Journal of Conventional Knowledge and Holistic Health
(Contents available at www.globalscitechocean.com)

Research article

Attitude and adherence to COVID-19 preventive measures - lockdown and vaccination among Niger Delta University students

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Article history

Received : November 01, 2022
Accepted : November 25, 2022

Keywords

Adherence
COVID-19
Preventive behaviours
Preventive measures
Undergraduate students

DOI: 10.53517/JCKHH.2581-3331.622022227

ABSTRACT

The aim of the present research is to evaluate the practice of COVID-19 and attitude towards COVID-19 preventive measures among students of Niger Delta University. A cross-sectional study was carried out among 350 Niger Delta University students. Respondents were drawn from the Faculties of Pharmacy (75, 21%), Nursing (80, 23%), Management science (150, 42%) and Arts (45, 13%). Three departments were chosen from each faculty; the respondents comprised 400 level students (36%), 300 level (21%), 100 level and 500 level (16%) respectively and 200 level (12%). The majority of the students were between the age of 18-25 years (63%), 25-30 years (35%) and 30 years and above (2%). The study had more males (55%) and of the Ijaw ethnic group (55%). A mean of 267 (76.3%) students were in agreement with the COVID-19 protocols whereas 83 (23.7%) had dissenting voices. The most adopted measure was wearing a facial mask (100%). The most applied measures were washing hands more frequently with soap and water (98%), use of hand sanitizers (96%), avoiding going out of the home unnecessarily (95%), staying at home whenever they fell sick (94%); use of disinfectants and solutions (91%), avoidance of handshaking, hugging and kissing (84%). A total of 79% of the respondents Always (6%) or Sometimes (73%) defiled the lockdown order for no special reasons. Regarding academic studying experience, 36% and 41% respectively reported the lockdown to be Somewhat stressful and Moderately Stressful; only 8% found it Extremely Stressful. About 64% of respondents had not been vaccinated. Out of those who had been vaccinated, 76% and 24% respectively had taken 1 or 2 doses. The majority of the participants reported good attitudes and adherence to COVID-19 prevention measures such as lockdown and vaccination.

INTRODUCTION

On December 31st, 2020, pneumonia of unknown cause in Wuhan China was first reported to the World Health Organization (WHO). On January 12th, 2020, the WHO declared the cause to be a novel coronavirus called "2019-nCoV". The WHO formally named the disease caused by this novel virus "COVID-19" (WHO, 2020). The pandemic of COVID-19 has continued to pose an unprecedented threat and challenge to people's health around the world (CDCP, 2020).

The COVID-19 pandemic did not only affect people's health; it influenced almost all other aspects of life, including education systems, educational environments, teachers, and students. One of the main challenges faced by the traditional education systems during the COVID-19 pandemic was adapting the system to meet the education needs (FMOE, 2020; OECD, 2021). Prevention is the best way to manage a pandemic like COVID-19. The WHO issued public advice to create awareness by providing people with knowledge to prevent/protect them from COVID-19. To this end, the NCDC placed a significant amount of emphasis on the application of preventive measures within educational facilities to contain the COVID-19 pandemic. These preventive measures on campus included maintaining social distancing, wearing face masks, avoiding shaking hands with others or touching public surfaces, washing or sanitizing hands as recommended, and checking the temperature and symptoms of COVID-19 at facility entrances. In addition, students were encouraged to receive COVID-19 vaccines, which were provided by health authorities free of charge. At some point, the nationwide closure of schools was ordered (Covid-19 Health Protection Regulations, 2021).

Applying preventive measures is very important in tackling the spread of the disease since there is no curative antiviral drug. University students comprise a large segment of Nigerian society and are exposed to behaviours that may affect their health and spread infectious diseases, such as COVID-19. The keen and desperate desires to acquire the Golden Fleece have resulted in most of the university campuses being over-populated with students leading to gross over-stretching of available infrastructures on campuses and their immediate environs. The

transmission of infection between students was a danger to their families and society. Students on campus at this time required the application of preventive measures. These groups were at risk, and the existence of a single case could cause pandemics among students. University students are more dynamic and more susceptible to acquiring and spreading the virus (Tadese and Mihretie 2021). Applying essential preventive measures to reduce such risk in this group was important. Therefore, in the COVID-19 era, there was a need to study the attitudes and adherence patterns to the preventive measures applied on campus. Studies on preventive behaviours in different parts of the world and among different age groups of the population are needed to demonstrate the social and cultural factors that may be related to non-adherence to stipulated public health interventions during the course of the pandemic, as well as to aid planning for future outbreaks. It is opined that attitude toward the disease may be a contributing factor that impacts the individual perception of the disease (Hessels et al., 2019).

It is also further suggested that the better the attitudes, and perceptions of students towards the COVID-19 outbreak in the country, the better to break the transmission chain. Attitude in this context refers to the participants' opinions regarding the implementation of the COVID-19 preventive measures as well as any related activities whereas Adherence refers to the commitment to which participants follow the recommended COVID-19 preventive measures. A sufficient level of attitude and adherence must be ensured. The present study provides insights into adherence to COVID-19 preventive measures among NDU students at the very beginning of the pandemic by assessing the attitudes and adherence patterns toward the recommended preventive measures, lockdown and vaccination instructions. The study was the pioneer on the issue of the practice of the prevention of COVID-19 among NDU students. It is, therefore, opined that data from this study could provide strategies for the school authorities to prioritize training and other activities which could effectively improve students' well-being and hence the quality of their educational outcomes. This should advise on future policies and guidance. This study was guided by the following objectives.

