

Covid-19: Knowledge, Perception and Health Education of Patients in Nigeria

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Abstract

Background and objectives

Adherence to protocols to curtail the spread of the COVID-19 is dependent on the awareness and knowledge of the public. The study set to determine the knowledge, risk perception, and adherence to COVID-19 protocols among outpatients in a tertiary hospital in Nigeria.

Methods

Convenience sampling was used to select 393 adult outpatients using a cross-sectional descriptive methodology. Frequencies, mean, median, and graphs were used to present the results while association was tested at $P=0.05$.

Results

387(96.4%) of the participants who were aware of the COVID-19 pandemic were used in further analysis. 316(85%) had good knowledge scores and the media (94%) served as the major source of awareness. Only 62(17%) of the participants had a low risk perception of the virus. Risk perception was associated with knowledge ($P=0.00$), while knowledge and sociodemographic variables were not related. Majority of the respondents 222 (65.1%) were extremely likely to follow preventive protocols while observing that the frequency of accessing health education increased during the pandemic compared to before (65.1% vs 33.7%)

Interpretations and results

Our findings are consistent with the belief that knowledge and perception of risks influence health behavior. The high likelihood of the respondents to follow protocols, and the good knowledge about the epidemiology of the virus illustrates a favorable impact of health education set out by stakeholders while evidencing the need to continue this at all level to prevent a resurgence of the epidemic especially as the country continues to lag in vaccination of its' citizens.

Keywords: COVID-19, Education, Knowledge, Perception, SARS-COV-2

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I. Introduction

COVID-19 is a severe respiratory illness caused by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-COV-2)(1). The route of transmission of the disease is via droplets from cough or sneeze, and contact with infected persons or surfaces(1). It presents clinically with symptoms such as dry cough, sore throat, fever, malaise, anosmia and difficult breathing amongst others(2). Considering that so little was known about the epidemiological idiosyncrasies of the virus as at the time of discovery the resulting paucity of clinical interventions which further heightened concerns were not surprising and resulted in a very large number of casualties and even as the world continue to battle the virus over a year later on, a clinically defined cure for the SARS-COV-2 virus remains elusive(3).

The limited experience on the virus at the time meant that stakeholders relied on measures adopted in past epidemics to control the virus and this resulted in a global shutdown of economies. Additionally, various

studies have established that similar to previous pandemics, collective adherence to individualized preventive measures such as handwashing, social distancing, and respiratory etiquettes are essential in curtailing spread(4), therefore, Governments globally and relevant concerned stakeholders devised various means and modalities to engage and educate the populace to reduce mortality and morbidity accruing to the virus and promoted a need to ensure strict adherence to these practices and to also become the new status quo. However, despite the efforts of stakeholders, various challenges resulted, especially the issue of false information which prompted the World health organization to coin the term “infodemic” and also approved campaigns to raise awareness against it, indeed “infodemiology” is being recognized as an emerging field of science(5). The internet then became a tool for promoting conflicting information which contributed to heighten tensions, anxiety, and disbelief about the novel virus, and these issues continue to linger on.

The occurrence of these factors thus necessitated a need to evaluate knowledge of the population on the virus. Before the declaration of COVID-19 as a global health pandemic, the disease was not taken seriously by Nigerians as they believed that it was a disease of foreigners only(1), this poor attitude to the virus led to apathy for proper precautionary measures which was further enhanced by the report of the first few cases involving individuals from the political and high socio-economic class, hence, it was termed “the disease of the rich”(6). Another Nigerian study further revealed that COVID-19 enlightenment before the reported index case was insufficient in quality, and effectiveness(7). Misconceptions and superstitious beliefs were also rife(8).

All of these factors contributed to the late uptake of precautionary measures in the country and hence, increased the spread of the virus(1). Following the increase in the number of confirmed cases in the country affecting both the rich and the poor, awareness began to increase and more strict precautionary measures were put in place and the level of compliance generally increased among the populace.

Just as projected by experts, the breakthrough discoveries of multiple vaccines were a turning point in stemming the virus which has resulted in an appreciable overall decrease in the transmission and infection rates of the virus(9). This translated to reduced hospitalizations and guaranteed opening of economies and resumption of the “normal”, however, the ever-present health inequalities and disparity in socioeconomic powers of countries have ensured a different outlook of these breakthroughs for countries. As of 20th May 2020 the USA reported that 48.4% of the U.S. population aged 18 years and older were fully vaccinated, and at 60.5% of their population has had the first dose of the virus(10) comparatively less than ten percent of the Nigerian population had received the first COVID-19 shot at this time(11).

