



# Journal of Health and Medical Sciences

**Nwoga, Hope O, Ajuba, Miriam O, and Ezeoke, Uche E. (2020), Knowledge, Attitude and Practice of Medical Students towards COVID-19 Pandemic in a Nigerian Tertiary Institution. In: *Journal of Health and Medical Sciences*, Vol.3, No.4, 522-534.**

ISSN 2622-7258

DOI: 10.31014/aior.1994.03.04.144

The online version of this article can be found at:  
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Published by:  
The Asian Institute of Research

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# Knowledge, Attitude and Practice of Medical Students towards COVID-19 Pandemic in a Nigerian Tertiary Institution

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## Abstract

The novel Coronavirus disease (COVID-19) SARS-CoV-2, is an evolving respiratory disease which was first detected in December, 2019 in Wuhan, China, and has eventually spread to larger parts of the world. COVID-19 may result in mild to severe respiratory distress, depending on the individuals' age and immune system as well as the presence of any underlying conditions. The objective of the study was to assess the knowledge, attitude and practice of medical students towards COVID-19. The study was a descriptive cross-sectional study that involved all the medical students in Enugu State University College of Medicine, Enugu State, Nigeria. Data was collected with an online questionnaire formulated in Google form. It was shared through their different class online platforms (WhatsApp). All the data were analyzed using SPSS version 25. Categorical variables were presented in the form of frequencies and percentages. Majority of the students were within the 15-24 years age group (79.3%), females (62.1%) and single (98.3%). All the students were of Igbo Ethnic group and Christians. Most of them were in their 5th year of study (39.7%). About 65.4% of the students had good knowledge of COVID-19, while 48.6% of them had good attitude towards COVID-19. Majority of them (77.6%) however, had good practice towards COVID-19. There is poor attitude of the medical students towards the COVID-19 pandemic but they had better knowledge and practice towards the pandemic. Measures should be put in place to address attitudinal change among this group of students towards infectious diseases like the present COVID-19.

**Keywords:** COVID-19, Enugu State, Medical Students, Nigeria, Tertiary Health Facility

## 1. INTRODUCTION

In December 2019, an outbreak of viral pneumonia of unknown aetiology was reported in Wuhan City in the East of China (Lu, Stratton & Tang, 2020). It was linked to a seafood and wild animal wholesale market in Wuhan, Hubei Province, China (Li et al, 2020). Gene sequencing showed that the pathogens were enveloped positive-stranded RNA viruses that belong to the family Coronaviridae and the order Nidovirales (Habibzadeh & Stoneman, 2020). The virus was first named 2019-nCoV by the Coronavirus Study Group (CSG) of the International Committee on Taxonomy of Viruses and then changed to Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) (Gorbalenya, 2020). On February 11, 2020, the World Health Organization (WHO) gave a new name to the disease caused by this virus – Coronavirus disease 2019 (COVID-19). WHO on 30<sup>th</sup> January, 2020 declared the outbreak as a Public Health Emergency of International Concern (PHEIC) and described it as pandemic on March 11, same year (World Health Organization, 2020). The most important transmission route that is currently agreed upon, is human-to-human via respiratory droplets or direct contacts (Lai, Shih, Ko, Tang & Hsueh, 2020). Like other viruses of the Coronaviridae family, the major clinical presentations of the disease are fever which occurs in 99% of the affected persons, dry cough, dyspnoea and bilateral patchy infiltration on imaging (Lai, Shih, Ko, Tang & Hsueh, 2020; Huang et al, 2020).

COVID-19 may result in mild to severe respiratory distress, depending on the individuals' age, immune system and the presence of any other underlying chronic conditions. The WHO earlier this year reported that approximately 80% of patients infected with COVID-19 showed mild symptoms or were asymptomatic, and eventually recovered without any medical intervention, whereas 15% of infected persons presented with severe illness, including shortness of breath, septic shock and multiple-organ failure, and remaining 5% of cases categorized as fatal requiring specialized care (World Health Organization, 2020).

