	Igbo	60
	Others	19
Duration of Tooth loss	Less than 1 year	17
	1 - 5 years	39
	6 - 10 years	45
	>10 years	100
Tooth Location	Anterior	36
	Posterior	143
	Both	22
Cause of Loss	Hole in my tooth	110
	Mobile tooth	41
	Trauma	38
	Cannot remember	12

Table 2. Knowledge of tooth replacement options and dental implants.

Variables		Frequency (n = 201)	Percent (%)
KNOWLEDGE OF TOOTH REPLACEMENT OPTIONS			
Removable dentures	no	55	27.4
	yes	146	72.6
Fixed partial dentures	no	137	68.2
	yes	64	31.8
Dental implants	no	104	51.7
	yes	97	48.3
KNOWLEDGE OF DENTAL IMPLANTS			
Where Implants are Placed	Gum	44	21.9
	Jawbone	43	21.4
	Neighboring teeth	4	2.0
	I don't know	110	54.7
How Long Implants Last	<5 years	7	3.5
	5 - 10 years	11	5.5
	Up to 20 years	14	7.0
	>20 years	23	11.4
	I don't know	146	72.6
Why Implants Fail	Due to patients	5	2.5
	Incompetence	24	11.9
	Poor oral hygiene	18	9.0
	Implant type and Quality	27	13.4
	I don't know	127	63.2
Maintenance of Implants	Cleaned similar to Normal teeth	49	24.4
	Needs more care than normal teeth	54	26.9
	Needs less care than Natural teeth	0	0.0
	I don't know	98	48.8

The majority of participants attained their knowledge of dental implants from dentists (46.3%) as well as their knowledge of other prostheses (40.8%). Although the level of knowledge of dental implants amongst the participants was low, the vast majority of them were willing to learn (86.1%), their preferred source of information being a dentist (59.2%) followed by the Internet (22.4%) (**Table 3**). The

majority of participants (70.6%) preferred fixed prostheses to removable ones, most (58.7%) considered dental implants as the best treatment of choice. The most common reason given for the preference of fixed prostheses was comfort (37.3%) closely followed by natural appearance (33.8%). The main concern with dental implants was high cost (39.8%) followed by the fear of surgery (30.3%) (**Table 4**).

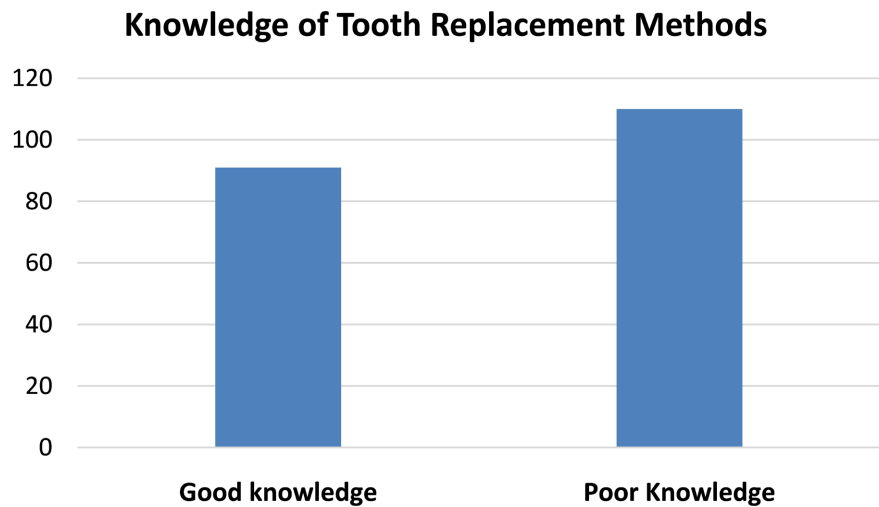


Figure 1. Knowledge of tooth replacement methods.

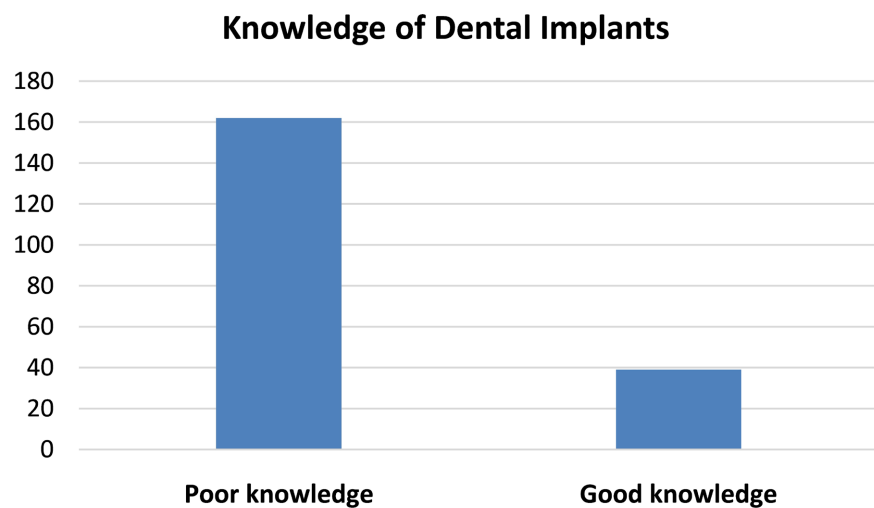


Figure 2. Knowledge of dental implants.