This unpleasant reality means that underdeveloped countries such as Nigeria and indeed most of the Africa and parts of the Asia regions must continue to advocate for continued practices of proven preventive measures especially at the individual and population level while the public must be cautioned against complacency especially because the timeline of vaccination is not guaranteed, and the health systems of these nations cannot marshal capable responses should spread becomes uncontrollable.

Studies have shown that correction of the wrong perceptions and proper health education could bridge the gap between knowledge and uptake of precautionary measures(12). Hence, this study aims to assess the knowledge, perception, adherence and health education of outpatients in a Nigerian hospital to COVID-19 at a time when the partial lockdown of the country was lifted and reported cases were on the decrease to address gaps in health education and mitigate the risk of resurgence of the pandemic locally.

This study is a subset of another paper that assesses the Impact of Covid-19 on delivering of adequate health care services in Nigeria.

II. Materials And Methods

A cross-sectional descriptive research methodology was used to sample 387 visiting either the Medical or Surgical out-patient clinics of University College Hospital, Ibadan, Nigeria between August 2020 and September 2020 using a convenience sampling technique. The university college hospital is the apex hospital in Nigeria. Data was collected using a researcher-structured questionnaire based on findings from reviewed literature.

The clinic heads were approached for entry permission and ethical approval was obtained from the ethical review board of the college of medicine, the University of Ibadan with ethical approval Number UI/EC/20/0408. Verbal and written permission was obtained from all patients, responses were anonymized and were untraceable to the patients. All patients were assured that no harm would come to them either by participating or not. The research instrument was translated to the Yoruba local language for participants who couldn't read or comprehend the formal English language. Only participants who were aged ≥ 18 years and had received healthcare services at either of these two clinics before the lockdown were eligible to participate.

The retrieved questionnaires were checked for the completeness of the required information and all were eligible for analysis. Among the 387 initially surveyed, 373 (96.4%) had heard of COVID-19. The remaining 14 (3.6%) respondents who had not heard of COVID-19 were excluded from further analysis.

IBM SPSS Statistics tool version 20.0 was used in the analysis of results. The Sociodemographic characteristics of the respondents and pattern of visits to the hospital were presented using frequency tables, mean, median, and percentages while chi-square test and correlation analysis were used to test the association between variables at a significance level of 0.05.

III. Results

Sociodemographic information

Three hundred and eighty-seven participants were surveyed in total; 153 (39.5%) males and 234 (60.5%) females. There were 261 (67.4%) married participants and 112 (30%) were over 54 years of age (Table.1)

TABLE 1: Sociodemographic characteristics of the respondents

Sociodemographic characteristics	Frequency (%)
Sex	
Male	145 (38.9)
Female	228 (61.1)
Marital status	
Single	95 (25.5)
Married	252 (67.6)
Separated	6 (1.6)
Widowed	20 (5.4)
Age	
Below 18	26 (7.0)
18 – 29	57 (15.3)
30 – 41	97 (26.0)
42 – 53	81 (21.7)
Above 54	112 (30.0)

Awareness of COVID-19

Among the 387 initially surveyed, 373 (96.4%) had heard of COVID-19. The remaining 14 (3.6%) respondents who had not heard of COVID-19 were excluded from further analysis (Table 2.).The media accounted as the means of awareness for 363 (97.3%) of those who had heard of COVID-19 (figure1

TABLE 2: Awareness of COVID-19

Items	Yes n (%)	No n (%)
Have you heard of COVID-19	373 (96.4)	14 (3.6)

