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Awareness and Adherence to COVID-19 Preventive Measures among Oral Health Care Workers in Nigeria

Sensibilisation et Adhésion aux Mesures Préventives COVID-19 Parmi les Travailleurs de la Santé Bucco-Dentaire au Nigeria

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ABSTRACT

BACKGROUND: Some studies have been conducted worldwide on the preparedness of dentists and even dental students for infection prevention and control with regard to the ongoing COVID-19 pandemic but very few studies have been done among other Oral Health Care Workers (OHCWs). The purpose of this study was to assess the knowledge and practices of dental health care workers in Nigeria on infection prevention and control with regards to COVID-19.

METHODS: This was a descriptive study on the knowledge and practices regarding infection control protocols and procedures with regard to the COVID-19 pandemic among dental personnel in Nigeria. A validated self-administered questionnaire was utilised for data collection. Bivariate analysis was done with a Chi-squared test to determine the association between the participants age, gender, profession and place of practice with knowledge and practices regarding COVID 19 infection. Statistical significance in associations was inferred at P-value < 0.05.

RESULTS: The majority of the OHCWs (77.4%) had good knowledge about infection prevention and control, and regulations regarding COVID-19, but most of them (58.5%) displayed poor practices with regard to infection prevention and control regulations related to COVID-19. Male respondents (68.8%), those aged between 55–64 (83.3%) years and Dental therapists (71.4%) had a higher proportion of those with good practices with the male gender and profession (Dental Therapist) being significantly associated with good practices. (P<0.05).

CONCLUSION: Our study identified a high rate of knowledge but low compliance with infection prevention and control guidelines regarding COVID-19. Better compliance with recommended infection control and waste management practices for all OHCWs and continuing education programs promoting infection control awareness are vital to improving the practices of these OHCWs. **WAJM 2022; 39(11): 1165–1173.**

Keywords: COVID-19, Infection, Knowledge, Oral Health Care Workers, Practice.

RÉSUMÉ

CONTEXTE: Certaines études ont été menées dans le monde entier sur l'état de préparation des dentistes et même des étudiants en médecine dentaire en matière de prévention et de contrôle des infections dans le cadre de la pandémie actuelle de Covid-19, mais très peu d'études ont été réalisées parmi les autres travailleurs de la santé bucco-dentaire (TSB). L'objectif de cette étude était d'évaluer les connaissances et les pratiques des travailleurs de la santé dentaire au Nigeria en matière de prévention et de contrôle des infections en ce qui concerne le COVID-19.

MÉTHODES: Il s'agissait d'une étude descriptive sur les connaissances et les pratiques concernant les protocoles et les procédures de contrôle des infections en ce qui concerne la pandémie de COVID-19 parmi le personnel dentaire au Nigeria. Un questionnaire auto-administré validé a été utilisé pour la collecte des données. Une analyse bivariée a été réalisée à l'aide d'un test de Chi-carré pour déterminer l'association entre l'âge, le sexe, la profession et le lieu d'exercice des participants et les connaissances et pratiques concernant l'infection par le COVID-19. La signification statistique des associations a été déduite à une valeur P < 0,05.

RÉSULTATS: La majorité des OHCW (77,4%) avaient une bonne connaissance de la prévention et du contrôle des infections, ainsi que des réglementations relatives à la Covid-19, mais la plupart d'entre eux (58,5%) affichaient des pratiques médiocres en ce qui concerne la prévention et le contrôle des infections liées à la Covid-19. Les répondants de sexe masculin (68,8 %), ceux âgés de 55 à 64 ans (83,3 %) et les thérapeutes dentaires (71,4 %) étaient plus nombreux à avoir de bonnes pratiques, le sexe masculin et la profession (thérapeute dentaire) étant significativement associés aux bonnes pratiques. (P<0.05)

CONCLUSION: Notre étude a identifié un taux élevé de connaissances mais une faible conformité aux directives de prévention et de contrôle des infections concernant Covid-19. Un meilleur respect des pratiques recommandées en matière de prévention des infections et de gestion des déchets pour tous les ACSO et des programmes de formation continue favorisant la sensibilisation à la prévention des infections sont essentiels pour améliorer les pratiques de ces ACSO. **WAJM 2022; 39(11): 1165–1173.**

Mots clés: COVID-19, Infection, Connaissance, Travailleurs de la santé bucco-dentaire, Pratique.