i. To evaluate the attitude towards covid-19 preventive measures among students of Niger Delta University.
ii. To evaluate the Practice of covid-19 preventive measures among students of Niger Delta University
iii. To evaluate Compliance with and Impact of covid-19 lockdown among students of Niger Delta University.
iv. To evaluate Compliance with COVID-19 Vaccination among students of Niger Delta University

MATERIAL AND METHODS

We carried out an observational cohort study in a representative sample of adolescents and adults in 4 Faculties at Niger Delta University during the 2020/21 academic session. Data were collected using convenience sampling between 2-19 November 2020. A total of 350 respondents took part in the cross-sectional study. Respondents were drawn from the Faculties of Pharmacy (75, 21%), Nursing (80, 23%), Management science (150, 42%) and Arts (45, 13%). Appropriately structured questionnaires were developed. The questionnaires were distributed and used for the collection of the required information. This included the student's demographic data (age and gender, faculty/department, level, and ethnicity), attitude towards Covid-19 preventive measures, level of compliance with Covid-19 preventive measures, compliance with Covid-19 vaccination, and impact of Covid-19 lockdown among students. The tool was evaluated comprehensively by 3 experts in the faculty for face and internal content validity. Then, it was pilot tested on 30 students in other faculties with the same characteristics as the target respondents. The reliability test returned a Cronbach alpha of a = 0.82.

Statistical Package for Social Sciences (SPSS) version 23 for windows was used to manage, clean, store, and analyze the collected data. Frequencies, percentages, and descriptive statistics were reported for each variable.
The aim of this analysis was to quantify self-reported adherence to individual COVID-19 preventive measures, namely: Hand hygiene, Social distancing, Face-masking; Avoiding crowded places; Restricted movements etc. Informed consent was obtained through a question regarding the willingness of each student to participate in the study. If they consented, they could move to the next step of the questionnaire; otherwise, they were automatically forced to leave the survey.

RESULTS

Demography

A total of 350 students completed the survey. Respondents were drawn from the faculties of Pharmacy (75, 21%), Nursing (80, 23%), Management science (150, 42%) and Arts (45, 13%). Three departments were chosen from each faculty; the respondents comprised 400 level students (36%), 300 level (21%), 100 level and 500 level (16%) respectively and 200 level (12%). The majority of the students were between the age of 18-25 years (63%), 25-30 years (35%) and 30 years and above (2%). The study had more males (55%); most respondents were of the Ijaw ethnic group (55%), Igbo (21%), Yoruba (20%), Hausa (2%) and others (22%). See Table 1 for details.

Table 1. Socio-demographic data of participants

S.No.	Variables	Frequency n=350	Percentage
1.	**Faculty**		
	Pharmacy	75	21%
	Nursing	80	23%
	Management	150	42%
	Art	45	13%
2.	**Department**		
	Pharmacy	75	21%
	OIM	50	14%
	Accountancy	50	14%
	Fine & applied art	15	4%
	Philosophy	15	4%
	Nursing	80	23%
	Insurance	50	14%
	ELS	15	4%
3.	**Level**		
	100	55	16%
	200	42	12%

	300 400 500	72 125 56	21% 36% 16%
4.	**Age** 18-25 25-30 30 years and above	 219 125 6	 63% 35% 2%
5.	**Gender** Male Female	 193 157	 55% 45%
6.	**Ethnicity** Ijaw Yoruba Igbo Hausa Others	 192 69 75 8 77	 55% 20% 21% 2% 22%

Attitude towards Covid-19 preventive measures

A mean of 267 (76.3%) students were in agreement with the COVID-19 protocols whereas 83 (23.7%) had dissenting voices. All (100%) respondents were in favour of always wearing facemasks, 98% and 94% respectively favoured closure of educational centres and maintenance of a distance of at least 2 meters; 89% and 77% respectively favoured restriction of travelling to and from COVID-19 diseased areas and quarantine of COVID-19 patients. On the contrary, only 41% and 29% respectively favoured restriction of religious areas and lockdown/ quarantine of cities. See Table 2 for details.

Adoption of preventive measures

COVID-19 preventive measures listed in the survey were adopted by 59.7% whereas 40.3% never adopted the preventive measures to protect themselves. The most adopted measure was wearing a facial mask (100%). The most applied measures were washing hands more frequently with soap and water (98%), use of hand sanitizers (96%), avoiding going out of the home unnecessarily (95%), staying at home whenever they fell sick (94%); use of disinfectants and other solutions (91%), and avoidance of hand shaking, hugging and kissing (84%).

Table 2. Attitudes of participants towards Covid-19 preventive measures

S.No.	Covid-19 Protocols	Yes N=350	No N=350	Don't Know N=350
1.	Individuals should always wear their facial masks.	350 (100%)	-	-
2.	individuals should always maintain a distance of at least 2 meters	321 (94%)	29 (6%)	-
3.	Authorities should restrict travel to and from Covid-19 disease areas to prevent contamination.	311 (89%)	39 (11%)	-
4.	authorities should quarantine Covid-19 patients in special hospitals	268 (77%)	82 (23%)	-
5.	In the event of an increase in the number of cases, authorities should be ready to close educational centres (kindergartens, schools and Universities).	342 (98%)	8 (2%)	-
6.	authorities should be prepared to restrict access to religious sites, shrines and mosques if the number of Covid-19 cases increases	143 (41%)	207 (59%)	-
7.	if the number of Covid-19 cases increases, authorities should be ready to lockdown and quarantine the city	102 (29%)	248 (71%)	-
	Mean ($\bar{x}$)	267 (76.3%)	83 (23.7%)	-

Protecting others mostly involved wearing a face mask (100%), covering one's nose and mouth while sneezing or coughing (83%), avoiding crowded areas like Workplaces/Classes (75%), public transportation (74%) and social distancing (66%). Around 84% adopted avoidance of social events, 83% paid more attention to personal hygiene, 74% used Bitter kola, and 57% used Ginger/Garlic/Vitamin supplements. Around 26% avoided touching the eyes/mouth. Around 40% used antibiotics, 15% used hydroxychloroquine, 15% used herbal products and 14% used Chloroquine. Only 8% applied Nose/Mouth steaming. Table 3 for details.

