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Non-pharmaceutical Interventions (NPIs) in Curbing COVID-19 in a Metropolis in North-Central Nigeria

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Abstract

Background: Effective treatment for COVID-19 is not available, neither is an effective vaccine for its prevention. Drastic measures in the form of non-pharmaceutical interventions need to be applied to reduce transmission and flatten the curve.
Objectives: This study aimed at analyzing the knowledge of the study population about social distancing and their attitude towards the use of face masks in a bid to flatten the curve of COVID-19 pandemic in the state and Nigeria as a whole.
Methods: This study, which was conducted in the central business district of Ilorin in Kwara State, Nigeria, investigated the knowledge of social distancing and attitude toward the use of face masks in a metropolis. A total of 300 participants were randomly selected, and their information was retrieved through the administration of a self or interviewer-administered questionnaire. The primary data was analyzed using SPSS. Variables were tested with chi-squared test, and data was presented in frequency tables and simple percentages. Attitude of the participants was evaluated using a five-point Likert scale ranging from strongly disagree to strongly agree.
Results: Most of the participants (93.3%) had heard about social distancing. What the term means was not known to 68 (22.7%) of the participants and not practiced by 106 (30.7%) of them. The consistent use of face masks was reported by 30 (10%) participants, while 164 (54.7%) used face masks irregularly, and 106 (35.3%) did not use them at all. Face masks are perceived to be uncomfortable by 165 (55%) respondents, 134 (44.7%) believed it disturbs normal breathing, 103 (34.3) thought it disfigures the face, and its effects on dressing was pointed out by 95 (31.7) respondents.
Conclusions: In general, the participants demonstrated a good knowledge of social distancing though not widely practiced it. They also had a positive attitude towards the use of face masks, though it was not correctly and consistently worn. Intensified efforts in education on the right use and essence of these non-pharmaceutical interventions are strongly recommended.

Keywords: COVID-19, Face Masks, Nigeria, Non-pharmaceutical Interventions, SARS COV2, Social Distancing

1. Background

COVID-19 caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was first reported in Wuhan, China, in December 2019 as a cluster of atypical pneumonia with high mortality (1-3). It was declared by the World Health Organization as a Public Health Emergency of International Concern on 30 January and a pandemic on 11 March (4, 5). As of 31 May 2020, more than 6.09 million cases of COVID-19 have been reported in more than 188 countries and territories, causing more than 369,000 deaths while more than 2.58 million people have recovered (6).

Human-to-human transmission of the virus is predominantly via the inhalation of infectious droplets produced in the process of sneezing, coughing, and talking when people are in close contact (7-9). The droplets typically fall to the ground or on surfaces instead of traveling through air over long distances due to its size, hence hand contact with these infectious fomites on hard surfaces and subsequent translocation to the mouth, nose, and eye is an equally important means of transmission (7, 8). The virus is mostly infectious during the first three days after the onset of symptoms, though its spread is feasible before symptoms appear and from individuals who are asymptomatic (7, 8). The incubation period ranges from 2 to 14 days with an average of five days, and the common clinical features include cough, fever, fatigue, shortness of breath, and anosmia (7, 10, 11). Extrapulmonary symptoms may occur singly as the presenting complaint or with the aforementioned common symptoms (12, 13).

Currently, there are no known vaccine or specific antiviral treatment (7), and emphasis is therefore on the prevention of infection. Non-pharmaceutical interventions (NPI) are strategies taken at the personal, community, and environmental levels to help slow the spread of the disease pandemic. They are a group of methods to reduce the spread of an epidemic without the use of drugs (14). This strategy has been previously used in the control of the 2009 swine flu pandemic influenza, and the Center for Disease Control advocates its use in curbing the coronavirus pandemic. Non-pharmaceutical interventions are among the best ways of controlling the flu pandemic when vaccines are not yet available (15).

As such, several NPIs have been implemented globally to control the COVID-19 pandemic, among which is social distancing (SD) (16). Social distancing, also called physical distancing, is a set of NPI aimed at preventing the spread of a contagious disease by increasing and maintaining the physical distance between people and reducing the frequency of close contact among people to decrease the risk of disease transmission (15, 17). The social distancing measures applied so far include school closures, ban on large gatherings for religious purposes or celebrations, closure of all non-essential business outfits, and restrictions on vehicular intra and intercity movement (16). These measures, when used in combination with good respiratory hygiene and the use of personal protective equipment, such as face masks and hand hygiene, are the most feasible way to reduce or delay a pandemic (18).