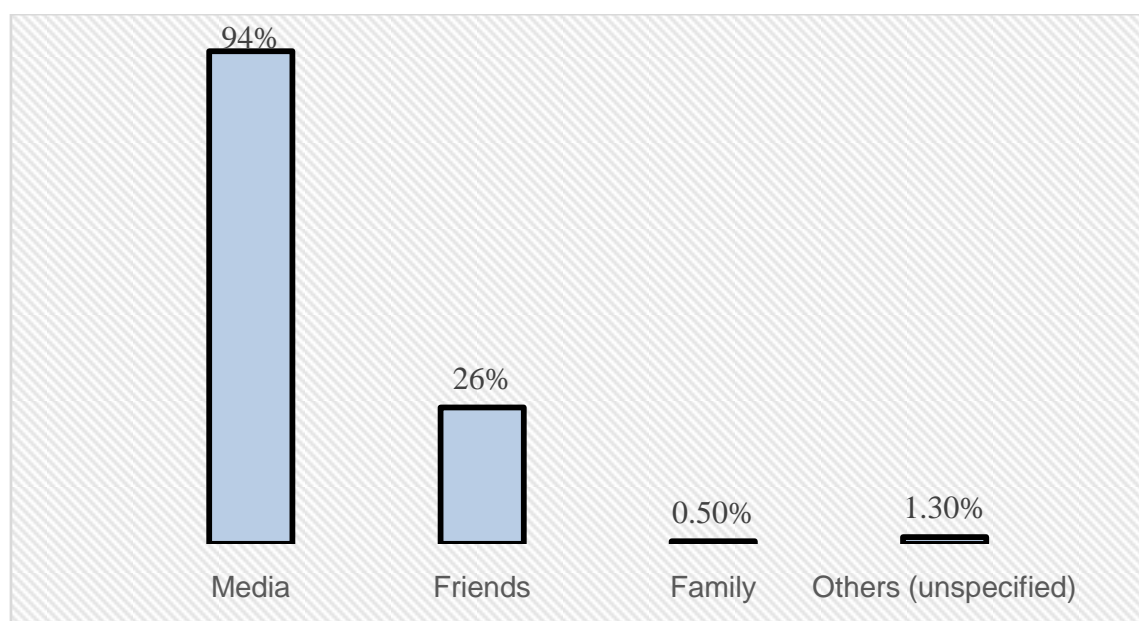


Figure 2: Source of awareness about COVID-19

Knowledge of COVID-19

Mean knowledge score of COVID-19 among the participants was 16.9 and this was used as cutoff. 316 (85%) of the respondents demonstrated a good knowledge about COVID-19 (figure 2.). 311 (80.4%) were aware that virus was the causative organism while 325(84%) affirmed that it could kill(Table 3.)

Table 3: Knowledge of COVID-19(n=393)

	Items	Yes n(%)	No n(%)	Don't know n(%)
What kind of organism causes COVID-19? (Tick all that applies)	Virus	311(80.4)		
	Bacteria	15 (3.9)		
	Parasites	2 (0.5)		
	Fungal	3 (0.8)		
	Don't know	56 (14.5)		
Which group of people are mostly affected? (Tick all that applies)	Children	6 (1.6)		
	Adolescents	9 (2.3)		
	Young	5 (1.3)		
	Adults	119 (20.7)		
	Old	219 (56.6)		
Which of the following is/are symptom(s) of COVID-19?	Don't know	29 (7.5)		
	Fever	326 (84.2)	7 (1.8)	54 (14.0)
	Dry cough	330 (85.3)	6 (1.6)	51 (13.2)
	Fatigue	195 (50.4)	56 (14.5)	136 (35.1)
	Diarrhoea	92 (23.8)	118(30.5)	177 (45.7)
	Sore throat	277 (71.6)	27 (7.0)	83 (21.4)
	Difficulty in breathing	352 (91.0)	7 (1.8)	28 (7.2)
Which of these medium are you likely to contract the infection from?	Inability to smell or taste	185(47.8)	67(17.3)	135(34.9)
	Through cough or sneezes from an infected person	353(91.2)	2(0.5)	32(8.3)
	Touching the eyes, nose or mouth after touching an infected person	345(89.1)	5(1.3)	37(9.6)
	Hugging an infected person	297(76.7)	25(6.5)	65(16.8)
	Greeting an infected person	91(23.5)	193(49.9)	103(26.6)
Which of these places are you likely to contract the infection?	Through contact with infected surfaces in the mall	323 (83.5)	15 (3.9)	49 (12.7)
	Through contact with infected surfaces in religious centers	324 (83.7)	18 (4.7)	45 (11.6)
	Through contact with infected surfaces in the eateries	310 (80.1)	19 (4.9)	58 (15.0)
	Through contact with infected surfaces in the markets	331 (85.5)	13 (3.4)	43 (11.1)
Which of the following groups of people is at increased risk of COVID-19?	Pregnant women	153 (39.5)	65 (16.8)	169 (43.7)
	People with heart diseases	277 (71.6)	26 (6.7)	84 (21.7)
	People with diabetes	229 (59.2)	41 (10.6)	117 (30.2)
	People with cancer	201 (51.9)	46 (11.9)	140 (36.2)
	People with lung diseases	272 (70.3)	18 (4.7)	97 (25.1)
Can COVID-19 kill?	People with sickle cell	186 (48.1)	48 (12.4)	153 (39.5)
		325 (84.0)	4 (1.0)	58 (15.0)