Worldwide the strategies established to reduce the transmission of COVID-19 were mostly behavioural, like, social distancing and regular washing of hands. These, largely depend on rapid change in behaviour, which relies on one's knowledge about the problem, ability to perceive the risk, and willingness to change their attitude and behaviours (Wise, Zbozinek, Michelini & Hagan, 2020).

Countries with large cases of COVID-19 patients such as Italy, the United States of America, and the United Kingdom, fast-tracked final year medical students and foundation year doctors into the next level of their career with expedited assessment to help the severely overwhelmed health workforce (Harvey A, 2020; Wang, Tan & Raubenheimer, 2020). Empowering medical students with adequate knowledge will help them to give the public correct information and refute myths and false information about COVID-19 being at the forefront of health education (Shimizu, 2020). A recent study among Iranian medical students spending their clinical courses in university teaching hospitals all over Iran, found a significantly negative correlation between self-reported preventive behaviours and risk perception, which is needed to reduce stress, anxiety, and risk perception, which are the major problems in disease outbreaks (Taghrir, Borazjani & Shiraly, 2020).

Medical students are the first individuals who may have close contact with the affected people due to their presence in the clinics, wards and hospital environment. Lack of proper knowledge among this population can make them overestimate the situation, increase their stress and anxiety level and may interrupt the appropriateness of their medical judgments (Kim & Choi). A basic study of medical students' knowledge, attitude and practice towards COVID-19 is necessary since COVID-19 is currently spreading in Nigerian hospitals and all over the world. To the best of our knowledge, no study is available yet to assess medical students' COVID-19 related knowledge, attitude and practice. This study thus, aims to assess these parameters in medical students in Enugu State, Nigeria.

## 2. METHODOLOGY

### 2.1. Study Area

This study was a descriptive cross-sectional study conducted at the Enugu State University College of Medicine, Enugu, Nigeria. Enugu State is located at the South-Eastern part of Nigeria and Enugu is the capital and the economic hub of the State.

## 2.2. Study design and population

All the medical students in the college of medicine were used for the study. The first year medical students were excluded from the study as they were still in the main campus of the University and have not joined the college of Medicine. There were about 552 medical students in the college as at the time of data collection.

## 2.3. Data collection

Data was collected between May-June 2020 through an online questionnaire formulated with Google form and shared through the different class WhatsApp chat group.

The questionnaire was formulated by the principal investigator after extensive literature review and based on recommendations of the Nigeria Center for Disease Control (NCDC) and WHO on the means of transmission and possible preventive measures. The questionnaire was divided into four sections. The socio-demographic characteristics of the medical students was on the first part, the second section was on knowledge, and the third was on attitude, while the fourth was on the practice of the medical students towards COVID-19. Eleven questions were used to access the students' knowledge of COVID-19. A correct answer scores one while a wrong answer scores 0. The higher the score the, more knowledgeable the student is. Twenty-one questions were used to assess the attitude of the students. A 5 Likert scale was used. The responses were strongly disagree, disagree, neutral, agree and strongly agree weighing 1, 2, 3, 4 and 5 respectively. The higher the score the better the student's attitude towards COVID-19. Some of the questions were reversed to eliminate the bias of giving a single similar response in all the questions. Ten 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 higher the score the better the students practice towards COVID-19.

## 2.4. Data analysis

All the responses in Google form were entered into SPSS version 25. All 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 poor and good. Scores of  $< 80\%$  were classified as poor while scores of  $\geq 80\%$  were classified as good.