Governments all over the world have responded to the current COVID-19 pandemic by employing travel restrictions, city lockdowns, workplace hazard controls, and non-essential facility closures. These restrictions are gradually being eased systematically across the globe, and Nigeria is not an exemption. However, since the easing of lockdown in many parts of Nigeria, there have been instances of non-compliance with safety measures such as maintaining social distancing and consistent and correct use of face masks when in public places (19).

2. Objectives

It is against this backdrop that this study was conducted to determine the knowledge of the study population about social distancing, assess the level of practice of social distancing, determine the attitude towards the use of face masks, and determine the likely factors influencing the adoption of these NPI. The attitude of participants was graded using a 5-point Likert scale, ranging from strongly disagree to strongly agree. Marks were allotted to each response as stated below: Strongly disagree was allotted 5 marks, disagree 4 marks, undecided 3 marks, agree 2 marks, and strongly agree 1 mark. Hence, the least score obtainable was 10 marks, while the highest was 50 marks. Converting the score to percentage, 10% - 50% was graded negative attitude, while 51% -100% was considered positive attitude. The level of knowledge displayed will be graded by allocating 20 marks to each correct answer, while zero was allotted to each wrong answer. Grading of correct scores will be done by converting the total obtainable correct score to percentage. Annotation for grading will be 0% -100%, such that 0% - 49% will be described as poor knowledge and 50% -79% as fair knowledge, while 80% -100% will be described as good knowledge.

3. Methods

The study was conducted in Taiwo area, which is the Central Business District (CBD) of Ilorin, the capital city of Kwara State, North Central Nigeria (20). This area has a population of 777,667 people, making it the 7th largest city by population in Nigeria (21). Taiwo road is a dual carriage road located at the heart of Ilorin city, connecting the city center to other parts of the city. The majority of the main business activities of the city take place here (Figure 1).

Located within this CBD are commercial banks, hospitals, boutiques, fuel filling stations, eateries, telecommunication outlets, offices, stadiums, schools, computer business centers, residential buildings, shopping malls, mini-markets, and religious houses, amongst others. It is usually densely populated in the daytime due to its numerous business activities, nightlife there is equally substantial. People from all walks of life, across various social classes and strata, with varying educational backgrounds and of different ethnicities can be found there at every point in time transacting.

A total of 300 participants selected through a simple random sampling technique participated in the study. Consenting men and women aged 18 years and above met at the CBD were interviewed. Research assistants were strategically located at various points in the CBD, interviewing businessmen and their prospective customers simultaneously. Individuals not up to the requisite age were excluded as well as those who could not converse in English and Yoruba, the prevalent native tongue. The concept of the study was explained to the participants in a language they could understand, and a written and verbal informed consent was obtained from them before the inter-