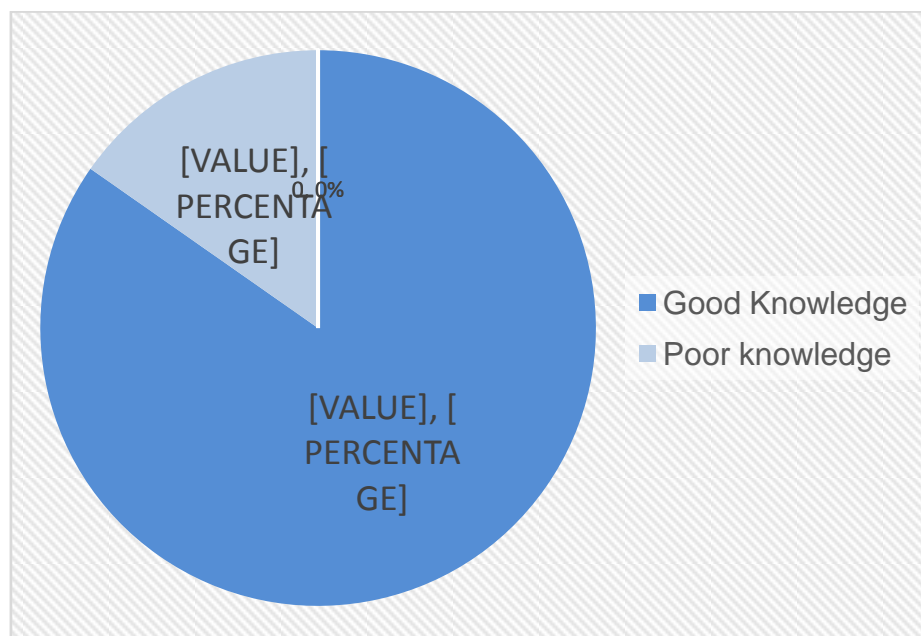


Figure 2: Respondents' knowledge score about COVID-19

Relationship between COVID-19 knowledge and sociodemographic characteristics

None of the tested sociodemographic variables were significantly related to the Knowledge level.(Table 4.)

Table 4: Relationship between COVID-19 knowledge and sociodemographic characteristics (n=373)

		Level of Knowledge		Chi-squared value (χ^2)	p-value
		Good Knowledge (%)	Poor Knowledge (%)		
Sex	Male	121 (83.4)	24 (16.6)	0.296	0.587
	Female	195 (85.5)	33 (14.5)		
Marital status	Single	83 (87.4)	12 (12.6)	4.087	0.223
	Married	213 (84.5)	39 (15.5)		
	Separated	6 (100.0)	0 (0.0)		
	Widowed	14 (70.0)	6 (30.0)		
Age	Below 18	24 (92.3)	2 (7.7)	4.207	0.379
	18 – 29	49 (86.0)	8 (14.0)		
	30 – 41	83 (85.6)	14 (14.4)		
	42 – 53	71 (87.7)	10 (12.3)		
	Above 54	89 (79.5)	23 (20.5)		

Risk Perception of COVID-19

361(96.8%) believed that the COVID-19 virus is real, 179 (48%) believed that it was “over hyped” and 50(13.4) opined that it was an infection of the high and mighty (Table 5.) The calculated mean risk perception score was 6.3. Sixty-two (16.6%) participants had low risk perception, whereas 311 (83.4%) had high risk perception (figure 3).

Table 5: Perception about COVID-19 (n = 373)

	Yes (%)	No (%)	Don't know (%)
Do you believe COVID-19 is real?	361 (96.8)	12 (3.2)	
Do you think it is a dangerous infection?	369 (98.9)	3 (0.8)	1 (0.3)
Do you think there is a racial effect on the impact of COVID-19?	189 (50.7)	116 (31.1)	68 (18.2)
Do you think the rate of infection was overhyped?	179 (48.0)	127 (34.0)	67 (18.0)
Do you think it is an infection of the high and mighty (rich people only)?	50 (13.4)	305 (81.8)	18 (4.8)