## RESULTS

Table 1: Socio-demographic characteristics of the students

Variable	Frequency	Percentage
<b>Age</b>		
15-24	230	79.3
25-34	50	17.2
35-44	10	3.4
<b>Gender</b>		
Male	110	37.9
Female	180	62.1
<b>Marital status</b>		
Single	285	98.3
Married	5	1.7
<b>Ethnicity</b>		
Igbo	290	100.0
Others	0	0.0
<b>Religion</b>		
Christianity	290	100.0
Others	0	0.0
<b>Year of study</b>		
2	75	25.9
3	20	6.9
4	45	15.5
5	115	39.7
6	35	12.1

About 552 students were reached out for the study but only 290 responded giving a 53% response rate. Table 1 shows the socio-demographic characteristics of the students. Majority of them were within the 15-24 years age group 230(79.3%), females 180(62.1%) and single 285(98.3%). All were of Igbo ethnic group and Christians. Highest proportion of the students were in their 5th year 115(39.7%) while the least proportion were the 3rd year students 20(6.9%).

Table 2: Knowledge of COVID-19 among the students

Variable	Frequency	Percentage
<b>Have heard about COVID-19</b>		
Yes	290	100.0
No	0	0.0
<b>If yes, sources of information*</b>		
Government	175	60.3
Internet	255	87.9
Mass media	215	74.1
Family and friends	185	63.8
Social media	235	81.0
Colleagues	175	60.3
Hospital management	90	31.0
<b>COVID-19 is a viral infection</b>		
Yes	285	98.3
No	5	1.7
<b>Its incubation period is 2-14days</b>		
Yes	285	98.3
No	5	1.7
<b>COVID-19 can spread by*</b>		
Droplet from infected persons	290	100.0
Surfaces touched by infected persons	270	93.1
Touching bank notes	160	55.2
Asymptomatic persons	230	79.3
Shaking of hands	255	87.9
Hugging	205	70.7
Staying together in a crowded room	255	87.9
Goods imported from China	15	5.2
<b>Common symptoms of COVID-19 include*</b>		
Fever	270	93.1
Dry cough	265	91.4
Body aches	180	62.1
Difficulty in breathing	285	98.3
Vomiting	45	15.5
Sneezing	215	74.1
<b>Vaccine for COVID-19 is available</b>		
Yes	5	1.7
No	285	98.3
<b>Effective treatment for COVID-19 is available</b>		
Yes	25	8.6
No	265	91.4
<b>People with co-morbidities are more at risk</b>		
Yes	270	93.1
No	20	6.9
<b>Children have no risk of death from COVID-19</b>		
Yes	0	0.0
No	290	100.0

<b>COVID-19 may be more dangerous for the elderly</b>		
Yes	285	98.3
No	5	1.7
<b>COVID-19 spreads through close contact</b>		
Yes	260	89.7
No	30	10.3
<b>All COVID-19 patients develop severe acute respiratory illness</b>		
Yes	100	34.5
No	190	65.5
<b>Influenza vaccine also gives protection for COVID-19</b>		
Yes	10	3.4
No	280	96.6
<b>COVID-19 can be prevented by *</b>		
Proper and regular hand washing with soap and water	280	96.6
Use of hand sanitizers	280	96.6
Social distancing	280	96.6
Wearing of face mask	280	96.6
Eating garlic, ginger and local herbs	20	6.9
Avoid touching of the eyes, nose and mouth	270	93.1
Good cough etiquette	260	89.7
Drinking/inhaling hot water	65	22.4
Drinking alcohol	5	1.7
Taking chloroquin tablets	15	5.2
Taking antibiotics	5	1.7
<b>Knowledge categorized</b>		
Good	190	65.4
Poor	100	34.6

