Volume 20 Issue 64
Originally issued as F11



Global Journal of Medical Research: F
Diseases
Volume 20 Issue 11 Version 1.0 Year 2020
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

# COVID-19: Public Health Implications among Healthcare Workers in a Tertiary Health Facility in Enugu State, Nigeria

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*Objectives:* To assess the knowledge, attitude, and practice of healthcare workers in a tertiary health facility towards COVID 19 pandemic and also the perceived barrier to the control of the infection in a healthcare setting.

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*Keywords:* *COVID-19, healthcare workers, Enugu State, Nigeria, tertiary health facility.*

*GJMR-F Classification:* *NLMC Code: W 84*




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# COVID-19: Public Health Implications among Healthcare Workers in a Tertiary Health Facility in Enugu State, Nigeria

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*Results:* Most of the HCWs were within 30-39 years of age (48.1%) and had worked for 11-20 years (45.5%). Majority were females (88.9%), married (86.0%) and nurses (82.1%). About 59.1% of the HCWs had good knowledge of COVID 19, while only 43.4% had a good attitude towards COVID 19. However, the majority (93.2%) of them had good practice towards COVID 19. The commonest perceived barrier to the control of infection was overcrowding in clinics, wards, and emergency rooms.

*Conclusion:* The knowledge and attitude of the HCWs in this study to COVID 19 was poor, but this did not affect their practice. There should be an orientation of the HCWs for attitudinal change towards the infection.

*Keywords: COVID-19, healthcare workers, Enugu State, Nigeria, tertiary health facility.*

## I. Introduction

Coronavirus is one of the emerging respiratory viruses that are known to cause diseases in humans.[1] It is a zoonotic infection that can be transmitted from animal-to-human and then human-to-human.[2] The most recent outbreak of coronavirus disease 2019 (COVID-19) in Wuhan City, Hubei Province, China, has emerged as a global outbreak and significant public health issue.[3]

Coronaviruses outbreaks have been recorded previously such as Severe Acute Respiratory Syndrome-Coronavirus (SARS CoV) and Middle East Respiratory Syndrome-Coronavirus (MERS-CoV) in 2003 and 2015, which are similar to the present novel coronavirus SARS CoV 2 (COVID-19). COVID-19 was first reported in December 2019 among patients with viral pneumonia symptoms in Wuhan City, Hubei Province; China.[2,4] Due to the rapid spread of the virus from the source to many other countries of the world, the World Health Organization (WHO) declared it a Public Health Emergency of International Concern (PHEIC) on January 30, 2020. The first case of COVID-19 in Nigeria was recorded on 27 February 2020, and as of the 29th of September 2020, there were about 58,647 confirmed cases with 1,111 confirmed deaths. Globally there were about 33, 249, 563 cases with 1,000,040 deaths as of 29th September 2020. [5]

However, on the 11th of March 2020 the WHO declared COVID-19 a global pandemic due to its fast spread, increase in the number of countries affected, the severity of illness, and the continuous escalation in the number of cases and causalities.[6]

Coronavirus spreads mainly from person to person through close contact with infected person through respiratory droplets (coughs or sneezes) or by touching a surface or object with the virus on.[7] The WHO reported that more than 80% of COVID-19 patients showed mild symptoms and recovered without any medical intervention, approximately 20% of infected cases had a severe illness such as shortness of breath, septic shock, and multi-organ failure while an estimated 2% of the cases can be fatal.6 The elderly, especially those with underlying chronic diseases are at an increased risk of having severe disease.

Coronavirus is most contagious during the first three days after onset of symptoms, however, spread may be possible before symptoms appear and in later stages of the disease.[8] It can survive on surfaces for up to 72 hours.[8] The best prevention for COVID-19 is to avoid being exposed to it. The recommended measures to achieve this include frequent hand washing,

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maintaining physical distance from others (especially from those with symptoms), covering coughs and sneezes with a tissue or inner elbow, keeping unwashed hands away from the face using face masks, isolating confirmed and suspected cases. [9]

