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Original Research

Assessment of Compliance to Preventive Measures against COVID-19 using WHO Checklist among Secondary Schools in Nnewi North Local Government Area of Anambra State, Nigeria

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Abstract

Background: Coronavirus Disease of 2019 (Covid-19) was arguably the greatest global health threat of our time. Immediately the pandemic was declared by WHO, countries around the world took broad public health and social measures (PHSM), including closure of schools, to prevent the spread of the SARS-CoV-2 virus, which causes COVID-19. The COVID-19 pandemic posed an enormous risk to the health and safety of learners, teachers, parents, school administrators, education practitioners, and the wider community. However, reopening schools carried the public health risk of viral resurgence. This study aimed to assess the compliance to COVID-19 preventive measures among secondary schools in Nnewi North LGA of Anambra state, Nigeria using WHO checklist.

Methodology: This was a facility-based cross-sectional observational survey of secondary schools within Nnewi North local government area of Anambra state. Data was collected through school surveys and observations of compliance measures, both done during the same school visit. Informed consent was obtained from the principal of each school or their representative before carrying out the study in their facilities.

Results: Out of the schools sampled, 12 schools (38.71%) had good compliance, 9 schools (29.03%) had moderate compliance, and 10 schools (32.26%) had poor compliance. The finding of this study thus revealed that the overall compliance level toward COVID-19 preventive and control measures among secondary schools in Nnewi-North LGA of Anambra state was 38.71%.

Conclusion: The common restraining factors against compliance to standard COVID-19 preventive measures included the fact that the students are children (aged between 11 – 18 years) and thus wouldn't always wear their masks, school ownership, attitude towards, and risk perception of COVID-19 and these factors significantly influenced the adherence of each school towards COVID-19 mitigation measures.

Keywords: Compliance; COVID-19; Preventive; Control Measures; Secondary Schools; WHO Checklist.

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Introduction

Coronavirus Disease of 2019 (COVID-19) was arguably the greatest global health threat of our time. Immediately the pandemic was declared by the WHO, countries around the world took broad public health and social measures (PHSM), including closure of schools, to prevent the spread of the SARS-CoV-2 virus, which causes COVID-19.[1] Being a highly infectious disease whose mode of transmission occurs by mere human contact and our daily activities thus facilitating its rapid spread, **t**he COVID-19 pandemic posed an enormous risk to the health and safety of learners, teachers, parents, school administrators, education practitioners, and the wider community.

During the COVID-19 pandemic, prolonged school closures resulted in a reversal of educational gains, limiting children's educational and vocational opportunities as well as their social and emotional interactions and development. The longer a student stays out of school, the higher the risk of dropping out. [2] Additionally, students who are out of school and particularly girls were at increased risk of vulnerabilities (e.g. subject to greater rates of violence and exploitation, child marriage and teenage pregnancy) [2,3,4]. Furthermore, prolonged school closures interrupted and disrupted the provision of, and access to, essential school-based services such as school feeding and nutrition programmes, immunization, and mental health and psychosocial support (MHPSS). [2,3]

Countries around the world remain at different points of the COVID-19 pandemic, which means they face varying challenges, from overwhelmed healthcare systems to growing economic despair, etc. However, in Nigeria, due to the challenges of online learning, schools had to be reopened. However, reopening schools carried the public health risk of viral resurgence.

The knowledge and practice of COVID-19 precautionary measures differ in individuals, communities, and states within the country. This results largely from orientation, behavioural practices, and environmental influences, and can thus affect compliance with standard precautions. The assessment of compliance with standard precautions therefore is necessary among students and staff as they are in close contact daily. The general society including the educational community needed to be educated on the need to adhere to these measures, the effects of abuse of the preventive measures, and how best to adapt with the new mode of function in our society towards a healthier environment.

The focus of this survey was to assess the level of compliance to standard COVID-19 precautionary measures in secondary schools in Nnewi North LGA of Anambra state, Nigeria and identify factors that affects compliance to these measures.

Methodology

This survey was a facility-based cross-sectional observational study carried out amongst secondary schools in Nnewi North LGA of Anambra state. This is equivalent to students in high school from grade 7 – 12. A census of all secondary schools in Nnewi North local government area of Anambra state was obtained from Nnewi North Education board and a total area population study was done.