Binary Logistic regression analysis on various factors affecting knowledge of dental implants, age and knowledge of tooth replacement options were significantly associated with good knowledge of dental implants. With increasing age, there were lesser odds of having good knowledge of dental implants (aOR = 0.963; CI = 0.932 - 0.994), Good knowledge of tooth replacement option increased the odds of having good knowledge of dental implants by 8 times (aOR = 7.858; CI = 3.011 - 20.510) (**Table 5**).

Table 3. Source of information of dental implants.

Variables		Frequency (n = 201)	Percent (%)
Source of Information of Dental Implants*	relatives and friends	42	20.9
	Internet	39	19.4
	Radio and television	3	1.5
	Advertising	1	0.5
	Newspaper and magazine	2	1.0
	Dentist	93	46.3
	Others	21	10.4
Source Information regarding other prosthesis*	Relatives and friends	43	21.4
	Internet	47	23.4
	Radio and television	6	3.0
	Advertising	4	2.0
	Newspaper and magazine	0	0.0
	Dentist	82	40.8
	Others	19	9.5
Willingness to know (Implants)	Yes	173	86.1
	No	28	13.9
Preferred source of info (Implants)*	Relatives and friends	10	5.0
	Internet	45	22.4
	Radio and television	5	2.5
	Advertising	1	0.5
	Newspaper and magazine	0	0.0
	Dentist	119	59.2
	Others	6	3.0
	Not interested	15	7.5

Multiple Response*.

Table 4. Level of acceptance of dental implant.

Variables		Frequency (n = 201)	Percent (%)
Best Treatment of Choice	Dental implants	118	58.7
	Fixed partial dentures	39	19.4
	Removable prosthesis	44	21.9
Which Is Better	Fixed prosthesis	142	70.6
	Removable prosthesis	59	29.4

Continued

If Fixed Was Chosen, Why (n = 142)	More comfortable feeling	53	37.3
	Looks more natural	48	33.8
	Better chewing efficiency	21	14.8
	Better phonetics	20	14.1
Main Concern with Implants	High cost	80	39.8
	Long treatment time	17	8.5
	Fear of surgery	61	30.3
	Lack of knowledge	34	16.9
	Fear of foreign object in jaw	9	4.5

Table 5. Binary logistic regression analysis of predictors of knowledge of dental implants predicted probability is for good knowledge of implants.

Predictor variables	B	S.E	Wald	p-value	OR	CI (lower)	CI (upper)
AGE	-0.038	0.016	5.500	0.019	0.963	0.932	0.994
GENDER							
							Reference = Female
Male	-0.564	0.472	1.424	0.233	0.569	0.226	1.436
MARITAL STATUS							
							Reference = Unmarried
Married	0.022	0.476	0.002	0.963	1.022	0.402	2.599
EDUCATIONAL LEVEL							
							Reference = Tertiary Education
No Tertiary Education	-0.720	0.641	1.261	0.261	0.487	0.138	1.710
OCCUPATION							
							Reference = Unemployed
Employed	-0.943	0.482	3.829	0.050	0.389	0.151	1.002
TOOTH LOCATION							
							Reference = Both
Anterior	0.517	0.891	0.337	0.562	1.677	0.293	9.611
Posterior	0.063	0.822	0.006	0.939	1.065	0.213	5.338
DURATION OF TOOTH LOSS							
							Reference 10 years
<1 year	0.414	0.934	0.197	0.657	1.513	0.243	9.436
1 - 5 years	0.605	0.533	1.289	0.256	1.832	0.644	5.209
6 - 10 years	0.398	0.586	0.461	0.0497	1.489	0.472	4.695
ACCEPTANCE							
							Reference = Others
Dental Implant	0.461	0.453	1.036	0.309	1.586	0.653	3.854
KNOWLEDGE OF TOOTH REPLACEMENT OPTIONS							
							Reference = Poor Knowledge
Good Knowledge	2.062	0.489	17.741	<0.001	7.858	3.011	20.510

B: Regression coefficient, Wald: Wald test, S.E: Standard error, OR: Odds ratio, CI: Confidence interval.

4. Discussion

The introduction of dental implants as a recognized treatment option has led to a major shift in dental practices. There has been an increase in the acceptance and popularity of dental implants over the years due to their long-term effectiveness and higher patient satisfaction especially in the developed countries. However, this cross-sectional study evaluated the level of knowledge, source of information and level of acceptance in the use of dental implants for replacement of missing tooth among patients visiting tertiary Dental facilities in South-west Nigeria.