Healthcare Workers (HCWs) are primarily involved in caring for patients with this highly contagious virus (COVID-19), and it has posed a serious occupational health risks to the HCWs owing to their frequent exposure to infected individuals in the course of their duty.[10] Protection of HCWs and prevention of intra-hospital transmission of infection are important aspects in epidemic response, and this requires that HCWs must have updated knowledge regarding the source, transmission, symptoms, and preventive measures.[11] Literature suggests that lack of knowledge and misunderstandings among HCWs leads to delayed diagnosis, the spread of disease, and poor infection control practice.[12] Thousands of HCWs have already been infected. Knowledge, attitude, and practice survey like the present study provide a suitable format to evaluate existing programs and protocols and to identify effective strategies for behavioral change both in the hospital setting and in the society at large.[13]

## II. Methodology

The study was a descriptive cross-sectional design conducted at Enugu State University of Science and Technology, Enugu, Nigeria. It is one of the tertiary health institutions in Enugu State. It is located at the heart of Enugu town.

*a) Study population*

All the consenting HCWs (doctors, nurses, and laboratory scientists) in the hospital were used for the study. There were about 426 HCWs (doctors, nurses, and laboratory scientists) in the hospital as at the time of data collection and, they were reached for the study.

*b) Data collection*

The data for the doctors and laboratory scientists were collected using an online questionnaire formulated with Google form. This was shared through the different doctors' and laboratory scientists' online platform (WhatsApp). The data for the nurses was collected using the same semi-structured self - administered questionnaire shared through the head nursing services to all the nurses. This was so because there was no online platform where all the nurses in the hospital belong.

The questionnaire was formulated after extensive literature review and, according to WHO recommendations on modes of transmission and prevention of COVID-19.[7] The questionnaire had five sections. The first section was on socio-demographic characteristics of the HCWs, the second section was on knowledge, the third was on attitude, the fourth on practice, and the fifth on perceived barrier to control of COVID-19 in healthcare settings. Eleven questions were used to access the HCWs knowledge of COVID-19. A correct answer scores one while a wrong answer scores 0. The higher the score the, more knowledgeable the HCWS is. Twenty-one questions were used to assess the attitude of the HCWs. A correct answer scores one while an incorrect answer scored 0. Some of the questions were reversed to eliminate the bias of giving a single similar response in all the questions. Thirteen questions were used to access the practice score using 3 Likert-scale questions. The responses were never, sometimes, and always weighing 1, 2, and ,3 respectively.

The perceived barrier to control of COVID-19 was accessed using nine questions. A correct answer scores one while a wrong answer scores 0. The higher the score the, more the barrier to control of COVID-19 in hospital settings

*c) Data analysis*

All the questionnaires were examined for completeness and all the completed ones were entered into SPSS version 25. All the responses in Google form were also entered into SPSS version 25. The data were edited for errors by generating frequencies. The categorical variables were summarized using frequencies and percentages. The significance level was placed at $\leq 0.05$. The knowledge, attitude, and practice scores were categorized into good and poor. Blooms cut-off criteria[14] of 80% were used to indicate good knowledge ($\geq$8.8), attitude ($\geq$16.8) and practice ($\geq$10.4) towards COVID-19, while less than these cut-offs were categorized as poor.

## III. Results

*Table 1:* Socio-demographic characteristics of the healthcare workers

| Variable | Frequency | Percentage |
|---|---|---|
| Age | | |
| 20-29 | 13 | 5.5 |
| 30-39 | 113 | 48.1 |
| 40-49 | 79 | 33.6 |
| 50-59 | 28 | 11.9 |
| Above 59 | 2 | 0.9 |
| Gender | | |

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| | | |
|---|---|---|
| Male | 26 | 11.1 |
| Female | 209 | 88.9 |
| Marital status | | |
| Single | 33 | 14.0 |
| Married | 202 | 86.0 |
| Ethnicity | | |
| Igbo | 231 | 98.3 |
| Yoruba | 3 | 1.3 |
| Edo | 1 | 0.4 |
| Religion | | |
| Christianity | 231 | 98.3 |
| Islam | 3 | 1.3 |
| Traditional Religion | 1 | 0.4 |
| Occupation | | |
| Doctor | 31 | 13.2 |
| Nurse | 193 | 82.1 |
| Laboratory Scientist | 11 | 4.7 |
| Years of service | | |
| 1-10 | 93 | 39.6 |
| 11-20 | 107 | 45.5 |
| 21-30 | 24 | 10.2 |
| Above 30 | 11 | 4.7 |

Out of the 426 HCWs that were reached out for the study, only 235 responded, giving a response rate of 55.2%. Table 1 above shows the socio-demographic characteristics of the studied HCWs. Most of the HCWs were within the 30-39 years age group (48.1%) and have worked for 11-20 years (45.5%). Majority were females (88.9%), married (86.0%) and nurses (82.1%). Almost all were of the Igbo ethnic group (98.3%) and Christians (98.3%).