A one-day training was done for data collectors and supervisors to create a common understanding of the objective of the study and the tool. Moreover, a pre-test was conducted in a secondary school outside the study area and necessary corrections were made to the tool. The filled checklist was checked for consistency and completeness by the supervisors daily. Data entry was carefully done using Microsoft excel to minimize and control errors during data entry.

Eligible facilities were secondary schools that were registered with the Nnewi North Education Board and are government approved. Facilities were ineligible if they refused consent, provided specific services only (e.g. JAMB tutorial services, non-formal schools, evening schools), and school entry was not possible for any reason.

Data was collected through a school survey and through observations of compliance measures, both done during the same school visit. Observations and NCDC guidelines based on WHO guidelines were used to measure compliance in secondary schools. [5,6]

Ethical approval was obtained from the department of community medicine, Nnamdi Azikiwe University Teaching Hospital Ethical Review Board prior to the commencement of the study and written informed consent has been obtained from every facility during the data collection time. All principals of the schools or their representatives were informed of the aims of the research and their anonymity assured. The participants were also informed that the information they provided will be kept confidential and that there were no risks associated with their participation in the study. Their participation was entirely voluntary, and they were told that they have the right to opt out any time they wanted to do so. Prior to participating, an informed assent was obtained from all students involved.

Fieldworkers spent 30 minutes in each facility observing interactions in the school gate, school compound, assembly grounds, classrooms, and cafeterias. A long-standing concern with clinical observations is the Hawthorne effect, in which study subjects' awareness of being observed caused them to alter their behaviour. [7] To minimise such bias, fieldworkers were coached to observe discreetly from the corner of the room, limit interaction with either staff or students, and not disclose that observations were focused on compliance. The study lasted for four (4) weeks spanning from February1st – February 28th, 2021.

The checklist was composed of three (3) parts. The first part contained questions about the facility itself (a dependent variable). The second part contained questions that were used to assess compliance of the facilities which consisted of nineteen (19) items with 'yes' or 'no' response options (an independent variable). The third part contained factors which are most likely the reasons for their lapse in compliance as obtained from the principal of each school or their representatives (an independent variable).

The tool assessing compliance in secondary schools specified 19 indications and corresponding actions. In this analysis, my primary focus was on the 15 indications most relevant to COVID-19. These indications and the corresponding actions were grouped into five (5) domains – 1. Hand hygiene and respiratory etiquette; 2. Physical distancing; 3. Use of masks in schools; 4. Environmental cleaning and ventilation; 5. Respecting procedures for isolation of all people with symptoms.

The collected data was entered into Epidata manager and exported to SPSS version 24.0 for analysis. Cronbach's alpha of the items assessing compliance level was calculated to check the internal consistency of the tool. Percentage compliance scores were computed and described for each item.

Compliance with COVID-19 prevention and control measures was assessed using 19 items with 'Yes' or 'No' response options as a binary variable. A score of '1′ was given for 'Yes' and '0′ for 'No' responses. 'Yes' indicates compliance with the item under consideration and 'No' indicates non-compliance. The possible sum score for each establishment ranges from 0 – 19. A mean compliance score for each school was computed by dividing the sum score by the number of items. Finally, an overall percentage compliance score was measured by the following formula, which indicates level of compliance of the secondary schools towards COVID-19 preventive and control measures in the study area.

% Compliance Score = (Sum of Mean Compliance Scores / Sample Size) x 100

The compliance scores towards COVID-19 preventive and control measures were interpreted as follows: 0 – 49% (Poor compliance); 50 – 69% (Moderate compliance); 70 – 100% (Good compliance)

Results

The data used for this study was collected from thirty-one (31) schools with the aim to assess the level of compliance to COVID-19 precautionary measures in secondary schools in Nnewi North LGA of Anambra state, Nigeria.

School demographics

Table 1 below shows the result of the school's demographics with regards to the location of the school, type of school, gender of students, and school ownership (Table 1).

Based on locality, the school sample included 4 (12.9%) schools which were in the rural region and 27 (87.1%) located in the urban region.

Based on the type of school, the school sample included 26 (83.87%) are day schools while 5 (16.13%) are day and boarding schools.