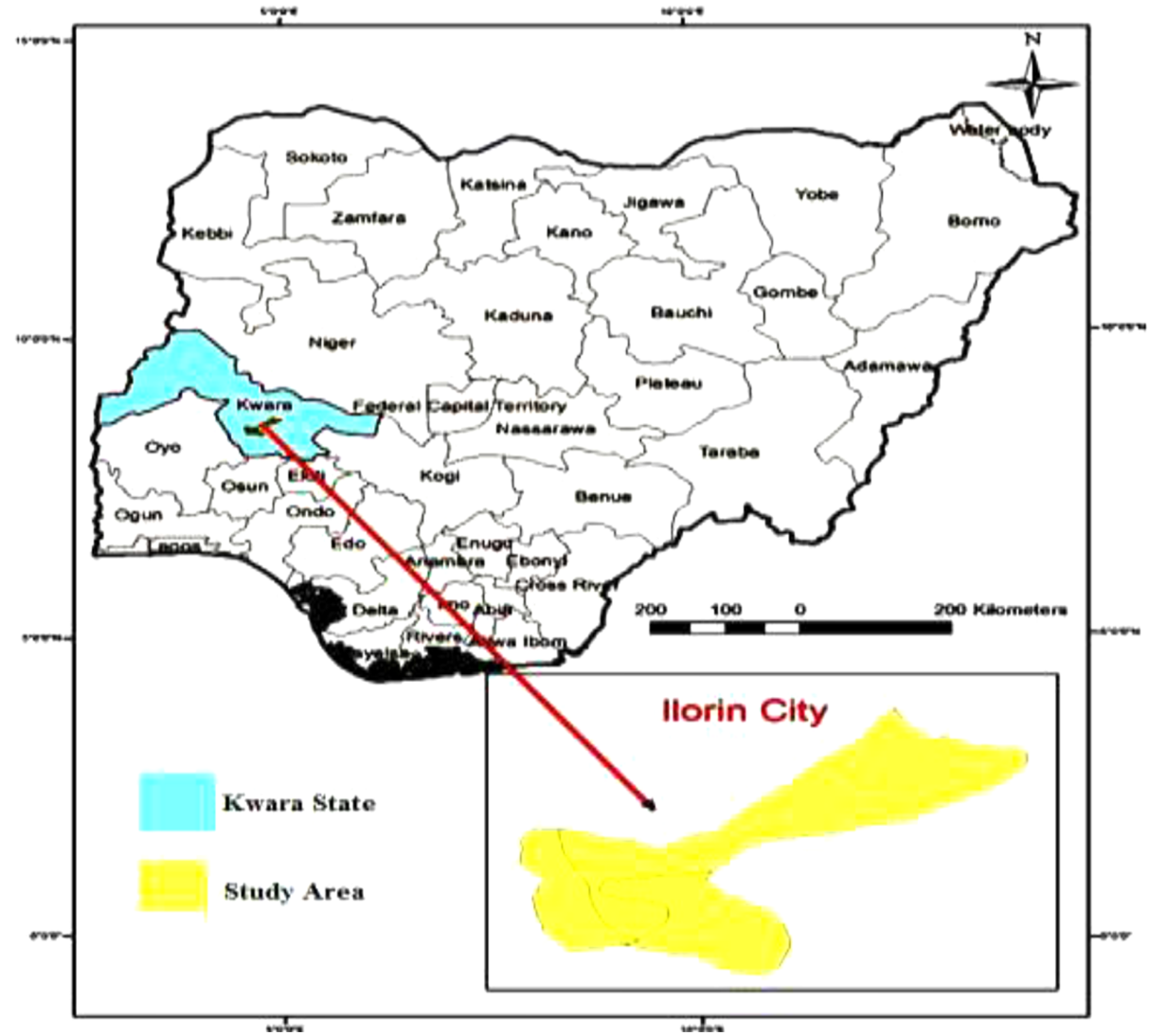

Figure 1. Map of Nigeria showing Kwara State and Ilorin the Study Area (shaded) (22)

view. The information retrieved through the interviewer-administered structured questionnaire was analyzed using SPSS, version 20. Variables were tested with chi-squared test, and information was presented in frequency tables and simple percentages.

4. Results

The sociodemographic characteristics of the participants is as depicted in Table 1. Male gender predominated (59.0% of all participants), most of whom were aged $\leq$ 30 years (49.0%). Other age distributions were 31 - 40 years (35.7%), 41 - 50 years (10.7%), 51 - 60 years (2.7%), and > 60 years (2.0%). Ethnicity likewise varied as 157 (52.3%) were Yoruba, the major language of the study area, and 104 (34.7%) were Igbo. Other ethnic groups represented included Hausa (4.3%), Nupe (4.3%), Ebira (2.7%), and Igala (1.3%). Educational attainment ranged from completing primary school education (15.0%) to attending a tertiary institution of learning in the country (60.7%). The respondents interviewed for the study were traders/businessmen and women who had their business outlets at the CBD (42.7%), public servants (7.7%), self-employed (10.3%), students (29.7%), and unemployed people (5.3%).

What is known about social distancing was tested, and

Table 1. Sociodemographic Characteristics of the Respondents[a]

Sociodemographic Characteristics (N = 300)	No. (%)
Gender	
Male	177 (59.0)
Female	123 (41.0)
Age, y	
≤ 30	147 (49.0)
31 - 40	107 (35.7)
41 - 50	32 (10.7)
51 - 60	8 (2.7)
> 60	6 (2.0)
Religion	
Christianity	219 (73.0)
Islam	81 (27.0)
Ethnicity	
Yoruba	157 (52.3)
Igbo	104 (34.7)
Hausa	13 (4.3)
Ebira	8 (2.7)
Nupe	13 (4.3)
Igara	4 (1.3)
Tiv	1 (0.3)
Edo	8 (2.7)
Educational background	
None	24 (8)
Primary	45 (15.0)
Secondary	73 (24.3)
Tertiary	158 (52.7)
Occupation	
Business/trader	128 (42.7)
Civil servant	23 (7.7)
Public servant (political office holders)	13 (4.3)
Self-employed	31 (10.3)
Student	89 (29.7)
Unemployed	16 (5.3)

[a]Source: Researchers' survey, 2020.

findings are reported in Table 2. The majority (93.3%) of the participants had heard about social distancing previously. Many were knowledgeable about what it entails, as 232 (77.3%) knew it involves keeping a physical distance of at least 6 feet from other people, 265 (88.3%) knew it involves avoiding gatherings, and 251 (87%) knew it involves staying out of crowded places and avoiding mass gatherings. The essence of social distancing, which is to reduce the likelihood of transmission of COVID-19, was known to 251 (83.7%) participants.