*Table 2:* Knowledge of COVID-19 among healthcare workers

| Variable | Yes | |
|---|---|---|
| | Frequency | Percentage |
| Have heard of COVID-19 | 235 | 100 |
| Sources of information* | | |
| Government | 191 | 81.3 |
| Internet | 213 | 90.6 |
| Mass media | 219 | 93.2 |
| Family/friends | 178 | 75.7 |
| Social media | 200 | 85.1 |
| Colleagues | 202 | 86.0 |
| Hospital management | 170 | 72.3 |
| Church | 3 | 1.3 |
| COVID-19 is a viral infection | 213 | 90.6 |
| Its incubation period is 14days | 212 | 90.2 |
| COVID-19 can be spread by* | | |
| Droplets from infected persons | 234 | 99.6 |
| Surfaces touched by infected persons | 221 | 94.0 |
| Touching banknotes | 167 | 71.1 |
| Asymptomatic persons | 201 | 85.5 |
| Shaking of hands | 220 | 93.6 |
| Hugging | 176 | 74.9 |
| Staying together in a crowded room | 224 | 95.3 |
| Goods imported from China | 65 | 27.7 |
| Common symptoms of COVID-19 includes* | | |
| Fever | 234 | 99.4 |
| Dry cough | 229 | 97.4 |
| Body aches | 177 | 75.3 |
| Loss of taste | 53 | 22.6 |
| Difficulty in breathing | 230 | 97.9 |



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| | | |
|---|---|---|
| Vomiting | 110 | 46.8 |
| Sneezing | 203 | 86.4 |
| Diarrhoea | 130 | 55.3 |
| Vaccine for COVID-19 is available | 7 | 3.0 |
| Effective treatment for COVID-19 is available | 55 | 23.4 |
| People with co-morbidities like hypertension/DM are more at risk | 205 | 87.2 |
| Children have no risk of death from COVID-19 | 33 | 14.0 |
| COVID-19 may be more dangerous for the elderly | 226 | 96.2 |
| COVID-19 spreads through close contact | 219 | 93.2 |
| All COVID-19 patients develop severe acute respiratory illness | 181 | 77.0 |
| Influenza vaccine also gives protection against COVID-19 | 20 | 8.5 |
| COVID-19 can be prevented by* | | |
| Proper and regular hand washing with soap | 235 | 100 |
| Use of hand sanitizers | 229 | 97.4 |
| Social distancing | 231 | 98.3 |
| Wearing face mask | 231 | 98.3 |
| Eating garlic, ginger and local herbs | 93 | 39.6 |
| Avoid touching of the eyes, nose and mouth | 228 | 97.0 |
| Good cough etiquette | 225 | 95.7 |
| Drinking/inhaling hot water | 114 | 48.5 |
| Drinking alcohol | 16 | 6.8 |
| Taking chloroquin tablets | 62 | 26.4 |
| Taking antibiotics | 60 | 25.5 |
| Knowledge categorized | | |
| Poor | 96 | 40.9 |
| Good | 139 | 59.1 |

**multiple answers allowed*

Table 2 above shows the knowledge of the HCWs towards COVID-19. All the HCWs have heard about COVID-19, and their major source of information was mass media (93.2%) and the internet (90.6%). About 90.2% of the HCWs knew the incubation period of the virus and, the majority also knew the modes of spread. However, about 27.7% believe that the virus can be spread by goods imported from China. The majority knew the common symptoms, but only 22.6% knew that loss of taste could be a symptom of COVID-19. About 77.0% asserted that all COVID-19 patients develop a severe acute respiratory illness. On the knowledge of the preventive measures, all the HCWs knew that proper and regular hand washing with soap could prevent COVID-19. The majority also knew the other preventive measures like the use of hand sanitizers, social distancing, wearing of face mask, and good cough etiquette. However, 39.6% believe that eating garlic, ginger, and other local herbs can prevent COVID-19.