The present study showed that less than half of the participants (48.3%) knew about dental implants as tooth replacement option and more than half of the participants (54.7%) had poor knowledge of tooth replacement methods. A similar survey in an Indian Metropolitan population, (53.6%) participants were aware about dental implants as a treatment option [7], while a study by Gupta *et al.* showed that most of their patients had a good knowledge of tooth replacement options, contrast to our study [6]. This disparity in knowledge of tooth replacement options and dental implant between the two populations may be due to the difference in exposure and development.

Majority of the participants didn't know where implants are placed, how long implants can last for, why implants fail and maintenance of implants in the mouth. However, in this study, only 19.4% of the participants had good knowledge about dental implant which can be attributed to lower socioeconomic status compared to the developed countries. The level of knowledge or awareness of dental implant varies among different countries based on their socioeconomic status and educational level. For instance, studies conducted in Austria, the United States and Saudi Arabia reported the awareness level as: 71%, 77% and 66.4% respectively [5] [15] [16]. Moreover, poor knowledge of implant as tooth replacement option may not be unconnected to the somewhat low level of implant dentistry practice in our environment, although efforts are being made by the dentists to raise patient awareness regarding the use of implant-retained prostheses as a tooth replacement option.

In this present study, dentists were the major source of information (46.3%) regarding dental implants followed by family and friends, then internet/social media, which is consistent with other studies revealing that dentists were the major source of information [1] [6] [17]. This could be due to the fact that most of the patients that patronize tertiary hospitals rely on professionals such as dentists, on their source of information. This is in contrast to a survey done in Japan; more than 50% of the participants obtained information regarding dental implants through magazines and books which has raised a public concern about treatment safety and success because magazines and various mass media sources are more inclined to report on malpractice or severe failures related to implants [18]. It's a known fact that source of information can play an important role in the knowledge and acceptance of patients in implant treatment. Some studies showed that media and friends were their main source of information which is inconsistent with our

study [2] [4] [16] [19] [20].

In this study, majority of the participants (86.1%) are willing to know about implants and their preferred source of information is from the dentists (59.2%), which was similarly found in previous studies [6] [21] [22]. This might be due to the fact that they trusted any information that would come from a professional because they would be rightly informed. Misconception regarding dental implant has been attributed to information from social media [18].

Despite their poor knowledge about dental implant, more than half of the participants (58.7%) still chose dental implants as their best treatment of choice. The reasons for their choice were: implants had a more comfortable feeling and looks more natural, but their main concerns with dental implant are: high cost and fear of surgery. Previous studies noted that the most prevalent factors deterring individuals from opting for implant treatment were the high costs, the lengthy process, and the fear associated with surgical procedures [1] [6] [17].

This survey showed that age and knowledge of tooth replacement options were significantly associated with good knowledge of dental implants. With increasing age of the participants, they had lesser chance of having good knowledge of dental implants (aOR = 0.963; CI = 0.932 - 0.994); this might be as a result of the younger participants having access to internets, social media and they are more interested in their appearances and oral functions, thereby visiting dentists more often, in return getting more information from them. Although, a study proved that there was no correlation between age and information deficit, however, age does not significantly influence the knowledge level concerning dental implants [23].

This study revealed that with good knowledge of tooth replacement options, there were 8 times higher chances of having good knowledge of dental implants (aOR = 7.858; CI = 3.011 - 20.510). This report is buttressed by some other findings in this study stating that more than half of the participants had poor knowledge of tooth replacement options and majority had poor knowledge of dental implants. Knowledge of tooth replacement options positively influences the decision-making of patients to choose a suitable, permanent options like dental implant that can improve the quality of life by giving them masticatory comfort and a high level of satisfaction irrespective of the high cost [2].

The limitation of this study was limited sample population in which two tertiary hospitals were surveyed. Further research can be done to confirm the findings of this present study in the other tertiary hospitals in geopolitical zones of Nigeria.

5. Conclusion and Recommendation

Within the limitation of this study, it can be concluded that there is lack of knowledge about dental implants in the population of study and majority had their source of information about implants from dentists. Most of the participants considered implants as the best treatment of choice and they are willing to know more about this implant. Dentists need to educate their patients more about dental implants and also necessary for healthcare providers to be aware of the essential prin-

ciples of oral implantology. A further study with a larger population and sample is recommended for better generalizability of the study.

Ethics Approval

Health Research and Ethics Committee of Lagos State University Teaching Hospital (LREC/06/10/2451).

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Authors' Contributions

TOO: Conceptualization, Writing - Original Draft, Investigation, Methodology, Resources, and Supervision.

GEA: Conceptualization, Investigation, Writing - Review and Editing and Project Administration.

MOB: Writing - Review and Editing, Data curation, Review and Editing, Visualization.

OO: Methodology, Investigation, Formal Analysis and Software.

CE: Writing - Review and Editing and Validation.

NUI: Writing - Review and Editing and Supervision.

Conflicts of Interest

There are no conflicts of interest declared by the authors.

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