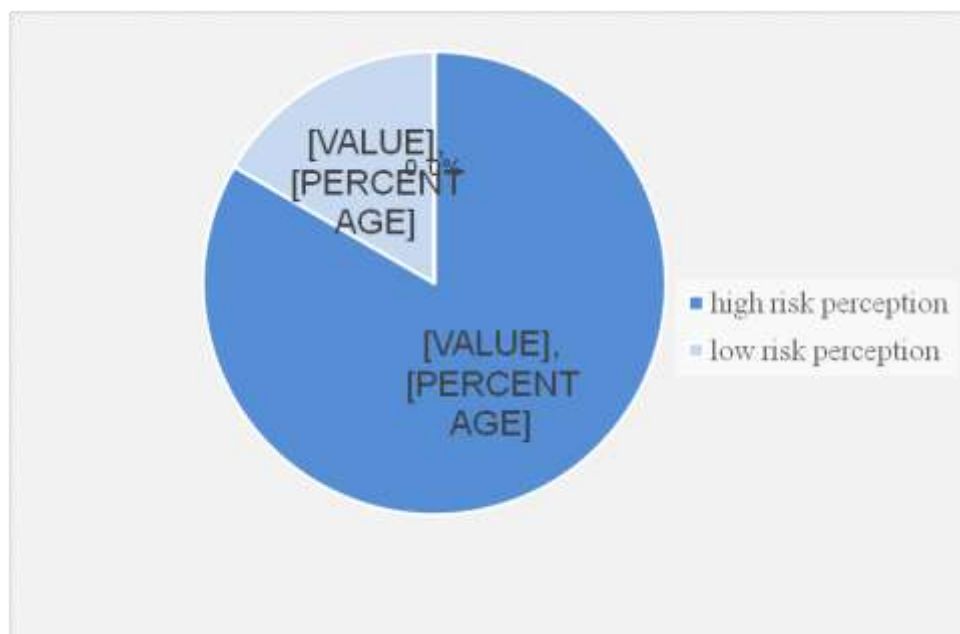


Figure 3: Graded risk perception of COVID-19

Adherence to COVID-19 preventive protocols

On a scale of 1 (Not likely) to 10 (Very likely), participants scored their likelihood of adhering to some highlighted COVID-19 protocols. Handwashing protocol was the practice most likely to be adhered to by the participants (n=311, 83.4%) while 101(27.08%) of the participants reported a lesser likelihood (<6) of maintaining at least a distance of 1 meter from other people. Mean likelihood score for adherence to handwashing was 8.0 ± 2.5 . (Table.6.)

Table 6: Adherence to COVID-19 preventive protocols

Items	Likelihood of adherence to guidelines Frequency (%)	
	1-5 (Less likely)	6-10 (Very likely)
Washing your hands (Mean= 8.0 ± 2.5)	62(16.6)	311 (83.4)
Sanitizing your hands with alcohol-based hand rubs (Mean= 7.6 ± 2.8)	97 (26.0)	276 (74.0)
Sanitizing your hands with alcohol-based hand rubs (Mean= 7.6 ± 2.8)	101 (27.08)	272 (72.92)
Sanitizing your hands with alcohol-based hand rubs (Mean= 7.6 ± 2.8)	89 (23.86)	284(76.14)

Relationship between Knowledge, risk perception and likelihood to adhere to COVID-19 guidelines

There is an association between knowledge and perception of risk of COVID-19, however, there was no association between knowledge and likelihood of adherence to guidelines (Table.7.)

Table 7: Relationship between Knowledge, risk perception and likelihood to adhere to COVID-19 guidelines
(n=373)

Items	Knowledge Score	Risk perception score	Likelihood of adherence to guidelines
Knowledge Score	Pearson Correlation (ρ)	1	0.631
	p-value		0.000*
Risk perception score	Pearson Correlation (ρ)	0.631	1
	p-value	0.000*	0.379

Likelihood of adherence to guidelines	Pearson Correlation (ρ)	0.024	0.046	1
	p-value	0.645	0.379	

*significant

Frequency of accessing health information

On a Likert scale of 1 (not likely at all) to 5 (Very likely) respondents scored the frequency with which they accessed health information. Compared to 115 (33.7%) who accessed health information extremely often before the pandemic it increased to 222(65.1%) during the pandemic. Median score also increased from 4 before the pandemic to 5 during the pandemic. (Table 6.)

Table 6: Frequency of accessing health information (n = 373)

Items	Frequency (%)				
	1 – Not often at all	2	3	4	5 – Extremely often
Before COVID-19 pandemic (Median score = 4)	31 (9.1)	38 (11.1)	56 (16.4)	101 (29.6)	115 (33.7)
During COVID-19 pandemic (Median score = 5)	11 (3.2)	12 (3.5)	43 (12.6)	53 (15.5)	222 (65.1)

Patients' perception about health workers' compliance with COVID-19 preventive measures

As reported by the respondents, Doctors constituted the highest percentage of health workers who are most compliant with COVID-19 preventive rules (Table 7.)

