



Availability and Utilization of Personal Protective Equipment by Nigerian Physiotherapists during COVID-19 Pandemic

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Authors' contributions

This work was carried out in collaboration among all authors. Authors UPO, JOU and EYI designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors FAM, ECO and CGC managed the analyses of the study. Authors UPO and COO managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Physiotherapists are exposed to contracting infectious diseases because of the level of contact they have with patients in the course of performing their statutory clinical duties.

Objective: The major objective of the study is to determine the availability and utilization of personal protective equipment (PPE) by Nigerian physiotherapists during the COVID-19 pandemic.

Methods: One hundred and eighty-one (181) Nigerian physiotherapists participated in an online survey using Google Form application that lasted between September 2020 and October 2020. The data collection instrument was a 22-item close-ended online questionnaire with three domains: demographics, availability of PPE, and utilization of PPE. The authors made use of different

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WhatsApp platforms hosting only physiotherapists as a means of reaching out to the respondents. Data obtained from the study were analyzed using STATA 13. A p-value of less than 0.05 was considered to be statistically significant (confidence level = 95).

Results: The result of the study shows there were high availability and utilization of facemasks and hand gloves for the Nigerian physiotherapists during the period of COVID-19 pandemic in the different health facilities; it also shows there was low availability of apron and poor availability of protective eye shield/goggles and shoes during the same period. The finding also showed there was low utilization of apron, protective glasses and shoes by the Nigerian physiotherapists during the peak of COVID-pandemic.

Conclusions: Most Nigerian physiotherapists had more face masks and hand gloves during COVID-19 pandemic than they had protective aprons, goggles and shoes. Also, there was high utilization of facemasks and the hand gloves more than an apron, eye shield and protective shoes because the more the PPE was available the more the utilization by the Nigerian Physiotherapists.

Keywords: Personal protective equipment; availability; utilization; Nigerian physiotherapists.

1. INTRODUCTION

Personal protective equipment (PPE) is a current hot topic – probably the most talked about and emotive subjects for front line healthcare staff working with patients with coronavirus disease (COVID-19). There are two main related problems: availability of equipment; and utilization of equipment [1]. Protecting the health personnel so that they can continue to help others is a priority for health care providers around the world. This includes being conscious and up to date with infection prevention and control measures and the appropriate implementation of PPE, hand hygiene, and waste management of potentially harmful materials. PPEs are devices worn by workers in their place of work to protect them from harm that could emanate from injury or infection. According to the World Health Organization (WHO), PPE consists of garments placed to protect the health care workers or any other persons from being infected [2]. PPE suits can be similar in appearance to a cleanroom suit [3]. It has a serious limitation that it does not eliminate the hazard at the source and may result in employees being exposed to the hazard if the equipment fails [3]. PPE is designed to protect health care providers from serious workplace injuries or illnesses [4]. PPE provides a physical barrier between microorganism and wearer. It offers protection by preventing microorganism from contaminating hands, eyes, clothing, hair and shoes [5]. PPE includes gloves, protective eyewear (goggles), mask, apron, gown, boots/shoe cover, hair cover. It should be used by all health care providers, supporting staffs, laboratory staffs, and family members who provide care to patients in situations where they have contact with blood, body fluids, secretions or excretions [2]. The

health facilities are expected to have different personal protective equipment made available to their health care professionals, and support staff to enable them to stay safe in their workplaces [6]. The Nigerian Center for Disease Control {NCDC} recommended medical mask, gown, gloves, eye protection goggles or face shield for health workers providing direct care to COVID-19 patients, and health workers who conduct a physical examination of a patient with respiratory symptoms. It recommended no PPE for health workers who are involved in activities requiring no contact with COVID-19 patients [7].

Physiotherapists have direct contact with patients, which make them susceptible to the transmission of infectious diseases. COVID-19 causes low pulmonary compliance and detrimental changes in lung function with hypoxemia and cardiovascular repercussions. These changes lead to the need for physiotherapy services and the management of oxygen therapy and ventilator support (invasive and non-invasive) for these patients [8]. Also, in its severe presentation, COVID-19 can present several cardiovascular repercussions, making continuous monitoring and a multidisciplinary approach necessary in the care of this patient [9]. Moreover, the integrity of aerobic physical performance is also associated with the integrity of the cardiovascular system. COVID-19 is a disease that causes a deficiency of respiratory tract structures, leading to impaired breathing functions [10] Also, depending on the clinical severity presented, there may be impaired respiratory muscle function and exercise tolerance. The patients may experience limitations, which make it difficult to carry out basic activities that involve the ability to move, affecting even routine tasks such as walking, and

performing self-care and transfers [11]. Interestingly, physiotherapists who practice in the Intensive care unit (ICU) environments may also provide airway clearance techniques for ventilated patients who show signs of inadequate airway clearance. They as well assist in positioning patients with severe respiratory failure associated with COVID-19, including the use of prone position to optimize oxygenation, as well as the provision of incentive spirometry in various modifications for ventilation of the airways [12]. Also, the physical weakness and the consequent disuse of the peripheral musculature mean that the survivors of COVID-19 may present some impairment in physical performance and participation restrictions. Therefore, among the various professionals involved in the physical recovery of patients with COVID-19, the role of the physiotherapist stands out, not for treating the disease but for preventing and rehabilitating the inherent deficiencies and functional limitations which predispose to prolong the restoration of functions or total loss of independence to function [13]. Physiotherapists are also often first contact practitioners, which means that they are in a position to take responsibility for the early identification of infectious disease and/or managing workload in primary care settings. It is therefore very important for physiotherapists to be familiar with COVID-19, and how to prevent its transmission, and understand how they can be involved in workforce planning. The PPE is so important for safe physiotherapy practice that the Chartered Society of Physiotherapy (CSP) threatened to advise and support members not to carry out procedures without the appropriate PPE in line with the Health and Safety at Work Act 1974 [14].