Table 3. Adoption of preventive measures by participants

S.No.	Preventive actions	Always N=350	Sometimes N=350	Never N=350
1.	I wash my hands with soap frequently under running water	64 (19%)	278 (79%)	8 (2%)
2.	I avoid going out of my home unnecessarily	193 (55%)	141 (40%)	16 (5%)
3.	I practice social distancing	140 (40%)	90 (26%)	120 (34%)
4.	I avoid handshaking, hugging and kissing	120 (34%)	178 (51%)	55 (15%)
5.	I avoid going to work/Class	41 (12%)	212 (63%)	97 (25%)
6.	I avoid public transportation (Taxi, buses).	98 (28%)	156 (46%)	96 (26%)
7.	I avoid consuming outdoor food	42 (12%)	65 (19%)	243 (69%)
8.	I pay more attention to my personal hygiene	78 (22%)	214 (61%)	58 (17%)

9.	I use disinfectants and solutions	121 (35%)	195 (56%)	34 (9%)
10.	I use hand sanitizers	141 (40%)	198 (56%)	11 (4%)
11.	I take Vitamin supplements	36 (10%)	166 (47%)	148 (43%)
12.	I wear my facial mask	150 (43%)	200 (57%)	-
13.	I sneeze and cough into my elbow	29 (8%)	264 (75%)	57 (17%)
14.	I stay at home whenever I feel sick	49 (14%)	286 (80/%)	15 (6%)
15.	I use antibiotics	19 (5%)	123 (35%)	208 (60%)
16.	I use herbal products	-	52 (15%)	298 (85%)
17.	I do Nose/Mouth steaming	-	29 (8%)	321 (92%)
18.	I use Chloroquine	-	48 (14%)	302 (86%)
19.	I use hydrochloroquine	10 (3%)	42 (12%)	298 (85%)
20.	I use Garlic	14 (4%)	186 (53%)	150 (43%)
21.	I use Ginger	14 (4%)	186 (53%)	150 (43%)
22.	I use Bitter kola	18 (5%)	241 (69%)	91 (26%)
23.	I avoid touching my face unnecessarily	34 (10%)	58 (16%)	258 (74%)
24.	I avoid touching my eyes unnecessarily	34 (10%)	58 (16%)	258 (74%)
25.	I avoid touching my mouth unnecessarily	34 (9.7%)	58 (16.6%)	258 (74%)
26.	I avoid social events	41 (12%)	124 (35%)	55 (16%)
	Mean ($\bar{x}$)	62 (17.7%)	147 (42%)	141 (40.3)

Level of compliance to Lockdown

All respondents always (69%) or sometimes (31%) defiled the lockdown in order to take care of feeding issues; 93% of the respondents Always (16%) or Sometimes (77%) defiled the lockdown in order to take care of medical issues; 89% of the respondents always (14%) or sometimes (75%) defiled the lockdown order to attend to spiritual issues; a total of 82% of the respondents always (9%) or sometimes (73%) defiled the lockdown order to attend to social issues (marriage/party etc.). A total of 79% of the respondents always (6%) or sometimes (73%) defiled the lockdown order for no special reasons. A total of 86% of the respondents (always 29%) or sometimes 57%) noticed friends/relatives defiling the stay-at-home order whereas a total of 76% of the respondents always (9%) or sometimes (67%) adhered strictly to the stay at home order (Table 4).

Table 4. Level of compliance to lockdown by participants

S.No.	Compliance to COVID-19 Lockdown Order	Always N=350	Sometimes N=350	Never N=350
1.	Did you defile the order to take care of medical issues	56 (16%)	268 (77%)	26 (7%)
2.	Did you defile the order to take care of feeding issues?	242 (69%)	108 (31%)	-
3.	Did you defile the order to attend to social issues (marriage/party etc.)?	31 (9%)	256 (73%)	63 (18%)
4.	Did you defile the order to attend to spiritual issues?	48 (14%)	263 (75%)	39 (11%)
5.	Did you defile the order for no special reasons?	22 (6%)	256 (73%)	72 (21%)
6.	Did you notice friends/relatives defiling the stay-at-home order?	102 (29%)	201 (57%)	47 (14%)
7.	Did you adhere strictly to the Stay at home order?	32 (9%)	234 (67%)	84 (24%)

Impact of lockdown

Overall, an average of 14.8%, 42.3%, 30.3% and 12.6% respectively reported the lockdown order to be Not Stressful, Somewhat stressful, moderately stressful and extremely stressful. Regarding academic studying experience, 36% and 41% respectively reported the lockdown to be somewhat stressful and moderately stressful; only 8% found it extremely stressful. On the other hand, social isolation was reported to be somewhat stressful (44.6%), moderately stressful (11.4% and extremely stressful (40.6%). The impact on the relationship with relatives was described as somewhat stressful (39%) and moderately stressful (47%) whereas the impact on the relationship with spouse/close friends was described as not stressful (46%), somewhat stressful (35%), moderately stressful (9%) and extremely stressful (10%). The impact on spiritual life was reported to be somewhat (48%) and moderately (36%) stressful whereas the impact on social life was described as somewhat (51%) and moderately (38%) stressful. The details can be found in Table 5.