Table 7: Patients' perception about health workers' compliance with COVID-19 preventive measures (n=373)

Group of health workers	Frequency (%)
Doctors	264 (70.7)
Nurses	131 (35.1)
Health attendants	81 (21.7)
Laboratory Scientist	1 (0.3)

IV. Discussion

Following the implementation of the Infection Prevention and Control Policy (IPC) by the Nigerian government, the spread of COVID-19 infection has reduced considerably. The effectiveness of IPC in Nigeria, is, however, largely affected by the knowledge, and perception of people about COVID-19 because poor knowledge results in poor adherence to IPC guidelines. This study demonstrates noteworthy intuition into the knowledge, perception and adherence to COVID 19 Guidelines of Out-patients in a Nigerian Teaching hospital. The Majority of the respondents in this study are females (60.5%), married (67.4%), and aged 54 years and above (30.5%).

This study was carried out in South-West Nigeria and most (96.4%) of the patients in this study were aware of COVID-19. This is similar to studies in Northern Nigeria, where 99.5% of Northern Nigerians are aware of the virus. Similar studies in South-East Nigeria and other geo-political zones showed a high level of awareness of the virus.(13) This nationwide awareness may be attributed to the effort of the Federal Ministry of Health (FMOH) and the National Center for Disease Control (NCDC), which organized campaigns and released regular updates on the spread and prevention of COVID-19 (NCDC, 2020).

Health education remains an invaluable tool in curtailing the spread of infections. The purpose of health education, is, therefore, to increase knowledge that will elicit behavioral change in individuals. We observed that a majority of the outpatients were extremely likely to engage in handwashing, sanitization of hands with alcohol-based hand rubs, staying at least one-meter distance away from other people, sneezing into the elbow or disposable tissue paper, and staying at home when unwell, additionally participants who had heard of COVID-19 were more likely to adhere to these preventive measures. Although the relationship between COVID-19 knowledge between males and females was not statistically significant, women (85.5%) showed better knowledge of COVID-19 than men (83.4%), this is consistent with findings in China(14)and Pakistan(15). This increased knowledge may translate to a positive attitude towards COVID-19 and better adherence to protective measures between genders(1).

We found that there was no association between knowledge of COVID-19 and age in our study which contradicts a study from Northcentral Nigeria(16) which showed that people in the age group 50 and above had lower knowledge of COVID-19 compared to other groups. The risk perception of individuals is also an important determinant of adherence to protective guidelines(17). It is generally believed that awareness of threats associated with a disease will translate to better health behaviors that will prevent infection of individuals(18). A study among adult Nigerians reported a positive association between knowledge, risk perception, and adherence to preventive guidelines(18), however, our study doesn't conform with this

findings suggesting that other factors may also contribute to change in behavior or adherence to precautionary measures. These additional factors may include gender, education, socio-economic, cultural background, among others. (19,20)

Despite the very high level of knowledge demonstrated by the respondents, the perception and beliefs they hold about the virus may impact how they utilize health education (21). Over a tenth (13.4%) of our respondents believed that the virus was an infection for the rich and mighty and almost a half (48.0%) felt the rate of infection was “overhyped” agreeing with findings from the same country (22) but disagrees with findings by another study which reported that their respondents only linked the disparity in infection rates across socioeconomic class to the ability to purchase needed protective materials (23). The majority of our respondents (98.9%) agreed that it was a dangerous infection, contradicting a report from the same country that reported the respondents believed the pandemic to be falsehood and was merely a source of panic which was intended for corruption (6), this may suggest a positive shift in perception or may be influenced by our study population predisposition to health-seeking.

Earlier reports from the region reported other various unfounded beliefs among Africans, such as a belief that they have a unique genetic make-up that makes them immune to COVID-19. Other theories such as the SARS-CoV-2 being a biological weapon to reduce the population of Africa was also believed by many and religious views that COVID-19 is a punishment from God because of the people’s sins and Faith is the only cure for the virus are also deep-seated superstitions that may hinder the effectiveness of IPC. Furthermore, mistrust in government authorities, misunderstanding of health information and, misinformation also contribute to poor adherence to preventive measures (24).

The media was the chief source of awareness (97.3%) for the outpatients in this study and corroborates findings of a review study in Nigeria which also reported that the media is a powerful tool in the dissemination of information on health-related issues (25). Other sources included information from friends and family members. A similar study assessing the sources of information among Nigerians in all geo-political zone reported that mass media (81.5%) and social media (70.2%) are the predominant sources of information concerning COVID-19 (18). This evidence of the power of media further underlines a need for better partnership and recognition of the media in health policies, disease surveillance, and mitigation efforts. However, the media, if not well-regulated, can equally spread misinformation to wide coverage of people. Some studies have shown that some media platforms exaggerate the risk associated with COVID-19, causing unnecessary panic, and often contain information that has not been peer-reviewed, and maybe misleading (2) thus a need to ensure clarity and correctness of media information. (26).