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Abbreviations: OHCWs, Oral Health Care Workers.

INTRODUCTION

Coronavirus 2019 (COVID-19) was first reported in Wuhan City, Hubei Province, Central China in December 2019.¹ It is caused by a novel coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), an enveloped single-stranded RNA virus.^{2,3} Since the first report it has become a major health concern worldwide.¹ COVID-19 can be transmitted from human to human through direct contact, droplets and faeco-oral means, with a 2–14 day incubation period.⁴ The characteristic symptoms of COVID-19 reported include dry cough, fever, breathing difficulty and headaches.⁵ However, the majority of cases of COVID-19 remain asymptomatic or may demonstrate mild symptoms similar to flu, seasonal allergy, and upper respiratory tract infections.¹ Health care workers (HCWs) are frequently exposed to the COVID-19 pandemic because they are at the frontline of the pandemic and are frequently exposed to infected individuals.⁶ Also, the pandemic has significantly affected health workers in dental schools and their affiliated hospitals and laboratories have been significantly affected by the pandemic.⁷

Viral spread among populations has been associated with aerosolised transmission, droplets generated from speech and sneezing or coughing, and contact with a contaminated surface. Many potential sources for airborne transmission are associated with aerosol-generating dental care procedures.^{8,9} In the dental setting, transmission commonly occurs through infected saliva-associated respiratory secretions in the oral or nasal cavity.⁷ Because of its availability, the saliva represents a noninvasive specimen for COVID-19 research, and the SARS-CoV-2 viral load in this biomaterial has been confirmed in various studies.^{10,11} This renders dental health providers to be at an extremely high risk of infection from the SARS-CoV-2 virus due to the nature of their work, being in direct and close contact with their patients.¹² Additionally, routine dental treatment procedures usually involve instruments such as ultrasonic scalers, air-water syringes, and air turbine handpieces that become contaminated with the patients' saliva and blood, and subsequently generate infectious

aerosols and droplets in the workplace.¹² Due to the high risk of exposure by the dental health care worker, it is critical that the risk of transmission through dental procedures is minimised through proper understanding and actions. Dental health care workers should be well aware of the characteristics of SARS-CoV-2 and new infection control standards.

African healthcare systems are not well-equipped to tackle the pandemic, thus African countries are at a higher risk of disease spread due to limited health infrastructure and training.¹³ The Centers for Disease Control and Prevention, the American Dental Association (ADA), and World Health Organization (WHO) published guidance for oral health care providers on how to control the spread of the disease.^{14–16} The science and understanding of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and COVID-19 are evolving, and recommendations and guidance are modified continuously due to this scientific evidence. The highly infectious nature of COVID-19, a disease transmitted through aerosols, droplets, and contact routes even in asymptomatic patients, requires robust personal protection for staff members and screening protocols for patients, undermining the standard personal protective equipment (PPE) used in dentistry.¹⁷

Some studies^{18,19} have been conducted worldwide on the preparedness of dentists and even dental students on infection prevention and control with regard to the ongoing COVID-19 pandemic but very few studies have been done among other Oral Health Care Workers (OHCWs) to determine their knowledge and practices on this emergent hazard which will probably alter the nature of dental practice for a while. All dental practices rely on team members from all categories of OHCWs to function effectively. Thus, the purpose of this study was to assess the knowledge and practices of dental health care workers in Nigeria on infection prevention and control with regards to COVID-19.

MATERIALS AND METHODS

Ethical Consideration

Ethical approval was obtained from the Health Research and Ethics Com-

mittee of the Lagos University Teaching Hospital. Copies of informed consent were obtained from all the study participants and their confidentiality was guaranteed.

Study Area and Study Population

The study area was Nigeria located in West Africa. It has about 200 million people and various ethnic groups. The country is divided into 6 geopolitical zones: North West, north east, north central, south west, south east and south-south zones. The study population was made up of all dental personnel excluding dental surgeons in all the geopolitical zones in the country within the study period.

The sample included all oral healthcare providers (dental therapists, dental technologists, dental nurses, dental technicians and dental surgery assistants) in all geopolitical zones in Nigeria. Inclusion criteria were those presently working in a dental clinic, having direct or indirect contact with patients and patient appliances, and who gave informed consent to participate in the study. We assessed their knowledge and practices regarding infection control protocols and procedures regarding the COVID-19 pandemic.

