ASSESSING COVID-19 KNOWLEDGE, PREVENTION PRACTICES, AND ENVIRONMENTAL IMPACT AWARENESS AMONG HEALTHCARE PROFESSIONALS AT WARRI CENTRAL HOSPITAL, DELTA STATE

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ABSTRACT

This study examines healthcare professionals' understanding of COVID-19 at Central Hospital, Warri, Delta State, with a focus on its causes, preventive measures, and environmental impacts. Using the Health Belief Model (HBM), a survey research design involving 200 healthcare workers reveals high COVID-19 knowledge (96.4%) and positive perceptions (85.5%) and attitudes (86.5%) towards its environmental impacts. Many respondents (78.1%) report noticeable environmental changes due to the pandemic. This research establishes a commendable level of COVID-19 understanding among healthcare professionals, emphasizing robust awareness and knowledge. It also underscores positive perceptions and attitudes towards the environmental effects of COVID-19. Implementing recommendations can promote a holistic and sustainable approach to addressing the pandemic's complex challenges from an environmental standpoint, prioritizing healthcare professionals' safety and community well-being.

KEYWORDS: *Pandemic Preparedness, Health Belief Model, Sustainable Practices, Community Awareness, Environmental Changes and Sustainability*

INTRODUCTION

The global battle against the Coronavirus Disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has been a defining challenge for humanity (Li *et al*., 2020). This novel coronavirus, initially named "2019 novel Coronavirus (2019-nCoV)," emerged in Wuhan, China, in December 2019 (Zhu *et al*., 2020). Subsequently, it was officially designated as COVID-19 by the World Health Organization (WHO) and declared a pandemic in March 2020 (Cucinotta and Vanelli, 2020; WHO, 2020).

COVID-19 is part of the Coronaviridae family, characterized by

enveloped, non-segmented, single-stranded, positive-sense ribonucleic acid viruses (Weiss and Leibowitz, 2011). It is a zoonotic disease with the potential for both animal-to-human and human-to-human transmission, leading to severe respiratory conditions (Li *et al*., 2020; Wang *et al*., 2020; Guan *et al*., 2020; Chang *et al*., 2020). Clinical symptoms include fever, dry cough, dyspnea, fatigue, and myalgia, with severe cases potentially resulting in kidney failure, severe pneumonia, acute respiratory syndrome, and death (Wang *et al*., 2020; WHO, 2020). Transmission primarily occurs through respiratory droplets, coughing, sneezing, and various forms of contact (Gu *et al*., 2020; Zheng *et al*., 2020; Sun *et al*., 2020). COVID-19 has impacted over 220 nations and territories worldwide, with varying degrees of severity. While Europe initially bore the brunt of the pandemic, particularly in Italy due to its aging population, the countries with the highest case counts are now predominantly in Asia (e.g., India) and the Americas (e.g., USA and Brazil). As of August 5, 2021, over 200 million positive cases, 4 million deaths, and 180 million recoveries have been recorded in approximately 220 countries (Worldometer, 2021). In Africa, South Africa has been severely affected, and more than 50 African countries are grappling with the virus.

Nigeria, faced its own COVID-19 challenges, with Lagos and Abuja reporting the first cases. As of July 2, 2021, Nigeria had confirmed 167,732 cases across 36 states and the Federal Capital Territory, with 2,121 deaths. To curb the spread, the government implemented measures such as social distancing, bans on public gatherings, hygiene protocols, face mask mandates, restrictions on public transport, and localized lockdowns. However, compliance varied and was often influenced by economic factors. Vaccination emerged as a vital tool to combat the pandemic, with unprecedented global efforts invested in developing and distributing vaccines (Petersen *et al*., 2021). While no vaccine provides absolute protection (Andersen *et al*., 2020), some, like the Pfizer-BioNTech mRNA vaccine and the AstraZeneca vaccine, have shown significant effectiveness (Majeed *et al*., 2021). Numerous other vaccines are in experimental and trial phases, with over 200 COVID-19 vaccine projects worldwide (Haidere *et al*., 2021; Mullard, 2020). Despite vaccine availability, vaccine hesitancy remains a challenge due to concerns about safety and side effects (Kaplan and Milstein, 2021). Healthcare workers (HWs) are crucial in responding to pandemics, but they also face significant risks due to their close contact with infected patients (Wu *et al*., 2020). The burden of COVID-19 has strained healthcare systems globally, resulting in inadequate personal protective equipment, environmental contamination, overcrowding, and insufficient isolation facilities (Nemati *et al*., 2020). Adherence to preventive measures by HWs, influenced by their knowledge, attitudes, and practices (KAPs), is critical (Abdelhafiz *et al*., 2020).