One of the emerging challenges of the COVID-19 pandemic is the reduced access to healthcare facilities (27) which has affected the follow-up of patients and resulted in late diagnosis of new diseases all of which ultimately culminates in the deterioration of health status and increases mortality and morbidity following infection with the virus. Additionally, the patient-doctor interface in a hospital contributes to health information that is void of the misconceptions or misinformation that may occur with media, this avenue for health information was reduced or eliminated for most of the patients. To compensate for this, dissemination of health information was increased during the pandemic, the reported increase in health education during the pandemic (65.1%) compared to before (33.7%) by the patient shows that the hospital is trying to fill this gap.

In conclusion, our study revealed very high levels of awareness, knowledge, and risk perception about the COVID-19 pandemic which may be related to the observed increase in health education in the hospital and information from the media. Majority of the outpatients were extremely likely to follow preventive protocols and reported that Doctors adhered the most to preventive guidelines in the hospital. Sex, marital status, age were not related to knowledge while there was an association between risk perception and knowledge. Our study supports the need to continuously educate the populace by especially targeting the media while also demystifying wrong perceptions about the virus, health educators should expand avenues for patients to voice concerns and ask questions about conflicting information thus supporting calls for better investment in telemedicine. Additionally, all healthcare workers should be made to adhere to protocols as they are not only caregivers but models in disease prevention.

References

- [1]. Reuben RC, Danladi MMA, Saleh DA, Ejembi PE. Knowledge, Attitudes and Practices Towards COVID-19: An Epidemiological Survey in North-Central Nigeria. *J Community Health*. 2020;(0123456789).
- [2]. Abdelhafiz AS, Mohammed Z, Ibrahim ME, Ziady HH, Alorabi M, Ayyad M, et al. Knowledge, Perceptions, and Attitude of Egyptians Towards the Novel Coronavirus Disease (COVID-19). *J Community Health*. 2020;45(5):881–90.
- [3]. Ijeoma U, Id N, Osual EC, Chireshe R. preventative practices towards COVID-19 in sub-Saharan Africa : A scoping review. *PLoS One* [Internet]. 2021;16(4):e0249853. Available from: <http://dx.doi.org/10.1371/journal.pone.0249853>
- [4]. Ha BTT, Quang LN, Mirzoev T, Tai NT, Thai PQ, Dinh PC. Combating the COVID-19 epidemic: Experiences from Vietnam. *Int J Environ Res Public Health*. 2020;17(9).
- [5]. Organization W health, Bradd S. Infodemic Management. 2020; Available from: <https://www.who.int/teams/risk->