Study Design

This was a descriptive study on the knowledge and practices regarding infection control protocols and procedures regarding the COVID-19 pandemic among dental personnel in Nigeria. The dependent variables were age categories, gender, profession and geopolitical zone of practice while the independent variables were knowledge and practices regarding infection control protocols and procedures with regard to the COVID-19 pandemic.

Minimum Sample Size

The minimum sample size was obtained using the formula for cross-sectional studies below:

$$N = \frac{z^2pq}{d^2}$$

Where, N= minimum sample size for the study, Z= 1.96 at 95% confidence level; p= proportion of dental personnel with

adequate knowledge about infection control (94.7%) from reference study;²⁰ $q = 1 - p$; $d =$ acceptable margin of error of 5% precision.

Substituting

$$n = \frac{(1.96)^2 \times 0.94 \times 0.06}{(0.05)^2}$$

$$= \frac{3.841 \times 0.94 \times 0.06}{0.0025} = 87$$

Making a provision for 20% of incomplete responses, the calculated minimum sample size was therefore 105 respondents.

Sampling Strategy

We utilised a convenience sampling strategy given that the data collection was conducted using an online survey tool.

Data Collection Tool

A validated self-administered questionnaire was utilised for data collection. The survey instrument was pretested among 15 dental health workers who were not part of the final sample to determine the clarity of wording, comprehension and ease of reading of the questions, and modifications were made based on the responses. It consisted of 3 sections. Section one included questions on demographic profile (age, gender, profession and geopolitical zone of practice) while section two had questions that focused on various domains of knowledge and perception about COVID-19. Responses on the incubation period, origin, preventive and treatment measures as well as infection control protocols and procedures were obtained. Section 3 consisted of questions on practices on infection control compliance of the respondents which included the availability of personal protective equipment (PPEs) and its usage by the respondents. Section 4 assessed the awareness of the respondents on the risk of cross-infection associated with dental procedures with 1 indicating a lower risk of aerosol production: Close contact but minimal; no aerosol (without the use of air/ water syringe); 2: Moderate/High risk of aerosol production: Close contact with aerosol, but aerosol controlled and 3:

Very high risk of aerosol production: Close contact with aerosols. Respondents were asked to provide answers to knowledge questions as either yes or no, with an additional “don’t know” option. Uncertain (do not know) responses were scored 0, and correct answers were assigned a score of 1. Responses to practice questions were also scored 0 for wrong answers while right responses were assigned a score of 1.

Data Analysis

The Statistical Package for Social Sciences SPSS® (IBM Corp, Armonk, NY) version 25 was utilised for data analysis. An exploratory analysis was conducted to ensure data consistency. Results were displayed using frequency and percentages as well as charts. Correct responses to knowledge and practice questions were scored 1 while wrong responses were scored 0, and the mean values were determined for both. Good knowledge and practices were rated with values above the mean cut-off scores. Bivariate analysis was done with a Chi-squared test to determine the association between the participants age, gender, profession and place of practice with knowledge and practices regarding COVID 19 infection. Statistical significance in associations was inferred at P -value < 0.05 .

RESULTS

Table 1 shows the socio-demographic characteristics of the 106 participants who completed the survey. Most participants were females (69.8%), between the age of 35 and 44 years (42.5%), from the southwestern part of the country (81.1%), with the highest proportion of respondents being dental nurses (32.1%). A higher proportion (34.0%) stated that dental practice was back to normal after the COVID-19 pandemic and strongly disagreed with the statements that the COVID-19 pandemic will change the future of dental treatment (39.6%), change the shape of the oral health workforce (34.0%), and change how public health plays a role in Dentistry (38.7%).

Table 2 displays the participants’ perception of the origin, mode of trans-

mission, complications, and treatment of COVID-19. Fifty-seven (53.8%) of the health workers incorrectly identified 7–14 days as the incubation period for COVID-19 while 93 (87.7%) also incorrectly identified skin rash as a common symptom. The majority (76.4%) however correctly identified that the source of the infection is unknown. All respondents correctly identified person to person spread through respiratory droplets and contact as the routes of transmission. All similarly identified that hand hygiene and respiratory hygiene can reduce the risk of transmission when coughing. However, only 21 (19.8%) identified vaccination as suitable for prevention/treatment.