Given the afforested background that highlighted the roles and relevance of the physiotherapists in the management of COVID-19, it is important to assess the safety of the physiotherapists during the COVID-19 pandemic in the Nigeria health system. There is a dearth of literature on this area of knowledge in Nigeria. Thus, this knowledge vacuum stimulated the interest of the authors to conceive and design this study that determines the availability, and utilization of PPE by Nigerian physiotherapists during the COVID-19. The correlation between availability and utilization of PPE among physiotherapists in their routine practice in Nigerian's health system, and influence of socio-demographic characteristics on the utilization of PPE. The authors limited the operational definition of personal protective

equipment (PPE) to safety wears available to physiotherapists in their workplaces for safe practice such as face mask, hand gloves, goggles or shield, gown and rubber boots or shoes [15]. The authors justified this study on the ground that physiotherapists rely on personal protective equipment to protect themselves and their patients from being infected during their routine practice. This study is therefore predicated on the fact that physiotherapists should be protected from infectious diseases in their workplaces by their employers by ensuring adequate provision of PPE, especially, in this period of COVID-19 pandemic. The outcome of the study might be an indicator of the safety of Nigerian physiotherapists during the COVID-pandemic

2. METHODS

The study was a cross-sectional online survey involving one hundred and eighty-one (181) blinded respondents. The authors were able to reach the respondents via different WhatsApp platforms hosting only physiotherapists. It took about seven minutes to fill the questionnaire and the duration of the online survey was one month. The respondents were physiotherapists that work in different health facilities in Nigeria. The data collection instrument was a 22-item close-ended online questionnaire with three domains: demographics, availability, and utilization. Before application, the study instrument was checked and certified for content validity by three renowned academics/researchers. After the pilot study, the necessary corrections were made and the questionnaire certified suitable to be applied in this study by the three research experts. The study was delimited to licensed Nigerian physiotherapists who work in both public and private health facilities.

2.1 Data Analysis

Data obtained from the study was meticulously entered into Microsoft Excel and analyzed using STATA 13 (Stata Statistical Software: Release 13 College Station, TX: StataCorp LLC). The sociodemographic characteristics of the respondents were presented in frequency tables and percentages. The level of availability and utilization of PPE was presented as frequency and percentages. Chi-square analysis was used to determine the relationship between the level of availability and utilization of PPE. Also, the influence of sociodemographic characteristics on the utilization level of PPE was studied using

Chi-square analysis. A P-value of less than 0.05 was considered to be statistically significant (confidence level = 95%). The availability outcome was analyzed with a four-point Likert scale of 'yes' (available), 'no' (not available), 'not sure' (not sure of availability) and 'not supplied' (available but not supplied). To highlight the main emerging three categories of utilization levels, a six-point Likert scale was collapsed into a three-point scale. The ratings of 'always', and 'very frequently' ratings were combined to the rating 'always'. Furthermore, the ratings of 'rarely' and 'occasionally' were combined to mean 'occasionally'. The 'very rarely' and 'never' ratings were combined on a three-point scale to mean 'rarely'. Hence, the outcome of the result will be interpreted as high, low and poor utilization. Also, the 5-point Likert scales of agree, strongly agree, disagree, strongly disagree and undecided were collapsed into a 3-point Likert scale of agree (agree and strongly agree), disagree (disagree and strongly disagree) and undecided (undecided) in the discussion section to sharpen the discussion.

3. RESULTS

The data used for this study was collected from one hundred and eighty-one (n=181) physiotherapists with the major objective of determining the availability and utilization of personal protective equipment by physiotherapists in the Nigeria health facilities during the COVID-19 pandemic.

Table 1 shows that 97 (53.59%) respondents were between the ages of 20 and 29, while 22 (12.15%) respondents were between the ages of 40 and 49 years. In the area of gender, more men 93 (51.38%) than women 88 (48.62%) participated. Seventy-two respondents with years of experience of between 11-15 years constituting 39.78% topped other participants as against those with less than 5 years' experience. The table shows that most of the participants 87(80.07%) have a first degree in physical therapy and 3(1.66%) are Doctor of physiotherapy holders. In the area of the place of work, 61 (33.70%) respondents comprised physiotherapists that work in the federal teaching hospitals in Nigeria. In the area of speciality, participants with interest in orthopaedics 52(28.73%) participated more in this study, while those with interest in community practice 1(0.55%) participated the least.

3.1 Facemasks

The Table 2 shows that higher number of respondents did not have enough face masks in the health facility where they work compared with lower number (44.20%) respondents who had enough face masks in their workplace, Also 2.76% respondents were not sure if they had enough, and 2.21% respondents were never supplied with face masks in their places of work.

3.2 Hand Gloves

The table shows that 51.93% of respondents had enough hand gloves in the health facility where they work compared with the 43.65% respondents who do not have enough hand gloves. Also, 2.76% of respondents were not sure if they had enough had gloves while 1.66% of respondents were never supplied with hand gloves workplace.