Findings regarding the practice of social distancing by the participants is shown in Figure 2. Few participants (6.7%) practiced social distancing consistently, 30.7% had never practiced it, while 62.7% occasionally practiced it.

All the participants knew what the face mask is and its use. Data regarding its usage is presented in Figure 3. Many were occasional users (54.7%), while a sizeable percentage did not use face masks at all (35.3%). In general, the participants displayed a positive attitude towards the use of the face masks (Figure 4). Questions asked to decipher the participants' attitudes, which were scored using a 5-point Likert scale, included (Table 3) if the face mask makes one uncomfortable, if it disfigures the face, if it negatively affects the individual's dressing if it impairs normal breathing, if the individual is confident that its usage can prevent infection with the coronavirus, and if its use connotes infection in the user.

Relating sociodemographic characteristics with knowledge on social distancing (Table 4) and attitude towards the use of face masks (Table 5), we found a statistically significant relationship between gender, age, education, and occupation of participants and the practice of social distancing (Figure 5). Male participants had a better knowledge than females (81.4%), and those < 30 years of age demonstrated a better knowledge than other age groups. Educational background likewise had

Table 2. what is Known About Social Distancing[a]

Knowledge on Social Distancing	No. (%)
Ever heard of social distancing	
Yes	280 (93.3)
No	20 (6.7)
social distancing can prevent spreading of covid-19	
Yes	251 (83.7)
No	49 (16.3)
Social distancing is staying at least 6 feet (about 2 arms' length) from other people	
Yes	232 (77.3)
No	68 (22.7)
Social distancing is avoiding gatherings	
Yes	265 (88.3)
No	35 (11.7)

[a]Source: Researchers' survey 2020.