Table 3 shows the practices of the respondents with regard to infection control guidelines during the Covid-19 pandemic. Most of them 91(85.6%), routinely used autoclaves for sterilisation but few (35.8%) had heavy-duty gloves available in the clinic for instrument disinfection. To prevent cross-infection in the clinic, most of the participants (79.2%) routinely wore gloves while treating patients, packaged sterile instruments appropriately (82.1%), and disinfected impressions with hypochlorite rinse (79.2%), though only 66% routinely wore facemasks in the clinical environment. The majority of the respondents stated that their dental clinic was not well equipped with protective equipment/materials with regard to preventing COVID-19 infection such as protective glasses for health workers (64.2%), headrest covers (73.6%), paper towels (63.2%), rubber dams (67.9%), and treatment room outfits (56.6%).

Table 4 shows the awareness of the respondents on the risk of cross-infection associated with dental procedures with 1: indicating a lower risk of aerosol production: Close contact but minimal; no aerosol (without the use of air/ water syringe); 2: Moderate/High risk of aerosol production: Close contact with aerosol, but aerosol controlled and 3: Very high risk of aerosol production: Close contact with aerosol, hard to control aerosol. The majority of the respondents correctly identified diagnostic (54.7%) and preventive procedures like fluoride applications

Table 1: Demographic Characteristics and Perception of Study Participants about Covid-19 Pandemic

Variable	Frequency (n=106)	Percentage
Gender		
Male	32	30.2
Female	74	69.8
Age group (Years)		
18–24	2	1.9
25–34	40	37.7
35–44	45	42.5
45–54	13	12.3
55–64	6	5.7
Profession		
Dental health technician	26	24.5
Dental surgery assistant	12	11.3
Dental nurse	34	32.1
Dental technologist	27	25.5
Dental therapist	7	6.6
Location		
Northcentral	2	1.9
South east	12	11.3
South-south	6	5.7
Southwest	86	81.1
Dental practice is back to normal		
Strongly disagree	6	5.7
Disagree	28	26.4
Neutral	22	20.8
Agree	36	34.0
Strongly agree	14	13.2
The COVID-19 crisis will change the future of dental treatment		
Strongly disagree	42	39.6
Disagree	27	25.5
Neutral	18	17.0
Agree	8	7.5
Strongly agree	11	10.4
The COVID-19 crisis will change the shape of the oral health workforce		
Strongly disagree	36	34.0
Disagree	36	34.0
Neutral	15	14.2
Agree	7	6.6
Strongly agree	12	11.3
The COVID-19 crisis will change the way in which public health plays a role in Dentistry		
Strongly disagree	41	38.7
Disagree	27	25.5
Neutral	15	14.2
Agree	6	5.7
Strongly agree	17	16.0

(46.2%) as low risk; Orthodontics procedures such as minor handpiece use with minimal aerosol generation (50.9%) as a moderate risk; Restorative procedures such as the use of highspeed handpiece, an air-water syringe without rubber dam (70.8%), Oral surgery procedures such as Surgical extractions (68.9%) and Preventive procedures such as Scaling with sonic/ultra-sonic instruments (74.5%) as high risk.

Figure 1 shows a pie chart displaying the knowledge score categories of the respondents. The majority of them (77.4%) had good knowledge about infection prevention and control, regulations regarding COVID-19. Figure 2 shows a bar chart displaying the practice score categories of the respondents. The majority of them (58.5%) displayed poor practices regarding infection prevention and control regulations related to COVID-19.

Knowledge scores significantly differed across genders, age groups, professions, and the location of the country where they are practicing, with their perception of infection prevention and control guidelines. Male respondents (84.4%), those aged between 18–24 (100.0%), 45–54 (100.0%) and 55–64 (100.0%) years, Dental therapists (100.0%), and those from the North east (100.0%) and North Central (100.0%) had a higher proportion of those with good knowledge. Only age was however significantly associated with knowledge scores ($P < 0.05$) (Table 5).

Practice scores significantly differed across genders, age groups, professions, and the location of the country where they are practising with their perception of infection prevention and control guidelines. Male respondents (68.8%), those aged between 55–64 (83.3%) years, Dental therapists (71.4%), and those from the South West (47.7%) had a higher proportion of those with good practices. However, both the male gender and profession (Dental therapist) were however significantly associated with good practices. ($P < 0.05$) (Table 6).