3.3 Apron/Gown

The table shows that 56.91% respondents did not have enough apron/gown compared to 19.34% respondents who did not have enough apron/gown in their workplace, Also, 5.52% respondents were not sure if they had enough apron/gown, while 18.23% respondents never had apron/gown supplied in their workplace.

3.4 Protective Shield/Goggle

The table shows that 39.78% of respondents did not have enough protective eye shield/goggle while 18.78% of respondents had enough protective eye shield. Also, 3.87% of respondents were not sure if they had enough protective eye shield while 37.57% of respondents never had it supplied to their workplace.

3.5 Protective Shoes

The table shows that 25.97%% respondents did not have enough protective shoes while 14.92% respondents had enough protective shoes, Also, 3.31% respondents were not sure if they had enough protective shoes, and 55.80% respondents never had it supplied to their place of work.

In Table 3, it was revealed that 171 (85.23%) of the respondents use hand gloves always, and 10 (5.52%) of the respondents wear hand gloves occasionally.

Table 1. Showing the socio-demographic characteristics of the study participants

Variable	Frequency	Percentage (%)
Age Group (Years)		
20-29	97	53.59
30-39	62	34.25
40-49	22	12.15
Gender		
Female	88	48.62
Male	93	51.38
Years of Experience		
<5	24	13.26
5-10	68	37.57
11-15	72	39.78
>15	17	9.39
Educational Status		
B.Sc.	87	48.07
DPT	3	1.66
Masters	59	32.60
PhD	32	17.68
Place of Employment		
Federal Medical Center	37	20.44
Federal Teaching Hospital	61	33.70
Private Hospital	20	11.05
Private Physiotherapy Clinics	20	11.05
State General Hospital	2	1.10
State Specialist Hospital.	7	3.86
State Teaching Hospitals	34	18.78
Area of Specialization		
Cardiopulmonary	24	13.26
Geriatrics	32	17.68
Neurology	33	18.23
Orthopedics/Sports	52	28.73
Palliative care/Oncology	8	4.42
Pediatrics	14	7.73
Community practice	1	0.55
Women's health	17	9.39
Total	181	

The same table revealed that 168 (68.5%) of the respondents always wear face masks when they are attending to a patient, 11(6.11%) respondents indicated they used the face masks occasionally, and 2 (2.21%) respondents used face mask rarely.

The result shows that 51 (44.2%) of the respondents wear a gown always when they were attending to patients, 57(30.83%) respondents wear gown occasionally when they were attending to patients and 24.18(23.14%) respondents rarely wear apron/gown when they are attending to a patient.

The table reveals that 115 (64.08%) respondents wear goggles always when attending to patients

with infectious diseases, 31 (17.12%) respondents wear goggles occasionally, and 34 (18.72%) of the respondents wear goggles when they are attending to a patient.

The number of people respondents that wore protective goggles always when attending to patients during COVI-19 were 69(38.12%), 26 (13.81%) used it occasionally was 26(13.81%), and 87 (48.02%) rarely used protective goggles same period.

Also, 45 (24.86%) wear protective shoes when attending to patients during COVID-19, 24 (13.35%) of the respondents occasionally uses protective shoes, while 112 rarely used protective shoes.

Table 2. Availability of personal protective equipment

Availability (4-likert Scale)	Frequency	Percentage
Do you have enough face masks?		
• Disagreed	92	50.83
• Undecided	5	2.76
• Agreed	80	44.20
• Not supplied	3	2.21
Do you have enough hand gloves?		
• Disagreed	79	43.65
• Undecided	5	2.76
• Agreed	94	51.93
• Not supplied	3	1.66
Do you have enough apron or gown?		
• Disagreed	103	56.91
• Undecided	10	5.52
• Agreed	36	19.34
• Not supplied	33	18.23
Do you have enough protective shield or google?		
• Disagreed	72	39.78
• Undecided	7	3.87
• Agreed	34	18.78
• Not supplied	68	37.57
Do you have protective shoes in your work place?		
• Disagreed	47	25.97
• Undecided	6	3.31
• Agreed	27	14.92
• Not supplied	1	55.80

The result shows that 39 (21.58%) of the respondents always have enough PPE (face mask and gloves) to use during the COVID-19 pandemic. 68 (37.57%) occasionally have and 74 (41.42%) rarely have.

The table shows that 21 (11.6%) of the respondents attend to patients without any PPE, 26(14.36%) respondents occasionally attend to patients without PPE, while 134 (74.04%) respondents rarely do.

The result shows that 41(22.65%) of the respondents agreed that they attend to patients without any PPE because it was not available, 132 (72.93%) of the respondents disagreed, while 8(4.42%) of the respondents were undecided.

Only 4(2.20%) of the respondents agreed they attend to patients without any PPE because they did not believe in it. 174(96.13), said they never did while 3(1.66%) were undecided.

The table shows that 4(2.21%) of the respondents agreed that they attended to their

patients without PPE because the patients did not like it, 173(95.51%) disagreed, while 4 (2.21%) were undecided.

Finally, the result shows that 118 (65.29%) of the respondents agreed that they used their PPE (face masks and gloves) when it is not provided, 55(30.34%) of the respondents did not agree, while 8(4.42%) were undecided.

Results from the Chi-square Table 4 showed that a significant relationship ($p \leq 0.05$) was observed between the level of utilization of personal protective equipment and the availability of personal protective equipment. This indicates that the more available these PPE becomes, the higher the level of utilization among the respondents studied.