Table 5. Impact of lockdown on students

S.No.	Impact of Covid-19	Not stressful N=350	Somewhat stressful N=350	Moderately stressful N=350	Extremely stressful N=350
1.	On academic studying experience	53 (15%)	126 (36%)	142 (41%)	29 (8%)

2.	Condition of social isolation	12 (8%)	156 (45%)	40 (11%)	142 (4%)
3.	Relationship with your relatives	34 (10%)	136 (39%)	165 (47%)	15 (4%)
4.	Relationship with your Spouse/ Close friends	162 (46%)	124 (35%)	30 (9%)	34 (10%)
5.	On your spiritual life	42 (12%)	168 (48%)	125 (36%)	15 (4%)
6.	Impact on your social life	13 (4%)	178 (51%)	132 (38%)	27 (8%)
	Mean	52 (14.8%)	148 (42.3%)	106 (30.3%)	44 (12.6%)

Level of compliance and other correlates of vaccination

About 64% of respondents had not been vaccinated. Out of those who had been vaccinated, 76% and 24% respectively had taken 1 or 2 doses. Reasons for not taking the vaccine ranged from not having faith in the vaccine (56%), Adverse effects (19%), belief that vaccination is a means to implant monitoring chips (10%), Parental refusal (5%) and not aware of where to get it (3%). Regarding plans to still get vaccinated, 20% reported yes, 52% reported no whilst 29% were unsure. Regarding preparedness to recommend the vaccine to others, 36% responded in the affirmative; the same ratio (36%) declined whilst 28% were unsure (Table 6).

Table 6. Level of compliance to and correlates of vaccination

S.No.	Compliance with COVID-19 Vaccination	Frequency N=350	Percentage (100%)
1.	**Have you taken the COVID-19 Vaccination?**		
	Yes	125	36%
	No	225	64%
2.	**If yes, how many doses?**		
	1 dose	95	76%
	2 doses	30	24%
3.	**If no, what are your reasons**		
	Don't believe in it	126	56%
	Adverse effects	43	19%
	Against my religion	-	-
	A means to implant monitoring chips	22	10%
	Don't know where to get it	6	3%
	Parents/won't allow me	11	5%
4.	**Do you still have plans to get the vaccine?**		
	Yes	69	20%
	No	181	52%
	Not sure	100	29%
5.	**Are you prepared to recommend the vaccine to others?**		
	Yes	125	36%
	No	124	36%
	Not sure	101	28%

DISCUSSION

Baseline characteristics of participants

Undergraduate students (350) from 4 faculties (Pharmacy, Nursing, Management Science and Art) at NDU participated in the study. The response rate was 100%. The majority of the students in the study were in the 400 level of study; were mostly male between the age of 18-25 years and from the Ijaw ethnic group.

Attitude towards Covid-19 preventive measures

Attitude is described as a feeling or opinion about something or someone. In this study, attitude represented a predisposition of students to respond positively or negatively towards recommended Covid-19 preventive measures. Public health authorities have widely recommended a number of specific preventive measures since the breakout of the Coronavirus Disease 2019 (COVID-19) pandemic. These preventive measures on campus included maintaining social distancing, wearing face masks, avoiding shaking hands with others or touching public surfaces, washing or sanitizing hands as recommended, and checking the temperature and symptoms of COVID-19 at facility entrances. In addition, students were encouraged to receive COVID-19 vaccines, which were provided by health authorities free of charge. These measures have been demonstrated to be effective, albeit partly, in reducing the transmission of common respiratory viruses [Jefferson et al 2008; Chu et al 2020; Howard et al 2021], including severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Chu et al., 2020; Howard et al., 2021; Rader et al., 2021). Respondents in this study expressed diverse attitudes towards COVID-19 preventive measures. This study revealed that about three-

quarters (76.3%) of the respondents expressed agreement with the preventive measures. This is lower than the 90.3% reported in a study in Ethiopia (Mola et al., 2021) but quite similar to reports from North Central Nigeria (79.5%) (Reuben et al., 2021) and 73.8% among Chinese undergraduates (Peng et al., 2020). The level of positive attitude reported in this study is however higher than reports from Ethiopia (54%), Saudi Arabia (45%) (Almalki, 2022), and Nigeria (48.6%) (Nwoga et al., 2020).

The study depicted that all respondents agreed to the wearing of Face-masks. This finding is better than studies done in Ethiopia (85.3%) (Tadese and Mihretie, 2021), and 70.5% in Saudi Arabia (Almalki, 2022). The study also showed that a very high proportion (94%) favoured the maintenance of a distance of at least 2 meters. This finding is better than the study done in Ethiopia (33.7%). The study revealed that a very high proportion of respondents (89%) favoured the restriction of travelling to and from COVID-19-diseased areas to prevent contamination. Similarly, 77% of respondents favoured the quarantine of COVID-19 patients in special hospitals. This serves to curtail the spread of the disease. Additionally, 98% of respondents showed a positive attitude toward the closure of educational centres (kindergartens, schools and Universities) in the event of an increase in the number of Covid-19 cases. On the downside, the respondents revealed a rather poor attitude towards the restriction of religious areas (41%) and only about one-third (29%) favoured the lockdown /quarantine of cities. Altogether, respondents in this study demonstrated a highly positive attitude towards Covid-19 protocols. Efforts are needed to improve the students' satisfaction with COVID-19 preventive measures. Steps are also required to ensure that the procedures and actions introduced by the school extend to all students. Thus, providing educational programs about COVID-19 could increase awareness and improve infection control and prevention.