DISCUSSION

Due to the nature of the dental profession, it is inevitable for OHCW to be constantly exposed to infectious

Table 2: Knowledge about the Origin, Mode of Transmission, Complications, and Treatment of COVID-19

Variable	Frequency (n=106)	Percentage
Incubation period for COVID-19		
2 – 7	1	0.9
2 – 14	45	42.5
7 – 14	57	53.8
7 – 21	3	2.8
Symptoms of COVID-19		
Cough	2	1.9
Fever	5	4.7
Headache	2	1.9
Skin rash	93	87.7
Sore throat	4	3.8
Origin of COVID-19 virus		
Bat	25	23.6
Unknown	81	76.4
Transmission route		
Air	37	34.9
Contact	17	16.0
All of the above	50	47.2
None of the above	2	1.9
Complication of COVID-19		
Respiratory failure	18	17.0
Death	3	2.8
All of the above	85	80.2
Prevention/Treatment		
Antiviral therapy	14	13.2
Supportive care	59	55.7
Vaccination	21	19.8
None of the above	12	11.3
How risk of transmission can be reduced		
Hand hygiene	2	1.9
Covering the nose and mouth when coughing	13	12.3
All of the above	91	85.8
COVID-19 infection is always associated with mortality		
No	101	95.3
Yes	5	4.7
History of contact with symptomatic patients is relevant in diagnosis		
No	17	16.0
Yes	89	84.0
Disinfection of working surfaces is highly required to break the chain of infection		
No	37	34.9
Yes	69	67.1

diseases. Provision of dental care during the pandemic is challenging because of the high risk of infection transmission in dental settings.^{21–23} Work activities with a high potential of COVID-19 infection include OHCW performing aerosol-generating procedures or collecting/handling specimens from patients known

to have or suspected of having COVID-19.²⁴ The risk of cross-infection in dentistry is considerably high since splatters and aerosols produced during routine dental treatments contribute to increasing the risk.²⁵ Most participants in this study were females and this is not unusual given that the dental hygiene,

dental therapy and the dental nursing profession has a preponderance of the female gender. A high proportion of the respondents however wrongly opined that dental practice was back to normal after the COVID-19 pandemic while many of them did not believe that the COVID-19 pandemic would change the future of dental treatment, the shape of the oral health workforce, nor change how public health plays a role in Dentistry. The observation that only 21 (19.8%) OHCW identified vaccination as suitable for prevention/treatment also confirms the level of imperception of this cohort of respondents. This low-risk perception among the OHCW is very concerning because it could reduce the heightened sense of the need for infection prevention and control observed in the early days of the pandemic.

In assessing knowledge, over half of the OHCW incorrectly identified the incubation period for COVID-19 while the majority also incorrectly identified skin rash as a common symptom. However, the majority of the OHCWs correctly identified that the source of the infection is unknown. All respondents correctly identified person to person spread through respiratory droplets and contact as the routes of transmission. All similarly identified that hand hygiene and respiratory hygiene can reduce the risk of transmission when coughing. Before the COVID-19 pandemic, studies conducted among dental professionals in some countries showed a low level of knowledge regarding standard precautions.^{26,27} Surveys conducted after the initial phase of the pandemic however showed an increased level of knowledge of standard precautions.^{28,29} This change in knowledge post-COVID-19 indicates that the initial heightened sense of risk improved the knowledge-seeking behaviour of the OHCWs.

Furthermore, in assessing the risk of exposure to Covid-19 associated with different categories of dental procedures, the majority of the respondents correctly identified diagnostic and preventive procedures like fluoride applications as low risk; Orthodontic procedures such as minor handpiece use with minimal aerosol generation as moderate risk; Restorative procedures such as use of

Table 3: Dental Infection Control Practices by Respondents in Relation to COVID-19 Pandemic