\*Multiple response allowed

Table 2 shows the knowledge of the medical students to COVID-19. All the students have heard about COVID-19 and their major source of information was the internet 255(87.9%) followed by social media 235(81.0%). The least source of information was through the hospital management (31.0%). Majority knew that COVID-19 is a viral infection 285(98.3%) and that the incubation period is 2-14days 285(98.3%). All the students knew that COVID-19 can spread by droplet from infected persons while a minority of them expressed that it can spread by goods from China 15(5.2%). Majority of the students knew the symptoms of COVID-19 like fever 270(93.1%), cough 265(91.4%) and difficulty in breathing 285(98.3%). Majority asserted that vaccine for COVID-19 was not available 285(98.3%), no effective treatment for COVID-19 265(91.4%), that people with co-morbidity 270(93.1%) and elderly 285(98.3%) are more at risk. Majority of the students knew that COVID-19 could be prevented by proper and regular hand washing 280(96.6%), social distancing 280(96.6%), use of hand sanitizers 280(96.6%), wearing of face mask 280(96.6%) while minor proportions said that it can be prevented by eating garlic, ginger and local herbs 20(6.9%), taking chloroquine tablets 15(5.2%) and antibiotics 5(1.7%).

Table 3: Attitude of the students towards COVID-19

Variable	Frequency	Percentage
<b>You think you will contact COVID-19</b>		
Yes	40	13.8
No	250	86.2
<b>You are worried that a family member may contact COVID-19</b>		
Yes	100	34.5
No	190	65.5
<b>Infection is associated with stigma</b>		
Yes	235	81.0
No	55	19.0
<b>Media coverage is exaggerated</b>		
Yes	125	43.1
No	165	56.9
<b>The virus was initially designed as a biological weapon</b>		
Yes	105	36.2
No	185	63.8
<b>It is a plague caused by sin and unbelief</b>		
Yes	20	6.9
No	270	93.1
<b>It was designed to control population</b>		
Yes	45	15.5
No	245	84.5
<b>Designed by pharmaceutical companies to sell drug</b>		
Yes	5	1.7
No	285	98.3
<b>COVID-19 can be successfully controlled.</b>		
Yes	220	75.9
No	70	24.1
<b>Self- protection is necessary for the protection of others</b>		
Yes	285	98.3
No	5	1.7
<b>Lockdown is an effective control measure</b>		
Yes	205	70.7
No	85	29.3
<b>Nigeria can win the battle against COVID-19</b>		
Yes	170	58.6
No	120	41.4
<b>If I contact a person infected with COVID-19 I will inform NCDC</b>		
Yes	215	74.1
No	75	25.9
<b>If I have symptoms of COVID-19 I will inform NCDC</b>		
Yes	195	67.2
No	95	32.8
<b>If I have contact with an infected person, I agree to be isolated at home</b>		
Yes	240	82.8
No	50	17.2
<b>If I have contact with an infected person, I agree to be isolated at an isolation center</b>		
Yes	200	69.0
No	90	31.0
<b>I am willing to take COVID-19 vaccine if available</b>		
Yes	210	72.4

No	80	27.6
<b>I follow updates about COVID-19 in my country</b>		
Yes	235	81.0
No	55	19.0
<b>Follow updates about COVID-19 worldwide</b>		
Yes	205	70.7
No	85	29.3
<b>Will attend any lecture about the virus around me</b>		
Yes	160	55.2
No	130	44.8
<b>COVID-19 can be controlled by following standard precautions for infection control</b>		
Yes	270	93.1
No	20	6.9
<b>Attitude categorized</b>		
Good	141	48.6
Poor	149	51.4

NCDC; Nigeria Center for Disease Control

Table 3 shows the attitude of the students towards COVID-19. Majority of the students believe that they cannot contact COVID-19 250(86.2%) and that the infection is associated with stigma 235(81.0%). Only a minority of the students are worried that a family member may contact COVID-19 100(34.5%), that the media coverage is exaggerated 125(43.1%), that the virus was initially designed as a biological weapon 105(36.2%), and that it was designed to control population 45(15.5%). Majority of the students however, believe that COVID-19 can be effectively controlled 220(75.9%), that self-protection is necessary for the protection of others 285(98.3%), and that lockdown is an effective control measure 205(70.7%). Also, majority of the students agree that they will accept to be isolated at home if they have contact with an infected person 240(82.8%), are willing to take COVID-19 vaccine if available 210(72.4%), follow updates about COVID-19 in Nigeria 235(81.0%) and worldwide 205(70.7%), believe that COVID-19 can be controlled by following standard precautions for infection control 270(93.1%).