Adoption of preventive measures

Since the beginning of the Coronavirus Disease 2019 (COVID-19) pandemic, public health authorities have widely recommended several specific preventive measures. Adherence to preventive measures by the population is important to reduce the spread and burden of COVID-19 (Chu et al., 2020; Howard et al., 2021). According to WHO, preventive measures against this virus include frequent hand-washing for at least 20 seconds, with soap and running water or using alcohol-based hand sanitizer, covering the nose and mouth with a disposable tissue or flexed elbow when coughing or sneezing, avoiding touching the eyes, nose and mouth if hands are not clean and avoiding close physical contact (1 meter or 3 feet) also known as social distancing (WHO, 2020). Studies have been conducted in several countries to assess adherence to COVID-19 preventive measures (Lang et al., 2021; Faria de Moura Villela et al., 2021). Respondents in this study reported a low level of adherence to Covid 19 protocols; as only 59.7% always or sometimes adopted the preventive measures whereas 40.3% never adhered to prescribed protocols. This falls short of the highly positive attitudes they demonstrated and requires further qualitative study to understand the bases for the discrepancy/paradox. This suggests that the appropriate COVID-19 preventive measures were poorly implemented. Our results are in tandem with data from other studies which revealed the adoption of preventive measures by 60.8% (Ngwewondo et al., 2020), 65% (Tadesse et al., 2020) and 59.8% (Desalegn et al., 2021). In contrast, a study depicted the poor attitude of medical students towards the COVID-19 pandemic but better practices towards the pandemic (Nwoga et al., 2020).

Our results are contrary to the data obtained from other studies indicating higher levels of adherence to recommended protocols: 98.5% (Alkhaldi et al., 2021), 88.8% (Adebowale et al., 2021) and 77.6% (Nwoga et al., 2020). Poorer practices of Covid-19 preventive behaviours were reported in some studies: 37.5% (Tadese et al., 2022), 36.5% (Salman et al., 2020); 42% (Angelo et al., 2021) 41.6% (Abate and Mekonnen, 2020); 40.7% (Amsalu et al., 2021) and 20% (Mola et al., 2021). The differences might have been subjected to variations in the study populations. The possible suggestion for such variation may be due to the difference in tools used to assess the practice of the students. The variation may account for the differences in the target population, study period, outcome measurement, and sample size. Another possible reason may be due to variation of enabling factors of awareness about the exact cause of the disease which may be influenced by socioeconomic and educational status. Regarding specific practices related to COVID-19, data from this study revealed that all respondents (100%) always or sometimes wore face masks, in consonance with their high attitude towards this behaviour. This is similar to other studies that reported high practice of face-masking: 90.2% (Edet et al., 2020), 96.4% (Hatabu et al., 2020), 98.3% (Nwoga et al., 2020), 98% (Zhong et al., 2020) and 91.6% (Almalki, 2021). Lower adoption rates of facemasks were however reported in some other studies: 10.6% (Osaro et al., 2021), 43.5% (Egbi et al., 2020) and 13.3% (Butty et al., 2022).

A face mask is a loose-fitting and single-use device that covers the nose, mouth and chin. It provides a physical barrier against potentially infectious droplets and is a simple and low-cost nonpharmaceutical individual intervention for protecting oneself and preventing the spread of respiratory infections. Health organizations worldwide recommend the use of face masks to prevent the spread of respiratory infections (CDCP, 2020). It has been suggested that appropriate wearing, handling and removal of simple facemasks could reduce the transmission of respiratory disease due to coronaviruses by 70% (WHO, 2020).

When people have respiratory symptoms, their respiratory droplets usually contain pathogenic microorganisms. If they do not cover their mouth and nose with a face mask, the transmission of respiratory infections is likely to occur. Face masks provide a physical barrier between the mouth and nose of the wearer and potential contaminants in the immediate environment (Kumar et al., 2020). The wearing of face masks in the public is to mitigate the spread of the virus. The Federal Government of Nigeria encouraged the wearing of face masks in public places. There is documented evidence that wearing masks can prevent or slow the spread of the COVID-19 pandemic (Howard et al., 2021; Esposito et al., 2020). The wearing of facemasks in public places has been adopted as a source

control measure in the prevention and control of Covid-19 worldwide. In Nigeria, its use in public places was made compulsory and defaulters were liable to sanctions (Edet et al 2020; Howard et al., 2021). It is further opined that the appropriate wearing, handling and removal of facemasks by healthy individuals in communities and healthcare workers may reduce the risk of transmission of the SARS-CoV-2 virus (Lyu and Wehby, 2020; Lee et al., 2020; Dimie, 2020).

Masks are particularly regarded as a key measure to reduce transmission and save lives and the wearing of well-fitted masks is advocated to be used as part of a comprehensive 'Do it all!' approach. Depending on the type, masks can be used for either protection of healthy persons or to prevent onward transmission, or both (WHO, 2022). It is recommended that a face mask should be used correctly to achieve the desired effect as incorrect usage may increase, instead of decrease, the spread of respiratory infections.

Additionally, data from this study showed that a significant proportion of respondents in this study practiced measures that are related to avoiding enclosed spaces, crowded areas, and close situations: avoiding going out of the home unnecessarily (95%); staying at home whenever they fell sick (94%); avoid handshaking, hugging and kissing (84%); avoiding crowded areas like Workplace/Classes (75%) and public transportation (74%); Practice of social distancing (66%), and avoiding social events (84%).