	Yes	No
Autoclave sterilisation used routinely	91(85.6)	15(14.2)
Instruments cleaned/ultrasonic bath before sterilization	38(35.8)	68(64.2)
Heavy duty gloves available	35(33.0)	71(67.0)
Sterile instruments packaged	87(82.1)	19(17.9)
Burs sterilised after each use	85(80.2)	21(19.8)
All hand/plastic instruments sterilised	83(78.3)	23(21.7)
Handpieces flushed 20-30 secs after use	32(30.2)	74(69.8)
Handpieces sterilised after use	73(68.9)	33(31.1)
3/1 syringe & hoses flushed 20-30 secs after use	28(26.4)	78(73.6)
Needles/sharps disposed of in special bins	89(84.0)	17(16.0)
Disposables (gloves, masks, wipes, surface covers etc.) discarded in sealed plastic bags)	74(69.8)	32(30.2)
Impressions disinfected with water only	13(12.3)	93(87.7)
Impressions disinfected with hypochlorite	84(79.2)	22(20.8)
Gloves worn routinely for each patient	83(79.2)	22(20.8)
Cover uniform or treatment room outfit worn by all patient care staff	46(43.4)	60(56.6)
Uniforms changed daily	48(45.3)	58(54.7)
Uniforms removed before leaving practice	88(83.0)	18(17.0)
Rubber dam used as appropriate and role in cross infection understood by team	34(32.1)	72(67.9)
Face masks routinely worn by all health care personnel	70(66.0)	36(34.0)
Sterilization & Infection control regime same for each patient	54(50.9)	52(49.1)
Bactericidal hand wash	73(68.9)	33(31.1)
Paper towels	39(36.8)	67(63.2)
Headrest covers	28(26.4)	78(73.6)
Protective glasses worn by all health care personnel	38(35.8)	68(64.2)
Protective glasses worn by patients during treatment	24(22.6)	82(77.4)
Dentists operates with instruments set up on a tray	82(77.4)	24(22.6)

highspeed handpiece, an air-water syringe without rubber dam, Oral surgery procedures such as Surgical extractions and Preventive procedures such as Scaling with sonic/ultra-sonic instruments as high risk. Overall, most of the OHCWs (77.4%) had good knowledge about infection prevention and control and regulations regarding Covid-19. It is well-known that dental procedures are prone to generating large amounts of droplets and aerosols, and that OHCWs are at risk of inhaling large amounts of aerosols. SARS-CoV-2 can persist in aerosols released into the dental operatory for up to 3hours,³⁰ while direct dental mucosal contact is also a potential high-risk route for SARS-CoV-2 infection.³¹ Thus, the awareness of the risk associated with different procedures in dentistry is a good indicator of the knowledge of the OHCWs about the

potential for infection associated with each dental procedure. However, most of the OHCWs in this study displayed poor practices regarding infection prevention and control regulations related to COVID-19.

Even though most of the respondents routinely used autoclaves for sterilisation, only few had heavy-duty gloves available in the clinic for instruments disinfection. Similarly, to prevent cross-infection in the clinic, most of the participants routinely wore gloves while attending to patients, packaged sterile instruments appropriately and disinfected impressions with hypochlorite. However, only 66% routinely wore facemasks in the clinical environment. Moreover, the majority of the respondents stated that their dental clinic was not well equipped with protective equipment/materials for

preventing COVID-19 infection. The majority of them had no access to face shields, head rest covers, paper towels, and treatment room outfits. Moreover, 67.9% of OHCWs stated that rubber dams were not used when they assisted dentists in treating patients.

Many studies have provided irrefutable evidence that rubber dam effectively reduces splatter transmission by 33% and reduces surface bacterial contamination by 80–99% during aerosol generation.³² The use of adequate protection is essential to avoid the transmission of SARS-CoV-2. There is however deficiency in adherence to these scientific recommendations as shown in a study by Shahin, *et al.*³³ conducted among dentists, dental assistants and hygienists, and dental undergraduates revealed certain deficiencies in training, as 93.5% of dental hygienists did not believe that rubber dam isolation was a SARS-CoV-2 prevention measure.³³

Knowledge scores significantly differed across genders, age-groups, profession, and the location of the country where the OHCWs are practising with their perception of infection prevention and control guidelines. Male respondents, dental therapists and those from the North east and North Central part of Nigeria had a higher proportion of those with good knowledge. Very young and elderly OHCWs however had significantly higher knowledge scores. In addition, practice scores significantly differed across genders, age-groups, professions, and the location of the country where OHCWs were practicing with male respondents, those aged between 55–64 years, dental therapists and those from the South West having a higher proportion of those with good practices. However, both male gender and profession (Dental Therapist) were significantly associated with good practices. This was in agreement with a hospital-based cross-sectional study conducted in Japan that found that compliance with infection control protocols had a significant correlation with age, profession within the dental clinic and patient frequency.³⁴ Regarding the adherence to official recommendations to prevent infection, the findings of this study was similar to that in a study