Based on the gender of the students, the school sample included 2 (6.45%) are boys only schools, 4 (12.9%) are girls only, and 25 (80.65%) are mixed schools.

Based on school ownership, the school sample included 6 (19.35%) are government – owned, 18 (58.06%) are private – owned, and 7 (22.58%) are private – mission owned.

Table 1 – Showing Locality of school, type of school, gender of students and school ownership

Variable	Frequency	Percentage (%)
Locality of school		
Rural	4	12.90
Urban	27	87.10
Type of school		
Day School	26	83.87
Day and Boarding School	5	16.13
Gender of students		
Boys only	2	6.45
Girls only	4	12.90
Mixed school	25	80.65
School ownership		
Government	6	19.35
Private	18	58.06
Private - Missions	7	22.58
TOTAL	**31**	**100**

Assessment of the compliance with COVID-19 preventive measures

The outcome for assessment of compliance for COVID-19 preventive measures is displayed in Table 2 and figure 1. Based on the results available in Table 2, all schools were able to orientate their students, teachers, staff, and community on COVID-19 and its mitigative measures (100%) while the least compliance was with regards to fencing and manned gates, classroom spacing, and the presence of a school clinic (each have 64.52% level of non-compliance).

Table 2 – Showing the assessment of the level of compliance to standard COVID-19 precautions among secondary schools in Nnewi North LGA of Anambra state, Nigeria.

Precaution	Frequency	Percentage (%)
Fencing & manned gates		
No	20	64.52
Yes	11	35.48
Classrooms		
No	20	64.52
Yes	11	35.48
Management of timetable		
No	18	58.06
Yes	13	41.94
Learners & teacher's furnitures		
No	18	58.06
Yes	13	41.94
Doors & windows		
No	13	41.94
Yes	18	58.06
Disinfection		
No	12	38.71
Yes	19	61.29
Infra-red thermometer		
No	12	38.71
Yes	19	61.29
Hand sanitizers		
No	10	32.26
Yes	21	67.74

Facemasks		
No	14	45.16
Yes	17	54.84
Safe water		
No	10	32.26
Yes	21	67.74
Soap & disinfectants		
No	5	16.13
Yes	26	83.87
Handwashing points		
No	4	12.90
Yes	27	87.10
School clinic		
No	20	64.52
Yes	11	35.48
Boarding and hostel accommodation		
No	2	50.00
Yes	2	50.00
Learners		
Yes	31	100.00
Teachers & administrators		
Yes	31	100.00
Other education personnel		
Yes	31	100.00
School community		
Yes	31	100.00
Other consideration		
No	24	80
Yes	6	20