This is not in line with the study from Ethiopia (Tadese and Mihretie, 2021) but is close in tandem with other studies (Alkhaldi et al., 2021; Almalki, 2021; Almalki, 2022). Recommendations advised people to stay safe and avoid the three C's: confined and closed spaces, crowded places, and close-contact settings whether at work, home, or school. Studies have revealed the proportion of the population reporting practicing social distancing as 60% in Switzerland (Butty et al., 2022), 45% in the United Kingdom (Atchison et al., 2020), 40% in Hungary (Urbán et al., 2021), 85% in Spain (Beca-Martínez et al., 2021), approximately 89% in the United States (Callaghan et al., 2021), and 98% in Saudi Arabia (Alkhaldi et al., 2021). Social distancing is a strategy to reduce physical contact between people to slow down and reduce the spread of COVID-19 in a community. This measure involves strict adherence to non-physical greetings (avoiding hand shaking or hugs), maintaining at least 2 metres (6 feet) physical distance between yourself and individuals and closure of activities that will cause any form of gathering including schools, places of worship, sporting and social events.

It has been variously reported that overcrowding and Close Physical Contact like Handshaking can aggravate the spread of Infection (Adhikari et al., 2020; Wu and McGoogan, 2019).

Through social distancing, one can become protected and also our loved ones and society at large. This is a veritable way to limit the chances of catching the virus, slowing down the transmission and reducing the spread of COVID-19 in Nigeria. It is noteworthy that an average of three-quarter of the respondents in this study sometimes practiced highly important aspects of the protocol like, washed their hands with soap frequently under running water, using disinfectants, and hand sanitizers, sneezing and coughing into the elbow, and paying more attention to personal hygiene. This is significant in the sense that they are effective measures to avoid the spread of the disease. However, the periods of non-adherence with these protocols become wide open for the transmission of the disease. There is a need to advocate for total adherence to forestall breakthrough transmission of the disease.

A study among Undergraduates in Ethiopia reported that 61% of them frequently washed their hands with soap and water but only 30.8% always use hand sanitizers (Tadesse et al., 2020). Adherence to simple hygiene practices was depicted as higher in other studies (Atchison et al., 2020; Callaghan et al., 2021, Schneider et al., 2021; Beca-Martínez et al., 2020). Prior studies have reported slightly poorer practices of washing hands frequently with soap and water and covering one's nose and mouth while sneezing or coughing (Angelo et al., 2021); Tadese and Mihretie, 2021). More worrisome is the self-report that as high as 73% of the respondents continued to touch their faces, eyes and mouth unnecessarily. It is a known fact that the hands can pick up the virus from various surfaces and transfer same to the face, eyes and mouth resulting in the transmission of the infection/virus (Karia et al., 2020).

These results are discordant with those obtained from studies elsewhere (Adebowale et al., 2021). Thus, it is vital to improve the COVID-19 preventive measures and encourage their adherence to students and college staff such that their safety is ensured. First, people should be encouraged to wear face masks correctly and consider appropriate hand hygiene practices. Additionally, social distancing within campus must be enforced by the school. If preventive measures are not applied correctly, students may contract the disease or unintentionally transmit the virus to others (Rose, 2020). Protecting others mostly involves covering one's nose and mouth while sneezing or coughing, wearing a face mask, avoiding social events/crowded areas, and washing hands more frequently with soap and water. Thus, it is vital to improve the COVID-19 preventive measures and encourage their adherence to students and college staff such that their safety is ensured. This study revealed self-medicating with the use of the following products: Antibiotics (40%); herbal products (15%); chloroquine (14%); hydroxyl-chloroquine (15%); Garlic (57%); Ginger (57%); and Bitter kola (74%). There are no evidence-based justifications for the use of these products in the prevention or treatment of Covid 19.

This is not in tandem with a multi-institutional survey in Nigeria that reported that 66.4% of respondents never self-medicated to prevent COVID-19 infection (Adebowale et al., 2021). The WHO does not recommend the use of Hydroxychloroquine based on the outcome of many clinical trials. Further, WHO stipulates that antibiotics do not work against viruses and should not be used for the prevention or treatment of Covid 19. Antibiotics may, however, be used to prevent or treat secondary bacterial infections which can be a complication of COVID-19 in severely ill patients (WHO, 2021).

Level of compliance to lockdown

Reports emanating from this study revealed that more than three-quarters of the respondents always or sometimes defiled the lockdown instructions for various reasons

ranging from taking care of feeding issues (100%), taking care of medical issues (93%), attending to spiritual issues (89%), attending to social issues (marriage/party etc.) (82%) and for no special reasons (79%).

Guidelines provided for the lockdown period stipulated that, for the period of the lockdown, every person was confined to his or her place of residence, unless strictly for the purpose of performing an essential service, obtaining an essential good or service, or seeking medical care (PTF Covid-19). This data would appear that the respondents largely adhered to the rules of the lockdown. Further analysis revealed that a significant proportion of respondents (86%) always or sometimes noticed friends/relatives defiling the stay-at-home order. The reasons for the defilement are not obvious. However, it is gratifying to note that a total of 76% of the respondents always or sometimes adhered strictly to the stay-at-home order. This is better than the 50.1% reported by a study in Nigeria (Adebowale et al., 2021). Further studies will be needed to fully understand this behavioural trend.