Table 4: Medical students practice towards COVID-19

Variable	Frequency	Percentage
<b>Have been to crowded places in recent time</b>		
Yes	130	44.8
No	160	55.2
<b>Wear mask always while leaving home</b>		
Yes	285	98.3
No	5	1.7
<b>Wear mask in correct way</b>		
Yes	280	96.6
No	10	3.4
<b>Dispose mask when it becomes moist or after 8hours</b>		
Yes	185	63.8
No	105	36.2
<b>Follow WHO hand washing technique</b>		
Yes	265	91.4
No	25	8.6
<b>Practice social distancing</b>		
Yes	275	94.8
No	15	5.2
<b>Follow lockdown regulations</b>		
Yes	265	91.4



No	25	8.6
<b>Cover mouth and nose with tissue while sneezing</b>		
Yes	255	87.9
No	35	12.1
<b>Dispose used tissue in the trash</b>		
Yes	255	87.9
No	35	12.1
<b>Avoid touching of eyes, mouth and nose as much as possible</b>		
Yes	255	87.9
No	35	12.1
<b>Practice categorized</b>		
Good	225	77.6
Poor	65	22.4

Table 4 shows the practice of the students towards COVID-19. Minor proportion of the students 130(44.8%) asserted to have been to crowded places in recent time. Majority wear mask while leaving home 285(98.3%) and in a correct way 280(96.6%), dispose the mask when it becomes moist 185(63.8%), follow WHO hand washing technique 265(91.4%) and practice social distancing 275(94.8%). Also, majority of the students follow lockdown regulations 265(91.4%), cover mouth and nose while sneezing 255(87.9%), and avoid touching of eyes, mouth and nose as much as possible 255(87.9%).

## Discussion

The participation of medical students in providing care for patients puts them at higher risk for contracting as well as transmitting infectious diseases. During pandemics such as the present COVID-19 pandemic, healthcare systems are put under great pressure, and a shortage of healthcare workers can drive the health system to co-opt the less experienced medical students into full care of patients. The present study was conducted at the peak of the COVID-19 pandemic in Nigeria.

The knowledge score in our study showed that only 65.4% of the students had good knowledge of COVID-19. This was poor considering that the study was conducted at the peak of the pandemic in Nigeria and the medical students are expected to be much knowledgeable about the disease. The finding was similar to the report of a similar study among medical students in Iran (Taghrir, Borazjani & Shiraly, 2020) but higher than the report of another study among final year medical students in Turkey where only 34.2% of the students had good knowledge of COVID-19 (Çalışkan et al, 2020). The poorer knowledge among the Turkey students may be because the study was conducted at the early stage of the pandemic in the country when much was not yet known about the disease. A Chinese study among healthcare workers however, reported a higher knowledge of 89.0% (Zhang et al, 2020). Medical students who may wish to join HCWs in managing the COVID-19 outbreaks have a high risk of exposure to the infection given their limited clinical experience. It has been shown among medical students that having and enhancing knowledge about a new infectious disease by fostering cooperation between hospitals and universities will help to improve the students' perceptions of the disease and preventive behaviours (Halboub, Al-Maweri, Al-Jamaei, Tarakji & Al-Soneidar, 2015). The risk of medical students acquiring coronavirus infection due to lack of good knowledge about COVID-19 is increased by the fact that there are asymptomatic carrier that transmit the coronavirus (Bai et al, 2020; Rothe et al, 2020).