Results from the Chi-square Table 5 showed that gender, level of education, place of employment, years of experience, area of specialization all had a significant influence on the utilization level of PPE among the study respondents.

4. DISCUSSION

The study was conducted to determine the availability and utilization of personal protective equipment by Nigerian physiotherapists during the upsurge of COVID-19 in Nigeria; to determine the relationship between availability and utilization of PPE, and to determine the influence of socio-demographic characteristics in the utilization of the PPE. The authors predicated the study on the ground that physiotherapists as frontline health workers have maximum contacts with their patients during the period of assessment and treatment, hence, deserve as much protection as any other health professionals in Nigeria's health system. The demographic characteristic of respondents shows that 181 participated in the online survey. The summary of Table 1 shows that more respondents were between the ages of 20 and 29, while the least number of respondents were between the ages of 40 and 49 years of age. In the area of gender, more men than women participated in the study. The respondents with the years of experience of between 11-15 years constituting participated more in the study, while those with less than 5 years' experience participated the least. The socio-demographic characteristic showed that most of the respondents have a first degree in physical therapy, and the respondents with the Doctor of physiotherapy (DPT) degree participated the least. In the area of the place of work, most respondents work in federal teaching hospitals in Nigeria. Interestingly, respondents with interest in orthopaedics participated more in this study, while those with interest in community physiotherapy participated the least.

The result of the respondents in Table 2 relating to the availability of facemasks showed that most Nigerian physiotherapists have access to facemasks on their duty point during the COVID-19 pandemic, This finding is consistent with the recommendations of the World Health Organization (WHO) that health personals should wear facemasks as one of the safety measures to prevent both the health personnel and patients who are undergoing therapeutic interventions. It also showed that most physiotherapists had enough hand gloves in their workplace. This high availability of hand gloves is a very good development as it is in tandem with the recommendation of the WHO on hand glove use when health workers are in contact with their patients [16]. This practice will help to minimize contracting infectious disease such as COVID-19

during treatment. It was only 1.66% of the respondents in Table 2 that showed that hand gloves were never supplied in their workplace; It was only 19.34% of respondents that indicated they had enough apron in their workplace. A staggering 56.91% indicated that they never had enough apron supplied, while 18.23% never had apron supplied to their workplaces. This would greatly interfere with the confidence and safety of the physiotherapists during their clinical duties especially as it affects managing patients with infectious diseases. Similarly, there was a low availability of protective eye shield among Nigerian physiotherapists. The authors noted that only a small percentage of respondents indicated they had enough protective eye shield in their workplace. This may be dangerous for physiotherapists who are involved in the management of COVID-19 patients and other infectious diseases. The study reveals that 39.78% of respondents indicated they did not have enough protective eye goggle, while 37.57% of respondents never had protective eye goggles supplied to their place of work. The table also shows that protective shoes were the most neglected PPE studied as there was poor availability for physiotherapists' use in the Nigerian health facilities. The authors found that it was only 14.92% of respondents that indicated that they had enough protective shoes in their workplace. According to the WHO, personal protective equipment consists of garments placed to protect the health care workers or any other persons to get infected" [2]. Medical PPE typically includes face protection, goggles and mask or face shield, gloves, gown or coverall, head cover, and rubber boots. PPE is needed where contact occurs with patients, residents, and clients (PRC). The PRCs environment certainly includes physiotherapy departments, clinics and a physiotherapy treatment room in a long-term care facility [15]. The CSP reacted to the possible dearth of PPE to its members when it made the following statement "Where a risk assessment process has been carried out and the required PPE is not available to enable CSP members to undertake a patient intervention safely, the CSP is clear that members should not be placed in the position of undertaking an unsafe treatment. Employers have a duty of care to their staff not to place them in harmful situations. The current COVID-19 crisis amplifies this duty and a lack of appropriate PPE available to CSP members is of grave concern. Should it be required, we will be advising and supporting members not to carry out procedures without the

Table 3. A frequency distribution table showing the level of utilization of PPE by the Physiotherapists (5-point Likert scale collapsed to 3- point Likert scale)

Level of Utilization of PPE by Physiotherapists in the Nigeria health facilities	Frequency	Percentage	3-point Likert scale	Frequency	Percentage (%)
I used hand gloves always					
• Always	117	64.64	Always	171	85.23
• Never					
• Occasionally	10	5.52	Occasionally	10	5.52
• Rarely					
• Very frequently					
• Very Rarely	54	20.83			
I used the face mask when attending to a client					
• Always	106	34.25	Always	168	68.5
• Never	1	.55			
• Occasionally	8	4.45	Occasionally	11	6.11
• Rarely	3	1.66			
• Very frequently	62	34.25	rarely	2	2.21
• Very Rarely	1	.55			
I wear apron when attending to a patient					
• Always	40	22.10	Always	51	44.2
• Never	33	18.10			
• Occasionally	43	23.76	Occasionally	57	30.83
• Rarely	14	7.73			
• Very frequently	40	22.10			
• Very Rarely	11	6.08	rarely	25	24.18
I wear protective apron or gown when attending to patients with infectious diseases					
• Always	58	32.04	Always	115	64.08
• Never	29	16.02			
• Occasionally	21	11.60	Occasionally	31	17.12
• Rarely	10	5.52			
• Very frequently	58	32.04	Rarely	34	18.72
• Very Rarely	5	2.7			