Healthcare workers' knowledge directly affects their perception of susceptibility to disease, and inadequate knowledge can lead to infections (Smith, 2006; Janjua *et al*., 2007; Ilesanmi and Alele, 2016). In Nigeria, more than 800

HWs have been infected (Ailemen *et al.*, 2020). Their behaviours in preventing infections are influenced by their KAPs (Tsiga-Ahmed *et al.*, 2021). Understanding HWs' knowledge is vital, as it impacts their infection control strategies.

The COVID-19 pandemic has also brought about environmental changes, with both direct and indirect consequences. These consequences, spanning public health measures and environmental impacts, underscore the need for a holistic approach. Understanding these dynamics is crucial for informed decision-making and sustainable pandemic responses. Thus, assessing HWs' knowledge at Central Hospital, Warri, Delta State, Nigeria, contributes to our understanding of how healthcare professionals perceive and respond to the environmental aspects of the pandemic.

MATERIALS AND METHOD
Study Design, Setting and Population

This study employed a cross-sectional survey research design, focusing on health workers at Central Hospital, Warri, as the target population. The study encompassed various healthcare professionals, such as Medical Doctors, Dentists, Pharmacists, Nurses, Laboratory staff, Radiologists, Respiratory therapists, EMTs, Ophthalmologists, Physiotherapists, Public Health Staff, Infection Prevention and Control (IPC) Staff, Social workers, Psychologists, and Dental technicians. In total, the study population comprised approximately 400 individuals from these diverse staff categories within the hospital.

Sample Size

The sample size required was determined using Taro Yamane formula for finite population which gave a value of two hundred (200) respondents.

The Instrument

Data was collected using a self-structured questionnaire featuring closed-ended questions, divided into five sections:
- Section A: Demographic characteristics (5 items)
- Section B: Knowledge of COVID-19 causes and symptoms (5 items)
- Section C: Awareness (4 items)
- Section D: Perception towards COVID-19's effects (5 items)
- Section E: Attitude (6 items).

Face and content validity were established by an evaluator and statistician, ensuring relevance, correctness, and clarity of questionnaire items. Reliability was assessed using 20 healthcare workers from a private hospital, resulting in a Cronbach's alpha of 0.75, signifying questionnaire reliability.

Ethical Consideration

Approval was obtained from the relevant authority in charge of the study area to ensure the respondents' ethical issue is respected.

Data Analysis

Statistical Package for Social Science (SPSS) version 24 was used in analysing data collected.

RESULTS

Table 1 reveals key demographic findings. Approximately 60.9% of respondents were female, while 39.1% were male. Most respondents fell within their third and fourth decades, accounting for 36.5% of the sample.

Specifically, 16.6% were aged 21-30, 27.1% were in the 41-50 age group, and 19.8% were over 51 years old. Regarding marital status, 68 respondents were single, 113 were married, and 11 fell into other categories not covered in the questionnaire, indicating a majority were married. In terms of religion, 83.9% identified as Christians, while 16.1% were Muslims. Finally, the respondents' specialties varied: 18.8% were medical doctors, 40.6% were nurses/midwives, 14.1% were public health officers, 9.4% were pharmacists, 6.7% were medical laboratory scientists/technicians, and 10.4% fell into unclassified categories. Notably, the majority were nurses/midwives.

Table 1: Bio-Data of Respondents

Gender	Frequency	Percent
Male	75	39.1
Female	117	60.9
Total	192	100
Age Range		
Below/or 20	-	-
21-30	32	16.6
31-40	70	36.5
41-50	52	27.1
51 and above	38	19.8
Total	192	100
Marital Status		
Single	68	35.4
Married	113	58.9
Others	11	5.7
Total	192	100
Religion		
Christianity	161	83.9
Islam	31	16.1
Others	-	-
Total	192	100
Specialty		
Medical Doctor	36	18.8
Nurse/Midwife	78	40.6
Public Health Officer	27	14.1
Pharmacist	18	9.4
Med. Lab. Scientist/Technician	13	6.7
Others	20	10.4
Total	192	100

Table 2 reveals that the majority (81.3%) correctly identified COVID-19 as "coronavirus disease 2019," indicating a high level of awareness among respondents. All participants demonstrated familiarity with COVID-19. Regarding the virus's mode of transmission, the majority (78.6%) recognized droplet and contact as the primary means. Symptoms were widely

recognized, with approximately 83.3% associating severe acute respiratory illness, cough, fever, gastrointestinal symptoms, and shortness of breath with the disease, showing consistency in responses. Nearly all (98.4%) were aware of an incubation period ranging from 2 to 14 days. When asked about the source of COVID-19 in China, 86% attributed it to the Wuhan seafood market, while 13.5% mentioned bats.