- communication/infodemic-management
- [6]. Ilesanmi O, Afolabi A. Perception and practices during the COVID-19 pandemic in an urban community in Nigeria: A cross-sectional study. *PeerJ*. 2020;8:1–15.
 - [7]. Gever VC, Ezeah G. The media and health education: Did Nigerian media provide sufficient warning messages on coronavirus disease? *Health Educ Res*. 2020;35(5):460–70.
 - [8]. Habib MA, Dayyab FM, Iliyasu G, Habib AG. Knowledge , attitude and practice survey of COVID-19 pandemic in Northern Nigeria. *PLoS One* [Internet]. 2021;16(1):e0245176. Available from: <http://dx.doi.org/10.1371/journal.pone.0245176>
 - [9]. Haas EJ, Angulo FJ, McLaughlin JM, Anis E, Singer SR, Khan F, et al. Impact and effectiveness of mRNA BNT162b2 vaccine against SARS-CoV-2 infections and COVID-19 cases, hospitalisations, and deaths following a nationwide vaccination campaign in Israel: an observational study using national surveillance data. *Lancet* [Internet]. 2021;397(10287):1819–29. Available from: [http://dx.doi.org/10.1016/S0140-6736\(21\)00947-8](http://dx.doi.org/10.1016/S0140-6736(21)00947-8)
 - [10]. Centres for disease control and Prevention. COVID Data Tracker-COVID-19 Vaccinations in the United States. 2021; Available from: <https://covid.cdc.gov/covid-data-tracker/#vaccinations>
 - [11]. National Primary Health Care Development Agency. COVID-19 Vaccination Update for May 20th , 2021 , in 36 States + the FCT . How ' s your State performing ? 2021; Available from: <https://twitter.com/NphcdaNG/status/1395461111202394117>
 - [12]. Brug J, Aro AR, Oenema A, De Zwart O, Richardus JH, Bishop GD. SARS risk perception, knowledge, precautions, and information sources, the Netherlands. *Emerg Infect Dis*. 2004;10(8):1486–9.
 - [13]. Oleribe O, Ezechi O, Osita-Oleribe P, Olawepo O, Musa AZ, Omoluabi A, et al. Public perception of COVID-19 management and response in Nigeria: A cross-sectional survey. *BMJ Open*. 2020;10(10):1–7.
 - [14]. Ge H, Wang X, Yuan X, Xiao G, Wang C, Deng T, et al. La epidemiología y la información clínica sobre COVID-19. *Rev Eur Microbiología Clin y enfermedades Infecc*. 2020;39(6):1011–9.
 - [15]. Hayat K, Haq M, Wang W, Khan FU, Rehman A ur, Rasool M, et al. Impact of the COVID-19 outbreak on mental health status and associated factors among general population: a cross-sectional study from Pakistan. *Psychol Heal Med*. 2021;
 - [16]. Abdelhafiz AS, Mohammed Z, Ibrahim ME, Ziad HH, Alorabi M, Ayyad M, et al. Knowledge, Attitudes and Practices Towards COVID-19: An Epidemiological Survey in North-Central Nigeria. *J Community Health* [Internet]. 2021;46(3):457–70. Available from: <https://doi.org/10.1007/s10900-020-00881-1>
 - [17]. Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, et al. Knowledge, attitudes, and practices towards COVID-19 among chinese residents during the rapid rise period of the COVID-19 outbreak: A quick online cross-sectional survey. *Int J Biol Sci*. 2020;16(10):1745–52.
 - [18]. Iorfa SK, Otu IFA, Oguntayo R, Ayandele O, Kolawole SO, Gandi JC, et al. COVID-19 Knowledge, Risk Perception, and Precautionary Behavior Among Nigerians: A Moderated Mediation Approach. *Front Psychol*. 2020;11(November):1–10.
 - [19]. Carlucci L, D'ambrosio I, Balsamo M. Demographic and attitudinal factors of adherence to quarantine guidelines during covid-19: The italian model. *Front Psychol*. 2020;11(October):1–13.
 - [20]. Apanga PA, Kumbeni MT. Adherence to COVID-19 preventive measures and associated factors among pregnant women in Ghana. *Trop Med Int Heal*. 2021;00(00):1–8.
 - [21]. Aiyewumi O, Okeke MI. The Myth That Nigerians Are Immune To Sars-Cov-2 And That Covid-19 Is A Hoax Are Putting Lives At Risk. *J Glob Health*. 2020;10(2):1–4.
 - [22]. Nwaubani AT. Why some Nigerians are gloating about coronavirus. *BBC* [Internet]. 2020; Available from: https://nouveaueureka.cc/Link/uqar1/web-20200423-RBC-1000174_4979610829_215
 - [23]. Erick K. COVID-19: A VIRURS FOR THE RICH AND POOR. *Prairie view A&M Univ* [Internet]. 2020;Working Pa:1–29. Available from: <https://ssrn.com/abstract=3693543>
 - [24]. Freckelton QC I. COVID-19: Fear, quackery, false representations and the law. *Int J Law Psychiatry* [Internet]. 2020;72(July):101611. Available from: <https://doi.org/10.1016/j.ijlp.2020.101611>
 - [25]. Obi-Ani NA, Anikwenze C, Isiani MC. Social media and the Covid-19 pandemic: Observations from Nigeria. *Cogent Arts Humanit* [Internet]. 2020;7(1). Available from: <https://doi.org/10.1080/23311983.2020.1799483>
 - [26]. Al-Dmour H, Masa'deh R, Salman A, Abuhashesh M, Al-Dmour R. Influence of social media platforms on public health protection against the COVID-19 pandemic via the mediating effects of public health awareness and behavioral changes: Integrated model. *J Med Internet Res*. 2020;Aug 22(8):e19996.
 - [27]. Xiao H, Dai X, Wagenaar BH, Liu F, Augusto O, Guo Y, et al. The impact of the COVID-19 pandemic on health services utilization in China: Time-series analyses for 2016–2020. *Lancet Reg Heal - West Pacific* [Internet]. 2021;9(March):100122. Available from: <https://doi.org/10.1016/j.lanwpc.2021.100122>