Impact of lockdown

On the impact of the lockdown on various aspects of their lives, various levels of stress were expressed. A little less than half (42.3%) reported that the lockdown was somewhat stressful whereas about a third (30.3%) reported that the lockdown was moderately stressful. About a tenth (12.6%) of the respondents declared that the lockdown was extremely stressful whilst 14.8% experienced no stress at all as a result of the lockdown. Specific to their academic studying experience, less than a tenth (8%) of the respondents reported having experienced extreme stress; less than half (36-41%) experienced some degree of stress in this domain. It should be noted that social isolation was reported by the respondents to be somewhat stressful (44.6%) and extremely stressful (40.6%). Relationship with relatives was reported to be somewhat (39%) and moderately (47%) stressful whereas the Relationship with Spouse/Close friends was described as somewhat (35%) stressful; a tenth of the respondents reported this to be extremely stressful; on the other hand, 46% of respondents experienced no stress. The impact on spiritual life was reported to have some degree of stress (84%). Also, the impact on social life was reported to have some degree of stress (89%).

A study among college students revealed stress, depression, loneliness, lack of motivation, difficulty focusing on schoolwork, restless sleep, appetite changes, and difficulties coping during the lockdown (Birmingham et al., 2021). Another study reported disruptive changes in finances (54%), living situation (35%), academic performance (46%), educational plans (49%), and career goals (36%); Primary mental health challenges included stress (41%), anxiety (33%), and depression (18%) (Molock and Parchem, 2022).

Adapting to the new normal" during the lockdown has been predicted to be associated with psychological distress not only among students but with staff and faculty (Liu et al., 2020). High baseline levels of stress and mental health challenges among college students have been reported (Chen et al., 2019) and pandemic-related stresses, including relocation, online learning, social distancing, and anxiety over health and economic risks have been reported to likely persist as long-term stressors (Liu et al., 2020). A study among students in Nigeria revealed that the students' psychology was significantly affected by the lockdown protocols, likewise their behaviours and routine activities (Ojetunde et al., 2020).

The lockdown has been shown to antagonistically impact children's emotional well-being prompting a wide assortment of psychological wellness issues like, tension, stress, depression, and sleeping difficulties (Dunleavy, 2020; Galvin, 2020).

Also, lockdown and school closure may negatively affect children, influencing their social life, education, and psychological well-being (Ojetunde et al., 2020). There is a need to evolve coping strategies and efforts to curb the adverse impacts of COVID-19 and similar future pandemics. University administrators are prompted to establish management approaches regarding pandemics to encourage positive health behaviour among students (Akan et al., 2010).

Level of compliance to and other correlates of vaccination

This study revealed that a high proportion (64%) of the respondents had never been vaccinated against Covid-19; only 36% had received the Covid-19 vaccination. Out of those who had been vaccinated, 76% and 24% respectively had taken 1 or 2 doses. A study among undergraduate students in south-south Nigeria depicted that only 41.2% of the participants accepted to take the COVID-19 vaccine and 51.1% had a positive perception (Orok et al., 2022) as opposed to an earlier study that showed that the perception of Nigerians toward Covid-19 vaccine trial was 61% positive and 39% poor (Enitan et al., 2020). Vaccine hesitancy is a threat to world health. Issues with vaccine acceptance and hesitancy have been a common problem globally, especially in African settings (Ackah et al., 2022). Also, vaccine hesitancy has been reported to be frequent among students and health workers in African countries (Agyekum et al., 2021; Mose et al., 2022). Previous studies from Saudi Arabia found that most of their participants were hesitant to receive a COVID-19 vaccine (Magadmi and Kamel, 2020; Almohaithef et al., 2021). However, a recent study from the Jazan region indicated that the COVID-19 vaccination had a high level of acceptance (Almalki, 2021). Reasons adduced for avoiding vaccination included lack of faith in the vaccine (56%) (deemed to be ineffective), fear of Adverse effects (19%) and the notion that vaccination was a means to implant monitoring chips (10%); some others reported that their Parents/won't allow them (5%) while others reported they did not know where to get vaccinated (3%); none of the respondents gave religion as an excuse. Literature reports have revealed a number of reasons for vaccine hesitancy. These include Lack of trust in the vaccine's safety and efficacy; Risk perception; inadequate information regarding the adverse effects of the vaccine, lack of trust in the vaccine source and in the government, the speed of vaccine development; anti-vaccine beliefs, circulating theories in social and traditional media about COVID-19 vaccines inefficiency coupled with a history of vaccine boycott, and belief that the vaccines would have future medical implications; rumours, conspiracy theories, and false claims about COVID-19 vaccines, including their

purpose, contents, efficacy, safety, and side effects (Jegede, 2007; Lucia et al., 2021; Orok et al., 2022). A previous study had also shown that some Africans feel immune to COVID-19 (Afolabi and Ilesanmi, 2021).

More worrisome are the reports from this study to the effect that only 0ne-fifth of the respondents were willing to still get vaccinated and about half the respondents (52%) reported not being ready or willing to get vaccinated; about a third (29%) were unsure if they would receive the vaccination. A study reported a higher level of willingness (84.6%) to receive the vaccine (Almalki, 2021) consistent with some studies (Yue et al., 2021; Kwok et al., 2020; Baloran Erick, 2020) but inconsistent with others (Fatmi et al., 2020).