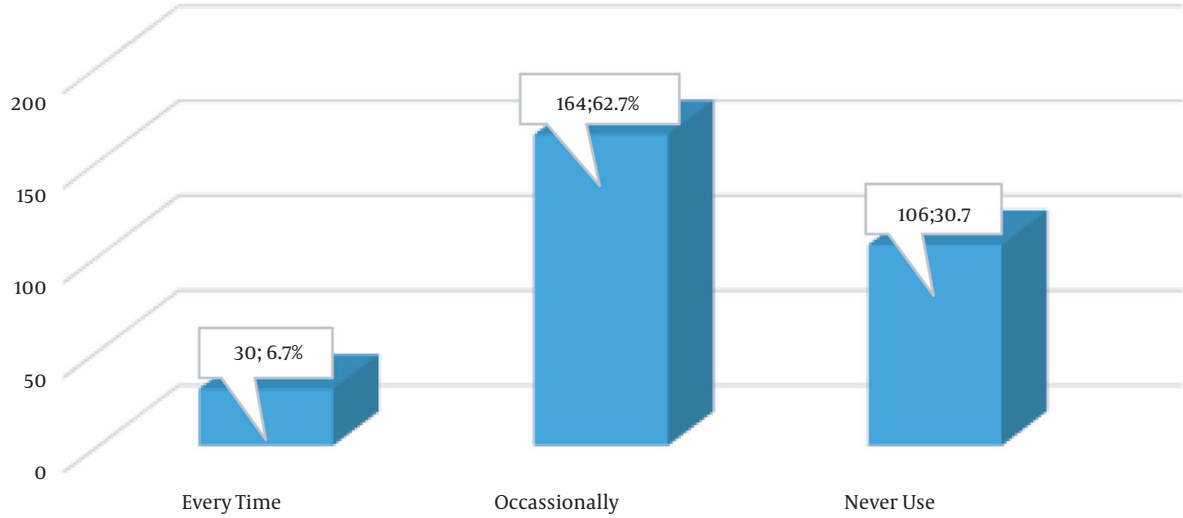

Figure 2. The practice of social distancing by participants

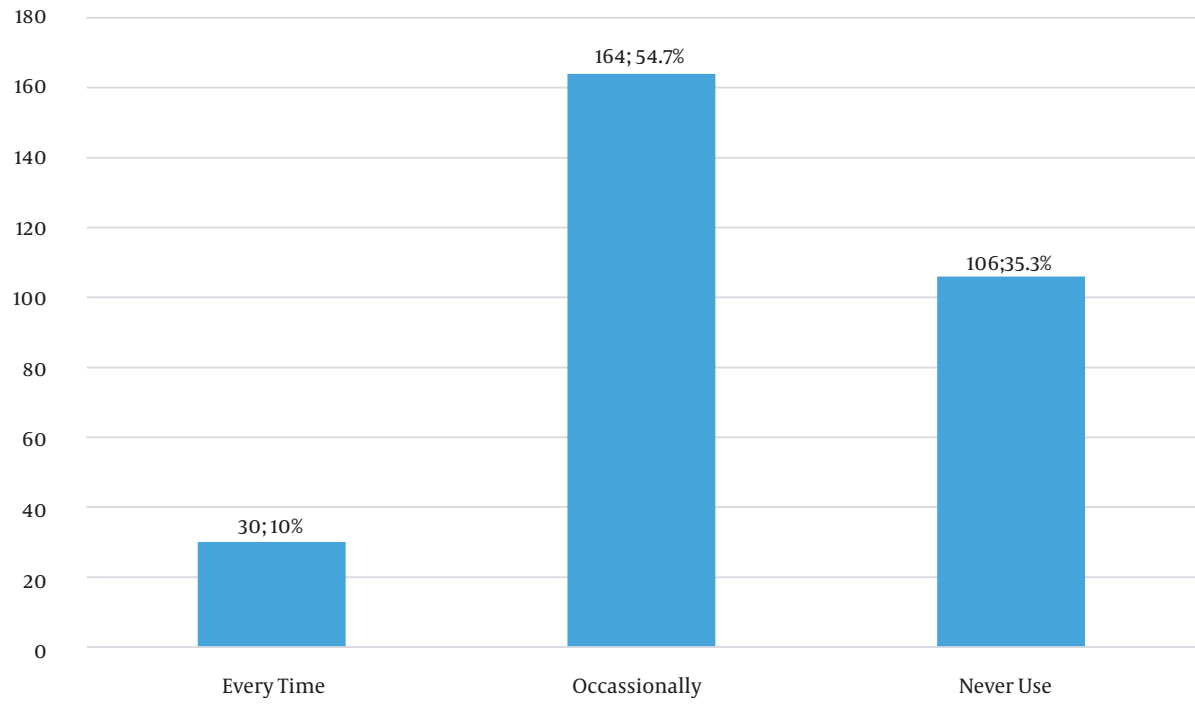

Figure 3. Participant's practice of face mask usage

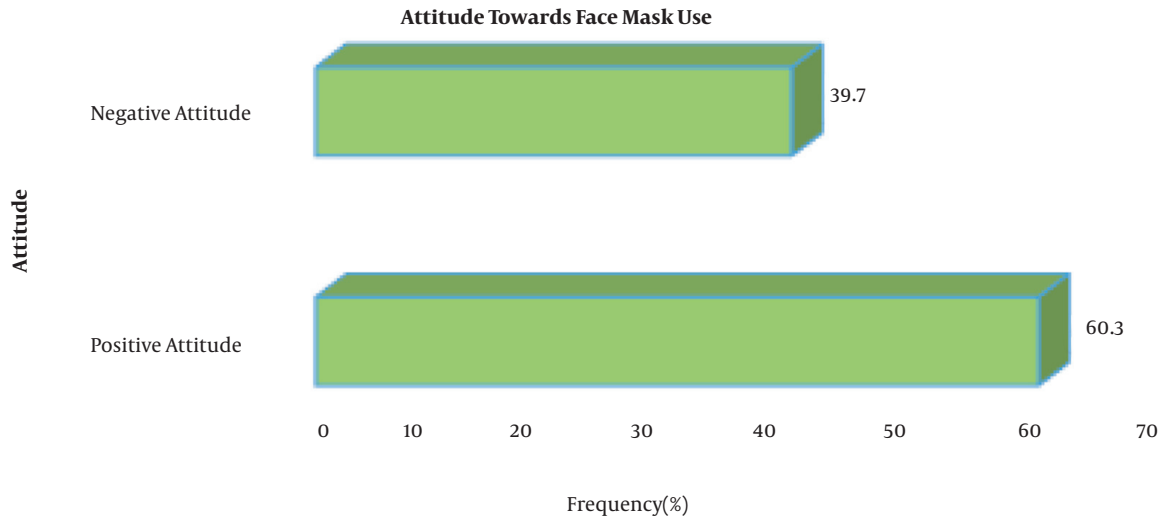

Figure 4. Grading of participants' attitude towards face mask

Table 3. Attitude of the Participants Towards the Use of Face Masks[a]