Level of Utilization of PPE by Physiotherapists in the Nigeria health facilities	Frequency	Percentage	3-point Likert scale	Frequency	Percentage (%)
I wear goggles when attending to patients during COVID-19					
• Always	37	20.44	Always	69	38.12
• Never	76	41.99			
• Occasionally	16	8.29			
• Rarely	10	5.52	Occasionally	26	13.81
• Very frequently	32	17.68			
• Very Rarely	11	6.08	Rarely	87	48.02
I wear protective shoes when attending to patients during COVID-19					
• Always	26	14.36	Always	45	
• Never	93	51.38			24.86
• Occasionally	12	6.68			
• Rarely	12	6.68	Occasionally	24	
• Very frequently	19	10.50			13.36
• Very Rarely	19	10.50	Rarely	112	
I have enough PPE to wear during the COVID-19 pandemic					
• Always	18	9.98	Always	39	21.58
• Never	37	20.98			
• Occasionally	28	15.47			
• Rarely	40	22.10	Occasionally	68	37.57
• Very frequently	21	11.60			
• Very Rarely	37	20.44	rarely	74	41.42
I attend to patients without PPE					
• Always	8	4.42	Always	21	11.6
• Never	85	46.96			
• Occasionally	13	7.18			
• Rarely	13	7.18	Occasionally	26	14.36
• Very frequently	13	7.18			
• Very Rarely	49	27.07	Rarely	134	74.04

Level of Utilization of PPE by Physiotherapists in the Nigeria health facilities	Frequency	Percentage	3-point Likert scale	Frequency	Percentage (%)
I attend to patients without PPE because it is not available					
• Agree	21	11.60	Agree	41	22.65
• Disagree	63	34.81	Disagree	132	72.93
• Undecided	8	4.42			
• Strongly disagree	69	38.12	Undecided	8	4.42
• Strongly agree	20	11.05			
I attend to patients without PPE because I do not believe in it					
• Agree	2	1.10	Agree	4	2.20
• Disagree	69	38.12	Disagree	174	96.13
• Undecided	3	1.66			
• Strongly disagree	105	58.01	Undecided	3	1.66
• Strongly agree	2	1.10			
I attend to patients without PPE because they do not like it					
• Agreed	3	1.66	Agree	4	2.21
• Disagree	80	44.20	Disagree	173	95.51
• Undecided	4	2.21			
• Strongly disagree	93	51.31	Undecided	4	2.21
• Strongly agree	1	0.55			
I use my PPE to attend to patients when it is not provided					
• Agreed	30	16.67	Agree	118	65.29
• Disagree	20	11.05	Disagree	55	30.34
• Undecided	8	4.42			
• Strongly disagree	35	19.34	Undecided	8	4.42
• Strongly agree	88	48.62			
Total	N = 181	100%		N = 181	100%

Table 4. Showing the correlation between the level of availability and utilization among physiotherapists in the Nigeria health facilities

Level of the utilization of personal protective equipment	Level of availability of personal protective equipment (%)					χ^2 value	p-value
	Strongly agree	Agree	I don't know	Disagree	Strongly disagree		
I use hand gloves when attending to a client							
Always	32 (64.0)	36 (52.9)	3 (50.0)	17 (73.9)	29 (85.3)	22.95	0.003*
Occasionally	4 (8.0%)	3 (4.4)	2 (33.3)	0	1 (2.9)		
Very Frequently	14 (28.0)	29 (42.6)	1 (16.7)	6 (26.1)	4 (11.8)		
I use the Face mask when attending to a client							
Always	27 (54.0)	33 (48.5)	1 (16.7)	17 (73.9)	28 (82.4)	33.90	0.027*
Never	1 (2.0)	0	0	0	0		
Occasionally	4 (8.0)	2 (2.9)	1 (16.7)	0	1 (2.9)		
Rarely	0	2 (2.9)	1 (16.7)	0	0		
Very Frequently	18 (36.0)	30 (44.1)	3 (50.0)	6 (26.1)	5 (14.7)		
Very Rarely	0	1 (1.5)	0	0	0		
I wear protective apron or gown when attending to a client							
Always	61 (2.0)	7 (10.3)	12 (1.7)	5 (16.7)	21 (61.8)	59.78	<0.001*
Never	14 (28.0)	14 (20.6)	2 (33.3)	3 (13.0)	0		
Occasionally	11 (22.0)	21 (30.9)	1 (16.7)	7 (30.4)	3 (8.8)		
Rarely	7 (14.0)	3 (4.4)	1 (16.7)	3 (13.0)	0		
Very Frequently	9 (18.0)	17 (25.0)	1 (16.7)	3 (13.0)	10 (29.4)		
Very Rarely	3 (6.0)	6 (8.8)	0	2 (8.7)	0		
I wear apron or gown when attending to patients with infectious diseases							
Always	13 (26.0)	16 (23.5)	1 (16.7)	6 (26.1)	22 (64.7)	37.28	0.011*
Never	14 (28.0)	11 (16.2)	1 (16.7)	3 (13.0)	0		
Occasionally	7 (14.0)	9 (13.2)	1 (16.7)	3 (13.0)	1 (2.9)		
Rarely	2 (4.0)	5 (7.4)	1 (16.7)	2 (8.7)	0		
Very Frequently	11 (22.0)	25 (36.8)	2 (33.3)	9 (39.1)	11 (32.4)		
Very Rarely	3 (6.0)	2 (2.9)	0	0	0		