Table 2: Knowledge of the HWs on the causes and symptoms of COVID-19 (N=192)

Question	Responses	Frequency (N)	Percent (%)
	Corona virus disease 2019	156	81.3
What is COVID-19?	Viral respiratory illness	9	4.6
	All answers are correct	27	14.1
	No idea	-	-
Total		**192**	**100**
		N	**%**
	Droplet	24	12.5
Mode of Transmission of	Contact	18	8.9
COVID-19	Droplet & Contact	151	78.6
	Don't know	-	-
Total		**192**	**100**
		N	**%**
	Severe acute respiratory illness	11	5.7
	Fever, cough and itchy throat	7	3.6
Symptoms of COVID-19	Gastrointestinal symptoms	5	2.6
	Shortness of breath	9	4.7
	All answers are correct	160	83.3
	No idea	-	-
Total		**192**	**100**
		N	**%**
	2 - 14 days	189	98.4
Incubation Period of	3 weeks	3	1.6
COVID-19	1 month	-	-
	3 months	-	-
Total		**192**	**100**
		N	**%**
	Bats	26	13.5
Source of COVID-19	Camels	-	-
when it was discovered	Domestic animal	-	-
in China	Seafood wholesale market	166	86.5
	No idea	-	-
Total		**192**	**100**

Table 3 displays respondents' awareness of COVID-19 preventive measures. A majority (54.2%) considered themselves significantly aware, with 42.2% claiming high awareness. Of the health worker

respondents (85.4%), they identified various preventive measures: handwashing with soap, using alcohol-based sanitizers, proper cough/sneeze etiquette, avoiding personal contact, practicing social distancing, wearing masks, and isolating suspected cases for 14 days. Notably, all participants (100%) affirmed the presence of COVID-19 treatment and vaccination, consistent with their status as healthcare professionals.

Table 3: Awareness of the HWs on the available preventive measures of COVID-19

Question	Responses	Frequency	Percent (%)
	Highly aware	81	42.2
How would you rate your	Aware	104	54.2
awareness of the virus and	Somewhat aware	7	3.6
the disease?	Not Aware	-	-
Total		**192**	**100**
		N	**%**
	Washing hands with soap under running water	5	2.6
Preventive Measures for			
COVID-19	Disinfecting hands with alcohol-based hand sanitizer	5	2.6
	Cover nose, mouth with tissue or bent elbow when coughing or sneezing	2	1.0
	Avoid personal contact (kissing, hugging, sharing cup etc.) with infected person	2	1.0
	Maintain social/physical distancing in public/crowded places	3	1.6
	Wearing of medical face masks can help to prevent the infection by the COVID-19 virus	4	2.1
	Suspected persons should be isolated in a proper place for 14 days	7	3.6
	All answers are correct	164	85.4
Total		**192**	**100**
		N	**%**
	Yes	188	97.9
Availability of Treatment	No	4	2.1
for COVID-19	No idea	-	-
Total		**192**	**100**
		N	**%**
	No idea	-	-
Availability of Vaccination	No need	-	-
for COVID-19	No vaccine	-	-
	There is vaccine	192	100
Total		**192**	**100**

In Table 4, respondents' perceptions regarding COVID-19 effects showed that a majority (92.2%, 177 respondents) disagreed that COVID-19 is similar to Malaria fever, while 72.9% (140 respondents) rejected the belief that COVID-19 mortality primarily affects the elderly. Similarly, most respondents (96.9%, 186) dismissed the idea that garlic consumption or drinking water can cure the virus. Regarding the medical nature of COVID-19, 5.7% strongly agreed, 8.9% agreed, 30.7% strongly disagreed, 50.5% disagreed, and 4.2% were undecided. On the final statement, 79.2% (152) of respondents disagreed with the notion that COVID-19 effects are permanent.