On the categorization of knowledge scores, only 59.1% of the HCWs had good knowledge of COVID-19.

*Table 3:* Attitude of the healthcare workers towards COVID-19

| Variable | Yes | |
|---|---|---|
| | Frequency | Percentage |
| You think you can contact COVID-19 | 82 | 34.9 |
| Worried that a family member may contact COVID-19 | 133 | 56.6 |
| COVID-19 infection is associated with stigma | 195 | 83.0 |
| Media coverage is exaggerated | 93 | 39.6 |
| The virus was initially designed as a biological weapon | 119 | 50.6 |
| It is a plague caused by sin and unbelief | 44 | 18.7 |
| Designed to control population | 47 | 20.0 |
| Designed by pharmaceutical companies to sell drugs | 21 | 8.9 |
| COVID-19 can be successfully controlled | 179 | 76.2 |
| Self-protection is necessary for the protection of others | 225 | 95.7 |
| Lockdown is an effective control measure | 183 | 77.9 |
| Nigeria can win the battle against COVID-19 | 190 | 80.9 |
| If I contact a person infected with COVID-19 I will inform NCDC | 216 | 91.9 |
| If I have symptoms of COVID-19 I will inform NCDC | 208 | 88.5 |
| If I have contact with an infected person I agree to be isolated at home | 210 | 89.4 |



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| | | |
|---|---|---|
| If I have contact with an infected person I agree to be isolated at an isolation centre | 177 | 75.3 |
| If vaccine for COVID-19 is available, I will be willing to take it | 144 | 61.3 |
| I follow updates on COVID-19 in my country | 212 | 90.2 |
| I follow updates about COVID-19 worldwide | 196 | 83.4 |
| Willing to attend any lecture about COVID-19 around me | 212 | 90.2 |
| COVID-19 can be controlled by following standard precautions for infection control | 226 | 96.2 |
| Attitude categorized | | |
| Poor | 133 | 56.6 |
| Good | 102 | 43.4 |

Table 3 above shows the attitude of the HCWs towards COVID-19. Only a minority of the HCWs think they can contact COVID-19 (34.9%), while about half (56.6%) were worried that a family member could contact it. The majority agree that self-protection is necessary for protecting others (95.7%) and that lockdown is an effective control measure (77.9%). Only about 61.3% of the HCWs are willing to take a vaccine for COVID-19. Almost all of the respondents (96.2%) agree that COVID-19 can be controlled by following standard precautions for infection control. Only 43.4% of the HCWs had a good attitude toward COVID-19 on categorization.

*Table 4:* Healthcare workers practice towards COVID-19

| Variable | Yes | |
|---|---|---|
| | Frequency | Percentage |
| I have been to crowded places in recent time | 139 | 59.1 |
| Have cancelled attending events due to COVID-19 | 174 | 74.0 |
| Wear face mask always while leaving home | 227 | 96.6 |
| Wear mask in correct way | 231 | 98.3 |
| Dispose mask when it becomes moist or after 8 hours | 194 | 82.6 |
| Follow WHO hand washing technique | 218 | 92.8 |
| Practice social distancing | 220 | 93.6 |
| Follow lockdown regulations | 208 | 88.5 |
| Cover mouth with tissue while sneezing/coughing | 199 | 84.7 |
| Dispose used tissue in covered trash | 215 | 91.5 |
| Avoid touching eyes, mouth and nose as much as possible | 204 | 86.8 |
| I educate my patients about COVID-19 | 226 | 96.2 |
| I follow standard precautions for infection control always | 224 | 95.3 |
| Practice categorized | | |
| Poor | 16 | 6.8 |
| Good | 219 | 93.2 |

Table 4 shows the HCWs practice towards COVID-19. The practice scores of the HCWs were high, as 93.2% of them had good practice towards COVID-19. The majority of them follow the WHO hand washing technique (92.8%), follow lockdown regulations (88.5%), and follow standard precautions for infection control always (95.3%).