Level of the utilization of personal protective equipment	Level of availability of personal protective equipment (%)					χ^2 value	p-value
	Strongly agree	Agree	I don't know	Disagree	Strongly disagree		
I wear goggles when attending to patients with infectious diseases							
Always	11 (22.0)	3 (4.4)	0	6 (26.1)	17 (50.0)	48.91	<0.001*
Never	25 (50.0)	38 (55.9)	2 (33.3)	9 (39.1)	2 (5.9)		
Occasionally	2 (4.0)	6 (8.8)	1 (16.7)	3 (13.0)	3 (8.8)		
Rarely	3 (6.0)	4 (5.9)	0	1 (4.3)	2 (5.9)		
Very Frequently	6 (12.0)	13 (19.1)	3 (50.0)	2 (8.7)	8 (23.5)		
Very Rarely	3 (6.0)	4 (5.9)	0	2 (8.7)	2 (5.9)		
I wear protective shoe when attending to patients with infectious diseases							
Always	3 (6.0)	5 (7.4)	0	4 (17.4)	14 (41.2)	47.56	<0.001*
Never	33 (66.0)	40 (58.8)	3 (50.0)	11 (47.8)	6 (17.6)		
Occasionally	2 (4.0)	5 (7.4)	1 (16.7)	1 (4.3)	3 (8.8)		
Rarely	4 (8.0)	6 (8.8)	0	1 (4.3)	1 (2.9)		
Very Frequently	1 (2.0)	8 (11.8)	2 (33.3)	3 (13.0)	5 (14.7)		
Very Rarely	7 (14.0)	4 (5.9)	0	3 (13.0)	5 (14.7)		
I have enough PPE to wear		0	0			105.71	<0.001*
Always	1 (2.0)	0	0	5 (21.7)	12 (35.3)		
Never	21 (42.0)	11 (16.2)	2 (33.3)	2 (8.7)	1 (2.9)		
Occasionally	3 (6.0)	15 (22.1)	2 (33.3)	3 (13.0)	5 (14.7)		
Rarely	8 (16.0)	21 (30.9)	1 (16.7)	8 (34.8)	2 (5.9)		
Very Frequently	2 (4.0)	4 (5.9)	1 (16.7)	1 (4.3)	13 (38.2)		
Very Rarely	15 (30.0)	17 (25.0)	0	4 (17.4)	1 (2.9)		
I attend to patients without PPE							
Always	5 (10.0)	1 (1.5)	1 (16.7)	1 (4.3)	0	45.09	0.001*
Never	22 (44.0)	32 (47.1)	0	9 (39.1)	22 (64.7)		
Occasionally	3 (6.0)	5 (7.4)	3 (50.0)	1 (4.3)	1 (2.9)		
Rarely	3 (6.0)	6 (8.8)	1 (16.7)	3 (13.0)	0		
Very Frequently	7 (14.0)	2 (2.9)	1 (16.7)	2 (8.7)	1 (2.9)		
Very Rarely	10 (20.0)	22 (32.4)	0	7 (30.4)	10 (29.4)		

Level of the utilization of personal protective equipment	Level of availability of personal protective equipment (%)					χ^2 value	p-value
	Strongly agree	Agree	I don't know	Disagree	Strongly disagree		
I attend to patients without PPE because it is not available							
Agree	4 (8.0)	8 (11.8)	3 (50.0)	4 (17.4)	2 (5.9)	68.27	<0.001*
Disagree	13 (26.0)	35 (51.5)	1 (16.7)	8 (34.8)	6 (17.6)		
Neutral	3 (6.0)	3 (4.4)	2 (33.3)	0	0		
Strongly agree	14 (28.0)	3 (4.4)	0	2 (8.7)	1 (2.9)		
Strongly Disagree	16 (32.0)	19 (27.9)	0	9 (39.1)	25 (73.5)		
I attend to patients without PPE because I don't believe in it							
Agree	0	1 (1.5)	0	1 (4.3)	0	69.13	<0.001*
Disagree	12 (24.0)	39 (57.4)	2 (33.3)	10 (43.5)	6 (17.6)%		
Neutral	0	0	2 (33.3)	0	1 (2.9)		
Strongly agree	0	1 (1.5)	0	1 (4.3)	0		
Strongly Disagree	38 (76.0)	27 (39.7)	2 (33.3)	11 (47.8)	27 (79.4)		
I attend to patients without PPE because they don't like it							
Agree	0	1 (1.5)	1 (16.7)	1 (4.3)	0	38.94	0.001*
Disagree	16 (32.0)	42 (61.8)	2 (33.3)	12 (52.2)	8 (23.5)		
Neutral	1 (2.0)	1 (1.5)	1 (16.7)	0	1 (2.9)		
Strongly agree	0	1 (1.5)	0	0	0		
Strongly Disagree	33 (66.0)	23 (33.8)	2 (33.3)	10 (43.5)	25 (73.5)		
I use my PPE to attend to patients when it is not provided							
Agree	8 (16.0)	16 (23.5)	3 (50.0)	3 (13.0)	0	62.46	<0.001*
Disagree	6 (12.0)	4 (5.9)	1 (16.7)	5 (21.7)	4 (11.8)		
Neutral	5 (10.0)	2 (2.9)	1 (16.7)	0	0		
Strongly agree	23 (46.0)	42 (61.8)	0	12 (52.2)	11 (32.4)		
Strongly Disagree	8 (16.0)	4 (5.9)	1 (16.7)	3 (13.0)	19 (55.9)		