In this study all the students have heard about COVID 19 and their major source of information was internet 87.9% and social media 81.0%. This was similar to the report of similar studies in Pakistan (Saqlain, Munir & Rehman, 2020), Jordan (Khasawneh et al, 2020) , Uganda (Olum et al, 2020) and Nigeria (Nwoga, Ajuba & Ezeoke, 2020) where 87.68%, 83.4%, 76.0 % and 85.1% of the healthcare workers (HCWs) and medical students got their information through social media.

This was however, higher than the report of other studies where 65.17% and 30% of the students and HCWs used social media as main source of information on COVID 19 (Kushalkumar, Prati, Pushti, Jay, Niraj & Asavari, 2020; Bhagavathula, Aldhaleci, Rahmani, Mahabadi & Bandari, 2020).

There is a wide range of information available on the internet, including unverified, biased and deceptive information's which can easily misguide the public. Thus medical students being at the frontline of medical practice should source information through verified websites. Also the medical community should create more verified websites where important information's like that of the present COVID-19 pandemic can be disseminated easily to the students knowing that internet is their major source of information.

Almost all the students 98.3% knew the incubation period of COVID-19. Knowing the incubation period of the virus would be very useful to identify the suspected cases and to provide medical care at an early stage which will help to reduce the transmission of the infection both among the HCWs and the general public. The finding in this study is similar to the report of similar studies in Iran (Taghrir, Borazjani & Shiraly, 2020), Pakistan (Saqlain, Munir & Rehman, 2020) and Nigeria (Nwoga, Ajuba & Ezeoke, 2020) where 85.4% and 96.38% 90.2% of the respondents knew the incubation period of the virus but higher than the report of a study in China (Zhong, Luo & Li, 2020). Another study among HCWs showed that only 36.4% of them knew the incubation period of COVID-19 (Bhagavathula, Aldhaleei, Rahmani, Mahabadi & Bandari, 2020). Majority of the students had good knowledge about the modes of spread and common symptoms of COVID-19. All of them knew that COVID-19 can spread by droplet from infected persons while majority knew that it can spread by staying together in a crowded place 87.9% and even from asymptomatic persons 79.3%. However, about 5.2% believe that it can be transmitted by goods from China. This can affect the use of products and aids from China for the prevention of COVID-19 and have a negative impact on the general control measures. It can also cause disharmony between the two countries if the information becomes popularized. It is very important that the students should be informed about the modes of spread of COVID-19 infection through validated sources to avoid this form of misconception.

Majority of the students also knew that people with co-morbidities 93.1% and the elderly 98.3% are more at risk. The report of a large survey carried out among general public of the United States of America (USA) and United Kingdom (UK) showed that 96.3% and 97.5% of the people believe that older adults are most likely to die from COVID-19 infection (Geldsetzer, 2020). Similarly, a study conducted among Egyptian public also showed that about 95.0% of study participants believe that COVID-19 is more dangerous for the elderly and those with chronic diseases (Abdelhafiz, Mohammed & Ibrahim, 2020).

A study among medical and allied health science students in India reported that nearly 40% of the participants believed that old/ geriatric or person with co-morbidities are more prone to COVID-19 (Kushalkumar, Prati, Pushti, Jay, Niraj & Asavari, 2020). The higher report in our study may be because all the respondents are medical students while the Indian study involved medical and allied health science students. Medical students by virtue of their training and exposure should have a better knowledge than the allied health science students. Majority of the students knew that COVID-19 can be prevented by proper and regular hand washing, social distancing, wearing face mask and good cough etiquette. The finding is similar to the report of other studies among students (Taghrir, Borazjani & Shiraly, 2020; Kushalkumar, Prati, Pushti, Jay, Niraj & Asavari, 2020; Zhong, Luo & Li, 2020 ) and HCWs (Saqlain, Munir & Rehman, 2020; Bhagavathula, Aldhaleei, Rahmani, Mahabadi & Bandari, 2020).