Attitude	Strongly Agree (%)	Agree (%)	Undecided (%)	Disagree (%)	Strongly Disagree (%)
I don't like wearing face mask	135 (45.0)	73 (24.3)	15 (5.0)	23 (7.7)	54 (18.0)
Face mask makes me feel uncomfortable	165 (55.0)	61 (20.3)	5 (1.7)	29 (9.7)	40 (13.3)
Face mask disfigures my face	103 (34.3)	36 (12.0)	45 (15.0)	20 (6.7)	96 (32.0)
Face affects my dressing	95 (31.7)	30 (10.0)	25 (8.3)	31 (10.3)	119 (39.7)
Face mask affects my breathing	134 (44.7)	64 (21.3)	9 (3.0)	21 (7.0)	72 (24.0)
Face mask is evil	34 (11.3)	22 (7.3)	37 (12.3)	44 (14.7)	163 (54.3)
Face mask is just for fashion	48 (16.0)	52 (17.3)	18 (6.0)	43 (14.3)	139 (46.3)
Those that wear face mask have corona virus	13 (4.3)	8 (2.7)	15 (5.0)	33 (11.0)	231 (77.0)
I don't have confidence in face mask	61 (20.3)	32 (10.7)	35 (11.7)	35 (11.7)	137 (45.7)
I can never wear face mask	50 (16.7)	56 (18.7)	36 (12.0)	39 (13.0)	119 (39.7)

[a]Source: researcher's survey.

a significant effect on the knowledge, as the majority of those with no formal education had poor knowledge (50%), unlike those with tertiary level of education whose majority had good knowledge (96.7%).

Gender and educational background had significant effects on the attitude of participants to the use of face masks. A positive attitude was mostly observed in males (54.1%) and those with tertiary education (68.5%).

5. Discussion

The COVID-19 has no known curative therapeutic agent, and neither is there a potent vaccine available in its prevention. It is therefore imperative to take preventive measures to limit the spread of the infection (22). Non-pharmaceutical interventions can reduce the transmission of diseases whose mode of transmission is via droplet contact, direct physical contact, and indirect physical contact (e.g., by touching a surface contaminated with virus, usually in fomites) (16). Its use dates as far back as the 1918 - 1919 influenza pandemic, during which a number of United States cities implemented home quarantine for infected persons, social distancing, and a reduction in public gatherings such as church meetings and closure of schools (23). The COVID-19 pandemic is still ongoing, and it is too early to make categorical statements on the success or otherwise of NPI in preventing the spread of the disease.