*: Statistically significant p-value ≤ 0.05

Table 5. Showing the influence of sociodemographic characteristics on the utilization level of PPE

Social demographics	I attend to patients without PPE (%)						χ^2 value	p-value
	Always	Never	Occasionally	Rarely	Very Frequently	Very Rarely		
Age Group (Years)								
20-29	0	2 (2.4)	0	0	0	1 (2.0)	17.85	0.22
30-39	7(87.5)	43(50.6)	10 (76.9)	5(38.5)	9 (69.2)	20 (40.8)		
40-49	1(12.5)	29(34.1)	2 (15.4)	8(61.5)	2 (15.4)	20(40.8)		
50-59	0	11(12.9)	1 (7.7)	0	2 (15.4)	8 (16.3)		
Gender								
Female	3(37.5)	40(47.1)	2 (15.4)	6(46.2)	5 (38.5)	32(65.3)	12.56	0.031*
Male	5(62.5)	45(52.9)	11 (84.6)	7(53.8)	8 (61.5)	17(34.7)		
level of education								
B.Sc. (PT)	7(87.5)	25(29.4)	7 (53.8)	6(46.2)	3 (23.1)	11(22.4)	31.61	0.007*
Diploma	0	2 (2.4)	1 (7.7)	0	0	0		
Masters (PT)	0	48(56.5)	2 (15.4)	3(23.1)	8 (61.5)	26(53.1)		
PhD	1 12.5)	10(11.8)	3 (23.1)	4(30.8)	2 (15.4)	12 24.5)		
Place of employment								
Academia	0	1 (1.2)	0	0	3 (23.1)	1 (2.0)	87.84	<0.001*
Domiciliary Physiotherapy	0	0	1 (7.7)	0	0	0		
Federal Medical Center	1(12.5)	18(21.2)	2 (15.4)	3(23.1)	3 (23.1)	10(20.4)		
Federal Teaching Hospital	0	22(25.9)	4 (30.8)	6(46.2)	2 (15.4)	27(55.1)		
Private Hospital	3(37.5)	13(15.3)	3 (23.1)	1 (7.7)	0	0		
Private Physiotherapy Clinics	4(50.0)	10(11.8)	2 (15.4)	0	1 (7.7)	3 (6.1)		
State General Hospital	0	1 (1.2)	0	1 (7.7)	0	0		
State Specialist Hospital.	0	1 (1.2)	0	0	0	0		
State Teaching Hospitals	0	19(22.4)	1 (7.7)	2(15.4)	4 (30.8)	8 (16.3)		
Years of experience								
<5	5(62.5)	6 (7.1)	6 (46.2)	3(23.1)	3 (23.1)	1 (2.0)	52.0	<0.001*
5-10	2(25.0)	38(44.7)	2 (15.4)	5(38.5)	3 (23.1)	18(36.7)		
11-15	0	36(42.4)	3 (23.1)	2(15.4)	7 (53.9)	24(49.0)		
>15	1(12.5)	5 (5.9)	2(15.4)	3(23.1)	0	6 (12.2)		

Social demographics	I attend to patients without PPE (%)						χ^2 value	p-value
	Always	Never	Occasionally	Rarely	Very Frequently	Very Rarely		
Area of specialization								
Cardiopulmonary	0	14(16.5)	0	2(15.4)	2 (15.4)	6 (12.2)	56.98	0.04*
Geriatrics	0	16(18.8)	3 (23.1)	1 (7.7)	2 (15.4)	10(20.4)		
Neurology	2(25.0)	12(14.1)	2 (15.4)	4(30.8)	3 (23.1)	10(20.4)		
None	2(25.0)	2 (2.4)	4 (30.8)	2 15.4)	1 (7.7)	0		
Orthopaedics/Sports	3(37.5)	19(22.4)	4 (30.8)	1 (7.7)	3 (23.1)	11(22.4)		
Palliative care/Oncology	0	(5.9)	0	1 (7.7)	0	2 (4.1)		
Paediatrics	1(12.5)	6 (7.1)	0	1 (7.7)	1 (7.7)	5 (10.2)		
Public/Community	0	0	0	0	1 (7.7)	0		
Women's health	0	11(12.9)	0	1 (7.7)	0	5 (10.2)		

*: Statistically significant p-value ≤ 0.05

appropriate PPE in line with the Health and Safety at Work Act 1974" [14]. The NCDC recommended medical mask, gown, gloves, eye protection goggles or face shield for health workers providing direct care to COVID-19 patients, and health workers who conduct a physical examination of a patient with respiratory symptoms. It is recommended no PPE for health workers who are involved in activities requiring no contact with COVID-19 patients [8]. This qualifies the physiotherapists as one of the health workers who should use PPE both in routine and critical care of patients, especially during the COVID-19 pandemic. The authors noted that the high availability of facemasks and gloves might be due to their routine use in clinical practice by the Nigeria Physiotherapists, unlike the other types of PPE (protective gown, goggles and shoes) whose use are mostly recommended when physiotherapists are co-managing a confirmed infectious disease condition such as COVID-19. The authors also noted that the reason for low availability of protective gown, goggle and shoes might be linked to the few numbers of Nigerian physiotherapists who are involved in the critical care and infectious disease management and hence the quantity made available to them are limited.