Finally, only about a third of respondents (36%} were willing to recommend the vaccine to others; the same proportion of respondents emphatically declined to recommend the vaccine to others; about a third (28%) of respondents were unsure whether they would recommend the vaccine to others. This outlook or attitude towards willingness to get vaccinated or recommend the vaccine to others is highly undesirable and will never enhance the uptake of the vaccine significantly. We need to achieve much greater vaccination uptake in order to achieve herd immunity against the disease. A study reported a marginally better attitude where it was reported that 46.8% accepted to encourage others to accept the COVID-19 vaccine (Orok et al., 2022).

Vaccine immunization of large populations has been identified as vital mitigation strategy for curbing the spread of COVID-19. The major threat to achieving this is vaccine hesitancy. Educational intervention in form of training should be done to improve students' perception toward COVID-19 vaccination which will reduce vaccine hesitancy.

Limitations of the study

Some limitations should be considered in interpreting this study. The questionnaire is subject to recall bias and misclassification. Another limitation was the use of self-reported measures, convenience sampling, and use of a cross-sectional design, which cannot be generalized to the study findings. Therefore, the generalization of the findings is impossible. Since this is cross-sectional, it fails to establish a causal relationship. Further study, such as a longitudinal study design, could provide an analysis of cause-and-effect relationships between students' demographic characteristics and positive attitudes, preventive practices, and the impact of lockdown during the COVID-19 outbreak.

One of the strengths of the study is that it was conducted during the COVID-19 outbreak, thus, the exact influence of the outbreak on students' attitudes and practices could be measured in real-time. Participants may have answered questions in a manner that would be viewed favourably by others and/or may not respond to the actual practice (social desirability bias). Other confounders like knowledge, awareness and perceptions were not assessed in this study.

CONCLUSION

This study revealed that NDU Students demonstrated a highly positive attitude towards Covid-19 protocols. However, this study reported an overall low level of adherence to Covid 19 protocols among the students but the study depicted that a significant proportion practiced measures that are related to avoiding enclosed spaces, crowded areas, and close situations. Also noteworthy is the fact that the study revealed that an average of three-quarter of the respondents practiced other highly important aspects of the protocol that relate to avoidance of the spread of the disease like hand washing, use of disinfectants/hand sanitizers, sneezing and coughing into the elbow and paying particular attention to personal hygiene. However, a high proportion of the respondents continued to touch their faces, eyes and mouth unnecessarily which could result in the transmission of the virus. Further, the study revealed self-medicating with the use of a number of unapproved products like Chloroquine, Hydrochloroquine, Ginger, Antibiotics, Herbal products, Garlic and Bitter kola. The study further revealed that more than three-quarters of the respondents always or sometimes defiled the lockdown instructions for various reasons ranging from taking care of feeding issues, taking care of medical issues, attending to spiritual issues and attending to social issues (marriage/party etc.), a demonstration of adherence to the rules of the lockdown but subject to the adoption of preventive protocols during the defilement. The study, however, depicted that a large proportion of respondents adhered strictly to the stay-at-home order. On the impact of the lockdown on various aspects of their lives (academic studying experience, Relationship with Relatives, Spouse/Close friends and spiritual life), various levels of stress were expressed – Somewhat stressful, Moderately stressful or Extremely stressful.

This study revealed that a high proportion (64%) of the respondents had never been vaccinated against Covid 19 and out of those who had been vaccinated, 76% had taken 1 dose. Reasons adduced for vaccine hesitancy included lack of faith in the vaccine, fear of adverse effects, the notion that vaccination was a means to implant monitoring chips, parental objection or ignorance of the source of vaccination.

IMPLICATIONS

This study assessed the attitudes, adoption of preventive behaviours, adherence to lockdown rules, impacts of the lockdown, vaccine adoption and reasons for vaccine hesitancy among NDU students during the Covid-19 pandemic. Results were vital to advance attitudes and adoption of critical behaviours towards management and curtailment of the pandemic. The study has significant implications for future actions, such as improving self-care by increasing COVID-19 prevention attitudes and control guidelines. The study recommends that efforts are needed to improve the students' satisfaction with COVID-19 preventive measures. Steps are also required to ensure that the procedures and actions introduced by the school extend to all students. University administrators are prompted to establish management approaches regarding pandemics to encourage positive health behaviour among students. The study further proposes that it is vital to improve the COVID-19 preventive measures and encourage adherence by all students such that their safety is ensured.

Further, there is a need to evolve coping strategies and efforts to curb the adverse impacts of COVID-19 and

similar future pandemics. Further studies will be needed to fully understand the behavioural trends. Providing educational programs about all aspects of Covid-19 could increase the attitude and practice of Covid-19 protocols that will subsequently improve infection control and prevention.

Finally, aside from Covid-19, there are likely to be other new communicable infections to deal with in the future. Therefore, long-term policies, structures, and strategies are needed to strengthen healthcare systems within the University and, specifically, the capacity and capability to respond properly to any future public health emergencies.

ACKNOWLEDGEMENTS

The authors wish to express their profound gratitude to all students who participated in this study.

AUTHOR CONTRIBUTIONS

Conceptualization: EJF, OPA, ODE; Data Collection: GGI, ODE; Formal analysis: OPA, GGI; Data curation: GGI, ODE; Writing—original draft preparation: GGI, OPA; Writing—review and editing: EJF; Supervision: EJF, OPA. All authors have read and agreed to the published version of the manuscript.

CONFLICTS OF INTEREST

The author(s) declare(s) no conflicts of interest.

DECLARATION

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How to cite this article?

Owonaro PA, Eniojukan JF, Owonaro DE, Godwin GI (2022). Attitude and adherence to COVID-19 preventive measures - lockdown and vaccination among Niger Delta University students. Journal of Conventional Knowledge and Holistic Health, 6 (2), Article ID 227.

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