Table 4: Awareness of the Respondents on Risk of Cross Infection Associated with Specific Dental Procedures

Variable	1	2	3
Diagnostic: Exam, intraoral radiographs	58(54.7)	33(31.1)	15(14.2)
Preventive: Fluoride application, including silver diamine fluoride, atraumatic restorative technique	49(46.2)	45(42.5)	12(11.2)
Restorative: Use of silver diamine fluoride for caries arresting, atraumatic interim restoration	27(25.5)	56(52.8)	23(21.7)
Oral surgery: Simple extraction	21(19.8)	52(49.1)	33(31.1)
Fixed prosthodontics: Preparation with rubber dam; crown insertion and cementation with all adjustments done extra orally	11(10.4)	45(42.5)	50(47.2)
Orthodontics: minor handpiece use, minimal aerosol generation	6(5.7)	54(50.9)	46(43.4)
Preventive: Scaling with sonic/ultra-sonic instruments	2(1.9)	23(23.6)	79(74.5)
Restorative: Use of highspeed handpiece, an air-water syringe without rubber dam	3(2.8)	28(26.4)	75(70.8)
Endodontics: Procedures with aerosol without rubber dam. Note: in general, it is not recommended to perform root canals without a rubber dam	8(7.5)	28(26.4)	70(66.0)
Periodontics: Scaling with sonic/ultra-sonic instrument	4(3.8)	31(2.9)	71(67.0)
Removable prosthodontics: Procedures requiring tooth modifications	11(10.4)	40(37.7)	55(51.9)
Dental implant: Procedures requiring an aerosol	4(3.8)	30(18.9)	82(77.4)
Fixed prosthodontics: Tooth preparation without rubber dam, restoration without rubber dam, crown and bridge-tooth preparation without rubber dam	4(3.8)	32(30.2)	70(66.0)
Oral surgery: Surgical extractions.	3(2.8)	30(28.3)	73(68.9)
Orthodontics: procedures requiring aerosol	7(6.6)	38(35.8)	61(57.5)
Orthodontics: Appliance adjustment	19(17.9)	37(34.9)	50(47.2)
Preventive: Scaling by hand, well-controlled polishing with minimal paste, sealant placement with a rubber dam	16(15.1)	43(40.6)	47(44.3)
Restorative: Restorations using a rubber dam	12(11.3)	50(47.2)	44(41.5)
Endodontics: Endodontic procedures using a rubber dam	11(10.4)	43(40.6)	52(49.1)
Periodontics: non-cavitron scaling	13(12.3)	48(45.3)	45(42.5)
Removable prosthodontics: Denture procedures without intraoral adjustments, for example, of occlusion.			
All adjustments after appliance disinfection	18(17.0)	49(46.2)	39(36.8)
Dental implants: Prosthodontic work	8(7.5)	30(28.3)	68(64.2)

in Spain in both the public and private sectors that indicated 82.6% of dental hygienists had high compliance.³⁵ Estrich et al., however observed a contrary trend among dental hygienists in the United States observing that only 55% of them complied with recommendations by the Centre for Disease Control and Prevention (CDC) and the rate was higher among professionals with more years of experience.³⁶ The Occupational Information Network which determined which job category has the highest risk of COVID-19 exposure, observed that dental hygienists had the highest risk, followed by dental assistants and dentists.³⁷ Results from an occupational risk exposure analysis to COVID-19 by the Occupational Safety and Health Administration (OSHA) and the Office for National Statistics (ONS) also placed dental hygienists as one of the highest risk professions among all occupations for exposure to COVID-19 due to three main factors.³⁸ Dental hygienists have prolonged exposure time to aerosols and they work in close proximity to patients; they also frequently work without dental assistants to help them to assess patients, control aerosols, sterilise instruments and disinfect surfaces,³⁹ earning them a 99.7 risk score for COVID-19 infection.⁴⁰ Therefore, it is not surprising that they took the most effective measures to protect themselves and their patients against the virus. Overall, the infection prevention practices of the OHCWs with regards to COVID-19 were quite unsatisfactory.