In Table 3, it was revealed that there was high utilization of gloves by the respondents in their health facilities as the percentages that wear gloves always and very frequently were much higher than those who wear gloves occasionally and rarely, and also those who wear gloves very rarely and never wear gloves at all. The same table shows high utilization of face masks by the respondents compared to those respondents with low and poor utilization. The authors noted that both the hand gloves and the face masks witnessed high-level utilization by the respondents during the period of COVID-19 in their respective health facilities. The result also shows high utilization of gown by most respondents when they were attending to patients compared with those with low and poor utilization. In contrast, there was poor utilization of goggles and protective shoes amongst the respondents probably because of low-level availability in the health facilities where they work. Table 3 also shows that a low number of physiotherapists had enough PPE (complete set) to wear. This might be attributed to the fact that the number of Nigerian physiotherapists involved in infectious disease management and critical care management is few. Another finding is that most respondents comply with the use of PPE

especially facemasks and hand gloves during patients care and management during the period of COVID-19 pandemic. Also, of the interest is that a low percentage of respondents agreed that they attended to patients without PPE because it was not available as most respondents declined to attend to patients when PPE was not available. Interestingly, only a small number of respondents agreed that they attended to patients during the COVID-pandemic because they (respondents) did not believe in the PPE. The similar finding showed that only a small number of the respondents indicated that patients opposed the use of PPE during treatment and that most of the physiotherapists declined to treat their patients who opposed the use of PPE. This outcome agrees with the previous study finding where one of the reasons for not using personal protective equipment was a risk that patients might get offended by the use of PPE by health care workers [17]. The outcome shows that most of the physiotherapists used their PPE especially face masks, hand gloves and gowns to attend to their patients when it was not supplied. This is a significant development as it will help to protect the Nigerian physiotherapists during their contacts with patients and ensure the continuity of care. It also portrays Nigerian physiotherapists as not fully relying on the supply of PPE by the employers especially facemasks, hand gloves and gown which are needed in routine clinical practice.

The results from the Chi-square (Table 4) showed that a significant relationship was observed between the level of utilization of personal protective equipment and the availability of personal protective equipment among Nigerian Physiotherapists. This indicates that the more available the PPE becomes, the higher the level of utilization among the respondents studied. This finding shows a positive correlation between the two variables ($p < 0.001$). This finding agrees with the previous study outcome that provision of PPE increases the uptake for using it [18]. Also, in another study, a low number of participants cited a lack of availability of PPE as a reason for not using it [19]. This finding might suggest that Nigeria physiotherapists understand the importance of PPE utilization as a protective measure during patients' care. From the finding, face masks and hand gloves have high utilization level because of the high-level availability in the health facilities where the respondents work. On the contrary, the other types of PPE – protective gown, goggles and shoes - witnessed low utilization

because they were not readily available to the majority of the respondents in their health facilities. As has been noted before, the number of physiotherapists involved in critical care and infectious disease management in Nigeria health facilities is few that might have occasioned low supply of PPE by Nigerian health authorities.

The Chi-square showed that gender, level of education, place of employment, years of experience, area of specialization all had a significant influence on the utilization level of PPE among the study respondents. However, age was not found to have a statistically significant ($p > 0.05$) influence on the utilization of the PPE. The authors are of the view that there is a dearth of literature to support this finding that showed the influence of socio-demographic characteristics on the utilization level of PPE amongst the Nigerian physiotherapists or any other population. The authors, therefore, postulate that the highlighted items in the socio-demographic characteristics of the respondents, except age, influenced the positive utilization of the PPE because they impacted positively on the knowledge base of the Nigerian physiotherapists. However, place of employment, years of experience and level of education were found to influence the utilization of the PPE more than gender and area of specialization. High level of utilization of PPE amongst Nigerian physiotherapists is pertinent to safe practice during COVID-19 because physiotherapists have direct contact with patients, which make them susceptible to the transmission of infectious diseases.

5. CONCLUSION

The result of this study showed that there were high availability and utilization of facemasks and hand gloves to the Nigerian physiotherapists during the period of COVID-19 pandemic in the different health facilities; it also shows that there were low availability and utilization of apron and poor availability and utilization of protective eye shield/goggles and shoes during the same period. This indicates that the more available the PPE becomes, the higher the level of utilization among the respondents studied. Also, of importance is the finding that the place of employment, years of experience and level of education were found to influence the utilization of the PPE more than gender and area of specialization. The age of respondents was however found not to influence the utilization of the PPE by the Nigerian physiotherapists.

6. RECOMMENDATIONS

The Nigerian health authorities should sustain the availability of facemasks and hand gloves and improve the supply of apron, goggles and shoes to the physiotherapists who work in critical care units in different health facilities as a way of minimizing their exposure to infectious diseases such as COVID-19 virus. This can be achieved by ensuring that proper funding is provided to ensure regular purchase of the PPE. Also, more studies in this area of knowledge are recommended that will reach out to more physiotherapists via different social media platforms like a telegram, Instagram, email et cetera. That will facilitate a comparison between the outcome of the current study and future studies.

7. LIMITATIONS

This study was limited by the dearth of literature in this area of knowledge that would enhance more robust discussion of the result.

CONSENT

The respondents were sensitized on the purpose of the study on the introductory part of the questionnaire, after which the respondents consented to participate in the study.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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