Table 4: Perception of the HWs towards the effects of COVID-19

Questions	SA	A	SD	D	UND	Total
COVID-19 effect is the same as Malaria Fever	5 (2.6%)	7 (3.6%)	74 (38.5%)	103 (53.6%)	3 (1.6%)	192 (100%)
COVID-19 mortality rate is only limited to aged people	13 (6.8%)	15 (7.8%)	68 (35.4%)	72 (37.5%)	24 (12.5%)	192 (100%)
Eating garlic or drinking much water can cure COVID-19	-	-	87 (45.3%)	99 (51.6%)	6 (3.1%)	192 (100%)
The effects of COVID-19 is only medically-related; it has nothing to do mental, emotional or psychological wellbeing	11 (5.7%)	17 (8.9%)	59 (30.7%)	97 (50.5%)	8 (4.2%)	192 (100%)
Effect of COVID-19 is permanent on the infected person	3 (1.6%)	5 (2.6%)	66 (34.4%)	86 (44.8%)	32 (16.7%)	192 (100%)

In Table 5, respondents' attitudes toward the effects of COVID-19 were examined, yielding significant findings. The analysis revealed that a majority strongly disagreed (30.2%) or disagreed (42.2%) with the notion of Africans' immunity to the virus due to genetics. Similarly, most respondents (47.4%) rejected the idea of the virus being engineered to reduce Africa's population. Furthermore, a substantial majority (67.7%) expressed confidence in scientists' ability to combat COVID-19. Additionally, the analysis found that 45.3% strongly disagreed that faith or spiritual healing was the sole cure for the virus. In terms of social and worship gatherings, the majority (52.6%) disagreed with allowing large crowds. Lastly, a significant majority (73.9%) disagreed with the concept that COVID-19 was a form of divine punishment for human sins.

Table 5: Attitude of the HWs towards the effects COVID-19

Questions	SA	A	SD	D	UND	Total
Africans are immune to COVID–19 virus infection because of their genetic makeup	4 (2.1%)	11 (5.7%)	58 (30.2%)	81 (42.2%)	38 (19.8%)	192 (100%)
COVID-19 was invented to reduce the human population in Africa	12 (6.3%)	8 (4.2%)	91 (47.4%)	64 (33.3%)	17 (8.9%)	192 (100%)
I have confidence that medical scientists can win the battle against the COVID-19 virus	73 (38%)	57 (29.7%)	9 (4.7%)	19 (9.9%)	34 (17.7%)	192 (100%)
Faith/Spiritual healing is the only cure for COVID-19 infection.	2 (1%)	5 (2.6%)	87 (45.3%)	76 (39.6%)	22 (11.5%)	192 (100%)
People should be allowed to congregate in large crowd at a place of worship/social functions	17 (8.9%)	29 (15.1%)	48 (25%)	53 (27.6%)	45 (23.4%)	192 (100%)
COVID–19 is a punishment from God because people sinned against God	3 (1.6%)	14 (7.3%)	74 (38.5%)	68 (35.4%)	33 (17.2%)	192 (100%)

Table 6: Witnessed Environmental Changes Due to COVID-19

	Questions	Responses	Frequency	Percent (%)
26	Yes, I have witnessed changes at my workplace.	Environmental changes related to covid-19	150	78.1
27	No, I have not observed any significant changes related to COVID-19	No observed environmental changes	42	21.9
	Total	-	**192**	**100**

Table 6 highlights COVID-19-related workplace environmental changes among healthcare professionals at Warri Central Hospital, Delta State, Nigeria. Approximately 78.1% of respondents noted these changes, including waste management adjustments, increased disinfectant usage, and modified healthcare practices. This suggests their attentiveness to pandemic-induced transformations. Conversely, 21.9% reported no observed environmental changes, possibly stemming from awareness gaps. These individuals might benefit from additional information or training regarding pandemic-related environmental aspects.

Discussion

The COVID-19 pandemic has emerged as a global Public Health Emergency of International Concern (PHEIC), dominating discussions across various sectors, particularly within the healthcare community. Most of the participants were young adults (36.5%), female (60.9%), and married (58.9%), and they frequently interacted with infected patients.

Our findings align with those of previous studies by Olowookere *et al.* (2015) and Ogolodom *et al.* (2020). While nurses comprised the largest group in our study (40.6%), Ogolodom *et al.* (2020) found doctors to be the majority in their research, while Olowookere *et al.* (2015) reported nurses as the dominant group. These discrepancies can be attributed to differences in sample size, study nature, and geographic location. It is noteworthy that most healthcare workers in our study were young and had significant years of service remaining. This emphasizes the importance of maintaining their health to effectively fulfil their responsibilities.