A minor proportion of the students (6.9%) however, believe that eating garlic, ginger and local herbs can prevent COVID-19 infection. This can be dangerous as such knowledge can be transferred to the general public who also depend on the medical students for information concerning the pandemic. This can delay seeking medical attention and worsen the disease outcome in such cases. Similar studies among medical students in India (Kushalkumar, Prati, Pushti, Jay, Niraj & Asavari, 2020), HCWs in Nigeria (Nwoga, Ajuba & Ezeoke, 2020) and general population in Egypt (Abdelhafiz, Mohammed & Ibrahim, 2020) also reported this wrong perception.

There was a general poor attitude of the medical students towards COVID-19 as only 48.6% of them had good attitude. This poor attitude was reported in a similar study among HCWs in Uganda (Olum, Chekwech, Wekha, Nassozi & Bongomin, 2020) and Nigeria (Nwoga, Ajuba & Ezeoke, 2020). This was however, lower than the report of other studies in Pakistan (65.4%) (Salman et al, 2020) and Uganda (74.0%) (Olum et al, 2020). It has been reported that forming positive attitudes, and promoting positive behaviours, and attitudes towards diseases affect the effectiveness of the coping strategies and behaviours (McEachan, Taylor, Harrison, Lawton, Gardner & Conner, 2016).

Outbreaks of novel infectious pathogens with poorly understood outcomes are often associated with tremendous fear amongst the general public (Person, Sy, Holton, Govert & Liang, 2004). Fear and stigmatization may impact the intentions of an infected individual to seek medical assistance in the right timing which might contribute to increased morbidity and mortality. This is true for a spectrum of previous coronavirus outbreaks and other infectious diseases including SARS, MERS, HIV infection and tuberculosis (Mak et al, 2009; Nachege et al, 2012; Sim, 2016; Jiang et al, 2018).

Only a minor proportion of the students 13.8% think that they can contact COVID-19. This was much lower than the report of a study among HCWs where 85% of them were afraid that they can contact the virus in their work place (Zhang et al, 2020). The HCWs may be more afraid of contacting the infection due to frequent exposure at work and inadequate provision of PPEs in the workplace. Study have shown that frequency of exposure is associated with risk of infection. About 43.1% of the students believe that the media coverage about COVID-19 is exaggerated. A Nigerian study (Nwoga, Ajuba & Ezeoke, 2020) reported a similar finding of 39.6% while another study reported a much lower finding of 5.38% (Olapegba et al, 2020).

A minority of the students believe that the virus was initially designed as a biological weapon (36.2%). This minority of medical students may constitute a negative source of information to the public as they also depend on these students for information on the pandemic. A nationwide survey in Nigeria however, reported a similar finding where 46.94% of the respondents had similar belief (Olapegba et al, 2020). The sources of information to the general public may have influenced their belief, thus information management is important during pandemics like the present one.

Majority of the students (75.9%) agree that COVID-19 can be successfully controlled. A similar study from Nepal reported a similar finding (Asraf, Garima, Singh, Ram & Tripti, 2020). However, in a Chinese study, 90.8% of the respondents were confident that COVID-19 could be controlled (Zhong, Luo & Li, 2020 ). The higher positive response among the Chinese participants may be due to better preventive measures put in place both at the health facilities and the country at large. However a study among Turkish final year medical students reported that only about 42.8% of the student believe that COVID-19 can be successfully controlled in Turkey (Çalışkan et al, 2020). Almost all the students (98.3%) agree that self-protection is necessary for the protection of others. A similar study from Nepal reported similar finding (Asraf, Garima, Singh, Ram & Tripti, 2020). This is appropriate and can be achieved by following standard precautions for infection prevention and control as recommended by CDC (Center for Disease Control and Prevention, 2007). About 29.3% of the students does not believe that lockdown is an effective control measure. This shows poor knowledge of the effect of community transmission which escalated cases of COVID-19 in most countries including Nigeria. However, another study reported a more positive response where 96.4% of the students believe that lockdown is an effective control measure (Asraf, Garima, Singh, Ram & Tripti, 2020).