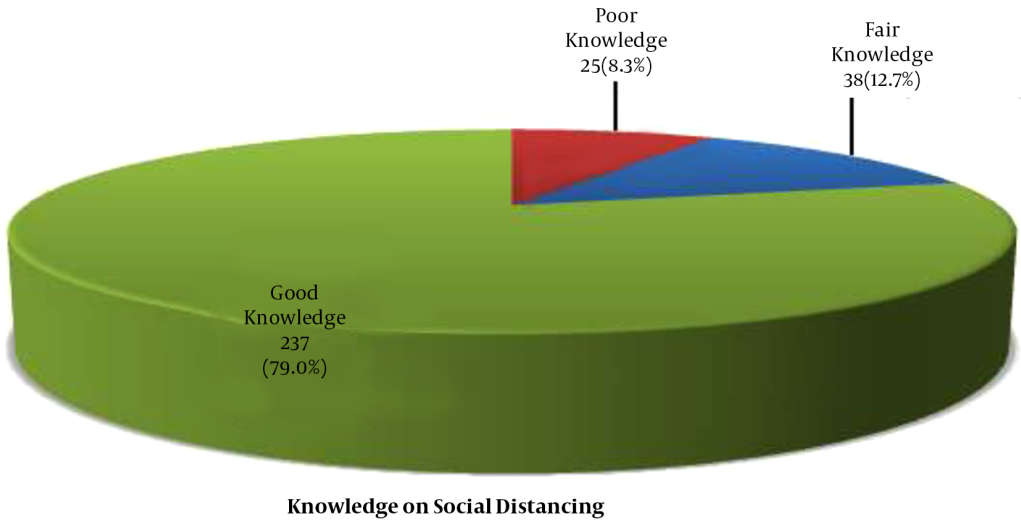

Figure 5. Participants' knowledge on social distancing

This study assessed the use of NPIs in curbing the spread of COVID-19 in a metropolis in North Central Nigeria. The interventions assessed were social distancing and face mask use. Results from the study suggest that participants had a good knowledge of the concept of SD. This finding is similar to the results of a survey conducted among 1750 households in Delhi, a metropolitan city in India, in which participants demonstrated an equally good knowledge of SD, with about 85% of the participants in the study attesting to the efficacy of this interventional strategy in preventing COVID-19 spread (24). The good knowledge displayed by participants may stem from the availability of information on media, print, and non-print, which many people have access, to most especially social media. This also may be the probable reason for the younger individuals less than 30 years of age having a better knowledge on the subject than older age groups as they spend more time surfing the social media.

The face mask serves as a means of source control when worn by an infected person and at the same time a protective tool to the uninfected, protecting them from the virus peradventure they come in contact with an infected individual (25). Its use, though unmistakably necessary, needs to be correctly and consistently done. To achieve this, the individual needs to have the right perception about the face mask, resulting in a positive attitude concerning its usage. A wrongly worn face mask is as good as not using it at all, while the incorrect handling of the mask while worn and after removal is equally as dangerous as not wearing, as the virus SARS CoV2 has been seen to persist on the face mask surface for up to seven days (26). The incorrect use and disposal of face masks may actually increase the rate of transmission (27).

The attitude of participants towards wearing face masks was generally a positive one, though many were occasional users. Its limited usage despite a positive attitude might stem from low risk perception about COVID-19 drawn from the low disease incidence reported in Africa compared to other parts of the world (28). This finding corroborates the result from a previous study conducted in Jordan in which participants a demonstrated positive attitude towards face mask wearing as a measure for preventing COVID-19 (29).

Reasons for the inconsistent or non-usage of face masks include feeling uncomfortable while wearing and its negative impact on breathing. These were some of the reasons highlighted in a study on face mask perception and face mask wearing (22). In that study, gender was noted to significantly influence face mask perception hence positive attitude to its use, as seen in our study. Gender and age likewise influenced achieving a good knowledge about social distancing. Other reasons for the low uptake were the belief that those who wear a mask are infected with the virus and a lack of confidence in the efficacy of the mask in preventing the infection. This could be as a result of mistrust in science and government rolling out policies, with the belief that the policies are for personal interest and marred with corruption (30). The use of mask is

Table 4. Relating Sociodemographic Characteristic with Knowledge on Social Distancing

Sociodemographic Characteristics	Knowledge on Social Distancing				P-Value
	Good Knowledge (%)	Fair Knowledge (%)	Poor Knowledge (%)	Total (%)	
Gender					0.018[a]
Male	144 (81.4)	15 (8.5)	18 (10.2)	177 (100.0)	
Female	93 (75.6)	23 (18.7)	7 (5.7)	123 (100.0)	
Total	237 (79.0)	38 (12.7)	25 (8.3)	300 (100.0)	
Age, y					< 0.001[a]
≤ 30	116 (78.9)	18 (12.2)	13 (8.8)	147 (100.0)	
31 - 40	94 (87.9)	9 (8.4)	4 (3.7)	107 (100.0)	
41 - 50	23 (71.9)	6 (18.8)	3 (9.4)	32 (100.0)	
51 - 60	1 (12.5)	3 (37.5)	4 (50.0)	8 (100.0)	
> 60	3 (50.0)	2 (33.3)	1 (16.7)	6 (100.0)	
Total	237 (79.0)	38 (12.7)	25 (8.3)	300 (100.0)	
Educational attainment[b]					0.002[a]
None	6 (25)	6 (25)	12 (50)	24 (100.0)	
Primary	9 (20.0)	21 (46.7)	15 (33.3)	45 (100.0)	
Secondary	52 (71.2)	13 (17.8)	8 (11.0)	73 (100.0)	
Tertiary	176 (96.7)	4 (2.2)	2 (1.1)	182 (100.0)	
Total	237 (79.0)	38 (12.7)	25 (8.3)	300 (100.0)	
Occupation					< 0.001[a]
Business/trader	107 (83.6)	8 (6.3)	13 (10.2)	128 (100.0)	
Civil servant	17 (73.9)	4 (17.4)	2 (8.7)	23 (100.0)	
Public servant	9 (69.2)	4 (30.8)	0 (0.0)	13 (100.0)	
Self-employed	12 (38.7)	10 (32.3)	9 (29.0)	31 (100.0)	
Student	78 (87.6)	10 (11.2)	1 (1.1)	89 (100.0)	
Unemployed	14 (87.5)	2 (12.5)	0 (0.0)	16 (100.0)	
Total	237 (79.0)	38 (12.7)	25 (8.3)	300 (100.0)	