Our findings indicate that most HCWs in Nigeria possessed a strong understanding of COVID-19, likely attributed to continuous national response efforts by the Nigerian Centre for Disease Control and Prevention/Presidential Task Force on COVID-19 (NCDC/PTF). This aligns with similar studies by Ejeh *et al.* (2020) and Al-Sulayyim *et al.* (2020), where HCWs demonstrated a good understanding of the virus in Nigeria and the Kingdom of Saudi Arabia, respectively. However, these findings contrast with that of Bhagavathula *et al.* (2020) study in India, which revealed insufficient knowledge among healthcare workers. These discrepancies may be due to variations in sample size and geographical locations across the studies. Our research also unveiled HCWs' favourable perception regarding the effects of COVID-19. They correctly recognized that COVID-19 differs significantly from malaria fever (92.2%). This alignment with established facts is essential, as it dispels common misconceptions that COVID-19 primarily affects the elderly, can be cured by garlic consumption or increased water intake, or is exclusively a medical concern. These misconceptions can be attributed to a knowledge gap in the disease's etiology, potentially stemming from a lack of accessible non-technical information sources. Such gaps may affect HCWs' risk perception, attitudes, and behaviours (Owhonda *et al.*, 2021). However, it is reassuring that most respondents (79.2%) disagreed with the notion that COVID-19's effects are permanent.

In the present study, most participants exhibited significant awareness levels regarding the virus (96.4%), preventive measures (85.4%), treatment availability (97.9%), and vaccine availability (100%), consistent with previous findings (Asaad *et al*., 2020; Khan *et al*., 2014). HCWs' attitudes significantly influence their adherence to infection prevention and control measures against COVID-19. The attitudes of healthcare workers regarding certain beliefs and misconceptions, such as immunity to COVID-19 due to African genetics, SARS-CoV-2 as a biological weapon against Africa's population, COVID-19 as divine punishment, and faith/spiritual healing as the sole cure for COVID-19. Acceptance of these negative attitudes within the community can undermine efforts to contain the disease's spread. Fortunately, our findings revealed that the majority of participants held positive attitudes towards the effects of COVID-19, aligning with studies by Al-Sulayyim *et al*. (2020), Abdelhafiz *et al*. (2020), and Biscayart *et al*. (2020). However, our results differed from a study in Pakistan (Saqlain *et al*., 2020), which found significant variations in attitudes related to age and years of healthcare service experience. Notably, 20 (10.5%) respondents in our study agreed with the misconception that SARS-CoV-2 was created to reduce Africa's population, reflecting the damaging impact of false rumours and misconceptions.

Misinformation fuelled by social media and the internet likely contributed to these findings. Additionally, a small percentage (3.6%) of respondents believed that faith/spiritual healing was the only COVID-19 cure, reflecting the deeply religious nature of the study participants. Their religious beliefs significantly influence their views and responses to global realities (Agulanna, 2010; Al-Hanawi, 2020). Regarding congregation in large crowds at places of worship, 52.6% of respondents viewed it as wrong, considering the risk of COVID-19 transmission, consistent with established knowledge (Rothan and Byrareddy, 2020; Guo *et al*., 2020; WHO, 2020). These congregations pose a significant risk for infectious cases to spread SARS-CoV-2 in crowded environments. HCWs' willingness to adapt to new changes and lifestyles during the pandemic was evident, with 67.7% expressing confidence in medical scientists' ability to overcome COVID-19. This confidence may stem from Nigerian HCWs' successful responses to previous outbreaks like Ebola virus in 2014 and the Avian influenza virus in 2007 (Oladokun *et al*., 2012; Althaus *et al*., 2015).

Conclusion

In the face of the COVID-19 pandemic, healthcare workers at Central Hospital, Warri, Delta State, have demonstrated strong knowledge, understanding, and a positive attitude towards the virus. They are well-informed about its causes, symptoms, prevention measures, treatments, and vaccination options. Most respondents also hold a positive outlook on successfully controlling and mitigating COVID-19. However, with the emergence of new, more virulent variants like Delta and Omicron, the battle against the virus is far from over. Therefore, ongoing training is essential to continually update healthcare workers' knowledge and ensure that they maintain

excellent practices in COVID-19 prevention and control, as their role remains pivotal in the pandemic response.

Recommendations

1. Prioritize workplace safety and insurance coverage for healthcare workers to ensure their well-being and effectiveness during the COVID-19 pandemic, recognizing the importance of environmental health.

2. Tailor public health education to high-risk healthcare worker categories, emphasizing risk assessment, control measures, and environmental implications.

3. Conduct continuous educational campaigns targeting both healthcare professionals and the wider population to promote collective responsibility in mitigating COVID-19's environmental and health impacts.

4. Ensure an ample supply of personal protective equipment (PPE) for healthcare workers, coupled with training, community awareness, and responsible waste management to address environmental concerns.

5. Foster political will and involve health facility management in infection prevention and control (IPC) systems to reduce COVID-19 risks among healthcare workers while considering environmental implications.

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