Despite the findings reported, it is important to stress that this survey had some limitations. A major limitation of our study was the low response rate. Despite many repeated reminders, very few of the OHCWs contacted accepted to participate in the study. Another major limitation of the study is the unequal representation of respondents across various geopolitical zones in the country due to this low response rate, making it difficult to generalise the findings to the whole country.

CONCLUSION

Our study identified a high rate of knowledge but low compliance with infection prevention and control

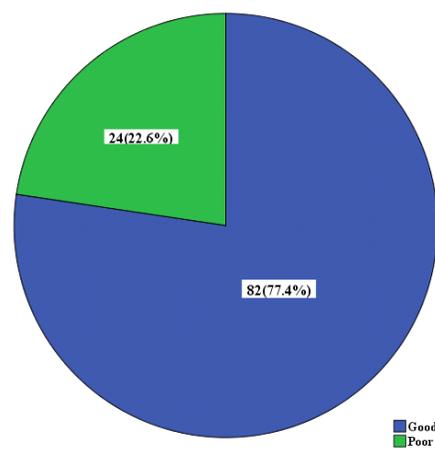


Fig. 1: Knowledge of Respondents about Infection Prevention and Control regarding COVID-19.

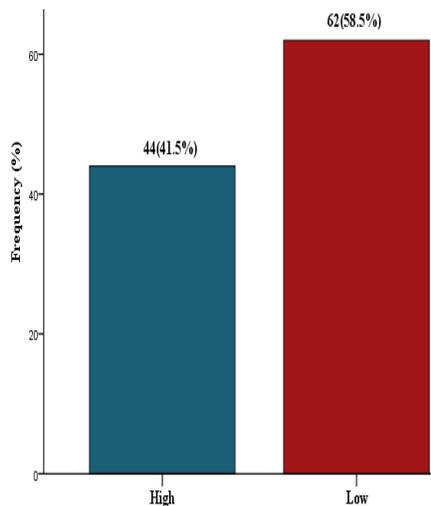


Fig. 2: Infection Prevention and Control Related Practices towards COVID-19.

Table 5: Association between Knowledge of COVID and Socio-Demographic Characteristics

	Good (n=82)	Poor (n=24)	χ^2	p-value
Gender				
Male	27(84.4)	4(15.6)	1.288	0.256
Female	55(74.3)	19(25.7)		
Age group (Years)				
18–24	2(100.0)	0(0.0)	36.235	<0.001*
25–34	39(97.5)	1(2.5)		
35–44	22(48.9)	23(51.1)		
45–54	13(100.0)	0(0.0)		
55–64	6(100.0)	0(0.0)		
Profession				
Dental health technician	19(73.1)	7(26.9)	4.3333	0.363
Dental surgery assistant	8(66.7)	4(33.3)		
Dental nurse	25(73.5)	9(26.5)		
Dental technologist	23(85.2)	4(14.8)		
Dental therapist	7(100.0)	0(0.0)		
Location				
North central	2(100.0)	0(0.0)	6.817	0.078
South east	12(100.0)	0(0.0)		
South-south	3(50.0)	3(50.0)		
South-west	65(75.6)	21(24.4)		

Table 6: Association between COVID Standard Precaution Practice and Socio-Demographic Characteristics

	Good(n=44)	Poor (n=62)	χ^2	p-value
Gender				
Male	22(68.8)	10(31.3)	14.010	<0.001*
Female	22(29.7)	52(70.3)		
Age Group (Years)				
18–24	1(50.0)	1(50.0)	5.105	0.277
25–34	17(42.5)	23(57.5)		
35–44	16(35.6)	29(64.4)		
45–54	5(38.5)	8(61.5)		
55–64	5(83.3)	1(16.7)		
Profession				
Dental health technician	8(30.8)	18(69.2)	19.521	0.001*
Dental surgery assistant	0(0.0)	12(100.0)		
Dental nurse	13(38.2)	21(61.8)		
Dental technologist	18(66.7)	9(33.3)		
Dental therapist	5(71.4)	2(28.6)		
Location				
North central	0(0.0)	2(100.0)	7.341	0.062
South east	2(16.7)	10(83.3)		
South-south	1(16.7)	5(83.3)		
Southwest	41(47.7)	45(52.3)		

guidelines regarding COVID-19. Better compliance with recommended infection control and waste management practices among OHCWs and continuing education programs promoting infection

control awareness are vital to improving the practices of these OHCWs.⁴¹

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Conflicts of Interest

There are no conflicts of interest.

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