Only about half of the students (58.6%) agree that Nigeria can win the battle against COVID-19. This shows poor attitude towards the preventive measures put in place by the Nigeria Centre for Disease Control and prevention (NCDC) and the government of Nigeria to combat the pandemic. A study from Turkey reported a similar finding (Çalışkan et al, 2020). Studies in Nepal (77.9%) (Asraf, Garima, Singh, Ram & Tripti, 2020) and China (97.1%) (Zhong, Luo & Li, 2020 ) reported higher positive responses. The better attitude among the respondents of the studies from China and Nepal may probably be because health care facilities in China and Nepal are comparatively better than Nigeria. Also better economic status of these countries may be another factor.

Majority of the students follow updates about COVID-19 in Nigeria (81.0%) and worldwide (70.7%). A study among HCWs in Pakistan showed that about 80% of them agreed that HCWs should acquaint themselves with all information's regarding COVID-19 (Saqlain, Munir & Rehman, 2020).

About 93.1% of the student agree that COVID-19 can be controlled by following standard precautions for infection control. The finding was similar to what was reported in a similar study where more than 96.2% of the participants strongly agreed that COVID-19 could be prevented by following standard precautions (Nwoga, Ajuba & Ezeoke, 2020).

Majority of the students (82.8%) agree to be isolated at home if they have contact with an infected person while a lesser proportion (69.0%) agree to be isolated at an isolation centre. The condition at the isolation centres and the attitude of the HCWs in such centres may contribute to the apparent apathy towards isolation centres in Nigeria. Higher finding was reported in a study conducted among medical students in Uganda (Olum et al, 2020) where 91.0% of the students agree to be isolated at an isolation centre if they come in contact with a patient with COVID-19.

About 77.6% of the students in the present study had good practices towards COVID-19 prevention. Majority of the students took precautions to prevent COVID-19 infection by: wearing face masks when leaving home (98.3%), following WHO hand washing technique (96.6%), practicing social distancing (94.8%) and following lockdown regulations (91.4%). These preventive practices could be primarily attributed to the very strict prevention and control measures implemented by the government of Nigeria such as banning public gatherings and strict lockdown regulations with provision of punishment to defaulters. It could also be the result of the students' knowledge regarding the high infectivity of the COVID-19 virus, which could be easily transmitted between people via invisible respiratory droplets. Unfortunately, the present study showed that about 44.8% of the students still went to crowded places despite the lockdown regulations. The general practice in the present study was higher than what was reported in similar studies in Uganda (Olum et al, 2020) and Ghana (Nkansah et al, 2020) but lower than the report of other studies in Iran (Taghrir, Borazjani & Shiraly, 2020, China (Zhang et al, 2020) and Nigeria (Nwoga, Ajuba & Ezeoke, 2020).

### Limitations

This was an online survey and responses mainly depend upon honesty and partly affected by recall ability and thus may be subject to recall bias. Potential sample clustering might also limit the generalizability of the study. Also this is an internet based online survey, students who reside in places without internet access may not be captured which may lead to demographic selection bias.

### Conclusion

The study was able to highlight gaps in specific aspects of knowledge, attitude and practice of the students towards COVID-19 that should be focused on in future awareness and educational campaigns. Continued access to online health information resources like free courses, clinical management guidelines, and webinars on COVID-19 offered internationally (e.g. by the International Federation of Medical Students Association (IFMSA) (International Federation of Medical Students' Association, 2020), the CDC (Centers for Disease Control and Prevention, 2020), and the WHO (World Health Organization, 2020) may help improve knowledge, attitude, and practices among these medical students.

### Acknowledgement

We acknowledge all the students that voluntarily participated in the study.

**Funding;** No funding from any source

**Conflict of interests;** No conflict of interest declared

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