*Table 5:* Perceived barriers to effective control of COVID-19 in hospital settings

| Variable | Yes | |
|---|---|---|
| | Frequency | Percentage |
| Lack of knowledge about mode of transmission of COVID-19 | 141 | 60.0 |
| Unavailability of infection control supplies* | | |
| Gloves | 179 | 76.2 |
| Face mask | 182 | 77.4 |
| Face shield | 207 | 88.1 |
| Splash proof apron | 214 | 91.1 |
| Goggles | 211 | 89.8 |
| Carelessness on the part of the healthcare workers | 138 | 58.7 |
| Insufficient training on infection control | 190 | 80.9 |
| Lack of policies on infection control | 175 | 74.5 |
| Less commitment of healthcare workers to policies | 139 | 59.1 |



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| | | |
|---|---|---|
| Overcrowding in the emergency rooms | 206 | 87.7 |
| Overcrowding in clinics and wards | 207 | 88.1 |
| Not washing hands before and after contact with patients | 174 | 74.0 |

**multiple answers allowed*

Table 5 shows the perceived barrier to control of COVID-19 in a hospital settings. The major perceived barrier to effective control of COVID-19 in the hospital setting was the unavailability of PPEs like splash proof aprons (91.1%) and goggles (89.8%) followed by overcrowding in emergency rooms (87.7%), clinics, and wards (88.1%). Others were insufficient training on infection control (80.9%) and a lack of policies on infection control (74.5%).

## IV. Discussion

COVID-19 is a global health problem that is affecting every aspect of human life. HCWs being at the forefront of the fight against the infection, are faced with a high likelihood of being infected with the infection than the general population. [15, 16]

This is one of the reasons why the WHO have recommended the adoption and use of proper prevention and control measures for HCWs. This includes the use of proper Personal Protective Equipment (PPE), such as face masks, splash-proof gowns, gloves, eye goggles, and FFP2 respirator masks in aerosol-generating procedures.[17]

In this study, about 59.1% of the HCWs had good knowledge of COVID-19 including its incubation period, mode of transmission, common symptoms, and preventive measures. This knowledge score was not optimal as knowledge helps to form one's attitude, promote productive behaviors and affect their coping mechanisms towards specific events.[18] The score was, however, similar to the report of a similar study in Uganda where 69% of the HCWs had good knowledge of COVID-19 [19] but lower than the report of other studies in China. [20, 21] Better knowledge among these HCWs may be due to better training on COVID-19.

Further education, training, and retraining of HCWs through continuous professional education, particularly on the common symptoms, modes of transmission, and prevention will help in improving the knowledge of the HCW about COVID-19. The commonest source of information on COVID-19 was the mass media like television, radio, newspapers (93.2%), followed by the internet (90.6%). This indicates that such media should be used to disseminate information about COVID-19 to reach the majority of the HCWs.

The delivery of rapid, reliable information that addresses critical infection control measures was of key importance, e.g., poor hospital infection prevention and control measures, inadequate training in infection control processes, poor compliance with the use of personal protection equipment (PPE), exposure to high-risk procedures such as tracheal intubation and exposure to unsuspected SARS patients are known to be associated with a high risk of transmission of viral infections to healthcare workers. [22, 23] The aim of information dissemination is to transfer knowledge of international best practices to the front-liners who need it most, at a rate equal to or faster than the increasing epidemic. The use of social media have shown to be a faster means as concurred by another literature.[24]

However, there has been worries about misinformation regarding COVID-19 on the internet, which can misguide HCWs because the internet is not without disadvantages. It is, therefore, necessary that before use, healthcare workers must critically appraise the information contained. [25] In particular, health authorities and scientists have warned that widespread misinformation about COVID-19 is a serious concern causing xenophobia worldwide. [26, 27] In this regard, HCWs should carefully evaluate COVID-19-related information and should use scientific and authentic content as information sources.