[a] Statistical significance at a P-value < 0.05.
[b] Primary education: first stage of formal education, equivalent of International Standard Classification of Education (ISCED) level 1; secondary education: comprises of the first 6 years after primary education, equivalent of ISCED level 2; tertiary education: includes in the minimum, degrees from universities, colleges of education, polytechnic, technical schools, up to the highest level of higher educational attainment, which is doctorates and postdoctoral qualifications (Dr, PhD). It is an equivalent of ISCED levels 6 - 8.

still being stigmatized in numerous countries, with wearers being labeled as infected (31).

Cloth masks were favored for use in low-income countries due to their ease of production, availability of material for its use, and its low cost. It is meant to offer barrier to the entry of the virus hence reducing the rate and likelihood of transmission through the performance of this type of mask is less than the surgical mask or the respirators. Studies have shown that community transmission could be reduced if everyone, asymptomatic or symptomatic, used face masks (29). It is particularly essential for all in countries like ours where testing coverage is still low. Asymptomatic, pre-symptomatic, and those with mild symptoms will continue to mingle with others in the community, transmitting infection to them.

5.1. Conclusions

Participants have good knowledge of social distancing even though not widely practiced and demonstrate positive attitude towards wearing face masks as a measure of preventing the spread of COVID-19, though it is not consistently and correctly worn. Intensified efforts in education on the right use and essence of these interventions is

Table 5. Relating the Participant's Sociodemographic Characteristics with Attitude Towards the use of Face Masks

Demographic Data	Attitude Towards Face Mask Wearing			P-Value
	Positive Attitude (%)	Negative Attitude (%)	Total (%)	
Gender				0.035[a]
Male	98 (55.4)	7 (44.6)	177 (100.0)	
Female	83 (67.5)	40 (32.5)	123 (100.0)	
Total	181 (60.3)	119 (39.7)	300 (100.0)	
Age, y				0.187
≤ 30	86 (58.5)	61 (41.5)	147 (100.0)	
31 - 40	72 (67.3)	35 (32.7)	107 (100.0)	
41 - 50	18 (56.3)	14 (43.8)	32 (100.0)	
51 - 60	3 (37.5)	5 (62.5)	8 (100.0)	
> 60	2 (33.3)	4 (66.7)	6 (100.0)	
Total	181 (60.3)	119 (39.7)	300 (100.0)	
Educational attainment[b]				0.0014[a]
None	2 (8.3)	22 (91.7)	24 (100.0)	
Primary	16 (35.6)	29 (64.4)	45 (100.0)	
Secondary	39 (53.4)	46.6%	73 (100.0)	
Tertiary	124 (78.5)	34 (21.5)	158 (100.0)	
Total	181 (60.3)	119 (39.7)	300 (100.0)	
Occupation				0.197
Business/trader	73 (57.0)	55 (43.0)	128 (100.0)	
Civil servant	14 (60.9)	9 (39.1)	23 (100.0)	
Public servant	11 (84.6)	2 (15.4)	13 (100.0)	
Self-employed	17 (54.8)	14 (45.2)	31 (100.0)	
Student	59 (66.3)	30 (33.7)	89 (100.0)	
Unemployed	7 (43.8)	9 (56.3)	16 (100.0)	
Total	181 (60.3)	119 (39.7)	300 (100.0)	

[a] Statistical significance at a P-value < 0.05.
[b] Primary education: first stage of formal education, equivalent of International Standard Classification of Education (ISCED) level 1; secondary education: comprises of the first 6 years after primary education, equivalent of ISCED level 2; tertiary education: includes in the minimum, degrees from universities, colleges of education, polytechnic, technical schools, up to the highest level of higher educational attainment which is doctorates and postdoctoral qualifications (Dr, PhD). It is an equivalent of ISCED levels 6 - 8.

strongly recommended, preferably in the local and pidgin languages, for the information to be well understood and internalized.

Footnotes

Authors' Contribution: 1Study concept and design: AJ. Acquisition of data: OJ. Analysis and interpretation of data: AJ. Drafting of the manuscript: OJ. Critical revision of the manuscript for important intellectual content: AJ. Statistical analysis: AJ. Administrative, technical, and material support: OJ. Study supervision: AJ.

Conflict of Interests: None declared.

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