The only factor that significantly affected the knowledge of COVID-19 in the present study was occupation where the nurses (64.2%) and the laboratory scientists (63.6%) were found to have better knowledge scores than the doctors (25.8%). This was surprising as doctors, by their training, were supposed to have a better knowledge of COVID-19 compared to other HCWs. However, a similar study reported that doctors had better knowledge than the other HCWs.[21,28]

One notable point on the HCWs knowledge of the mode of spread of COVID-19 is that about 27.7% asserted that COVID-19 could be contacted from goods imported from China. This can affect the use of aids and other products from China for the prevention of COVID-19 and have a negative impact on the general control measures. Also, 39.6% agree that eating ginger, garlic, and local herbs can prevent COVID-19 infection. This misconception can delay seeking medical advice and result in fatal outcomes for COVID-19 cases. Awareness of the mode of spread and prevention should be heightened among the HCWs as the general public also depend on the information given by the HCWs.

In the present study, only 43.4% of the HCWs had good attitude toward COVID-19. This poor attitude of HCWs towards COVID-19 was reported in a similar studies in Uganda, where only 21% of them had a good attitude toward COVID-19. [19] The similarity may be because both studies were done in Africa with similar beliefs and attitudes.

About half (50.6%) of the HCWs believe that the virus was initially designed as a biological weapon. This finding was similar to the report of a Nigerian study



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where 46.9% of the respondents had a similar view. [29] About 56.6% are worried that their family member may contact COVID-19. This was lower than the report of a similar study where 79.8% of the HCWs are worried that their family member may contact COVID-19. [20]

However, there was a good attitude towards some of the individual elements of attitude. About 95.7% believe that self-protection is necessary for the protection of others, 90.2% follow update about COVID-19 in Nigeria, 90.2% are willing to attend lectures on COVID-19 if organized around them, and 96.2% believe that COVID-19 can be controlled by following standard precautions for infection control. A similar study in Egypt reported a similar finding where 95.6% of the studied HCWs asserted that following standard precautions can prevent infection transmission.[30]

The majority of the HCWs (93.2%) in the present study had good preventive practices towards COVID-19. They reported to follow standard precautions for infection control and follow the WHO hand washing technique. Good knowledge and practice of standard precautions including good cough etiquette, have been shown to reduce infection transmission in hospitals.[31] The finding in this study was, however, higher than what was reported in another study in Uganda. [19]

The commonest perceived barriers to effective infection control were overcrowding in the clinics, wards, and emergency rooms; thus, the HCWs were not able to maintain a safe distance from their patients. This will lead to an increase in infection transmission. An Egyptian study reported that crowdedness and poor ventilation were factors that make HCWs more susceptible to infection than the general population.[30] An Iranian study reported that physicians (67%), nurses (24%), and operating room staff (100%) did not keep a one-meter distance from patients due to lack of space.[32]Other barriers were the unavailability of infection control supplies, especially the Personal Protective Equipment's (PPEs). This was reported in similar studies in Iran[32] and China[33] where lack of these PPEs was reported to be one of the reasons for infection of HCWs with COVID-19. A Nigerian study conducted in primary and tertiary health facilities showed that there is poor availability of infection control supplies in the studied facilities.[34]This strengthens the finding in the present study.

Insufficient training on infection control and lack of knowledge on the mode of transmission of COVID-19 were also reported barriers to its control. This was not surprising as COVID-19 is a novel virus that was not well understood at the onset of the pandemic. It calls for training and retraining of HCWs on such novel diseases once they come up to reduce its transmission in hospital settings. This lack of knowledge by the HCWs has been reported in other studies as a significant factor in the transmission of infection in hospitals.[35]

*a) Limitations*

The data presented in our study were self-reported and partially dependent on the participants' integrity and recall ability; thus, they may be subject to recall bias. However, in despite of this limitation, our findings present valuable information on the knowledge, attitudes, and practice of HCWs during a peak period of COVID-19.

## V. Conclusion

The advancing global threat of COVID-19 indicates that greater efforts through educational campaigns that target HCWs and the wider population are highly needed. This can be done using more effective social media.

## Acknowledgment

We thank all the study participants for their voluntary participation and for the provision of essential information.

*Authors' contributions:* NHO designed the study, developed the questionnaire, collected the data, analysed the data, and prepared the manuscript. MOA also collected data, conducted the pre-test, conducted the literature review.EUE contributed to literature review and filtered the data. All the authors read and approved the final manuscript.

*Funding:* No source of funding

*Competing interests:* The authors declare that they have no competing interests

*Short running head;* COVID-19 among healthcare workers

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