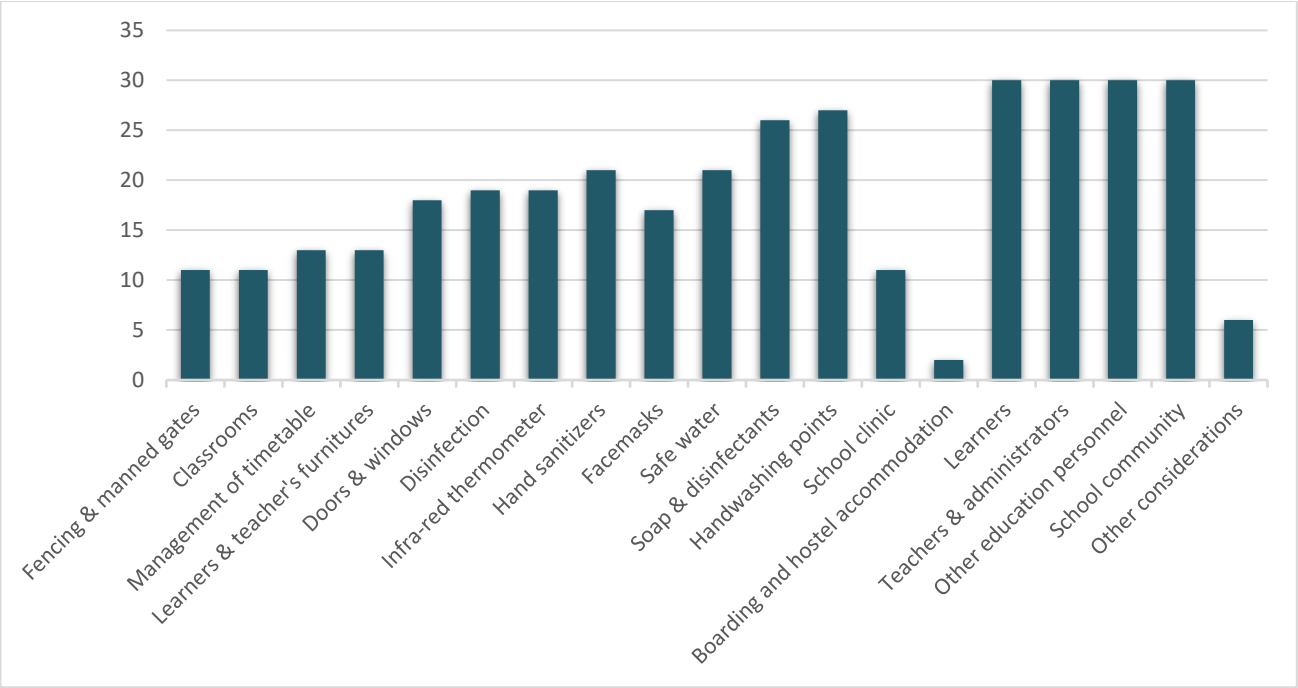


Fig. 1 – Showing the assessment of the level of compliance to the 19 standard COVID-19 precautions among secondary schools in Nnewi North LGA of Anambra state, Nigeria

Assessment of the main domains

Table 3 provides a more detailed breakdown of the compliance based on five (5) main domains using seven (7) key variables from the checklist which are Hand hygiene and respiratory etiquette – Handwashing points and hand sanitizers; Physical distancing – Classroom spacing; Use of masks in schools – Masks; Environmental cleaning and ventilation – Soap and disinfectants, Safe water; Respecting procedures for isolation of all people with symptoms – Disinfection

Based on the results available on table 3.3, among the main domains, the highest level of compliance was with regards to availability of handwashing points – 27 schools (87.1%) while 4 schools (12.9%) were non-compliant to this measure. The least complaint was with regards to wearing a face mask as 14 schools (45.16%) were non-complaint while 17 schools (54.84%) were compliant.

Table 3 – Showing the level of compliance to main domains of the COVID-19 preventive measures

Precaution	Frequency	Percentage (%)
Disinfection		
No	12	38.71
Yes	19	61.29
Infra-red thermometer		
No	12	38.71
Yes	19	61.29

Hand sanitizers		
No	10	32.26
Yes	21	67.74
Facemasks		
No	14	45.16
Yes	17	54.84
Safe water		
No	10	32.26
Yes	21	67.74
Soap & disinfectants		
No	5	16.13
Yes	26	83.87
Handwashing points		
No	4	12.90
Yes	27	87.10

Level of compliance of each school to standard COVID-19 precautions

Table 4 shows the level of compliance of each school to COVID-19 preventive measures. Out of the 31 schools that participated in the study, only 4 schools had 100% compliance.

Table 4: Showing the level of compliance to standard COVID-19 precautions among individual secondary schools in Nnewi North LGA of Anambra state, Nigeria.

Name of School	Compliance score (%)	Level of compliance
School 1	38.89	Poor
School 2	66.67	Moderate
School 3	55.56	Moderate
School 4	**100.0**	**Good**
School 5	88.89	Good
School 6	**100.0**	**Good**
School 7	61.11	Moderate
School 8	94.74	Good
School 9	89.47	Good
School 10	61.11	Moderate

School 11	27.78	Poor
School 12	77.78	Good
School 13	94.44	Good
School 14	50.00	Moderate
School 15	33.33	Poor
School 16	66.67	Moderate
School 17	72.22	Good
School 18	33.33	Poor
School 19	38.89	Poor
School 20	**100.00**	**Good**
School 21	38.89	Poor
School 22	88.89	Good
School 23	88.89	Good
School 24	61.11	Moderate
School 25	**100.00**	**Good**
School 26	33.33	Poor
School 27	66.67	Moderate
School 28	21.05	Poor
School 29	33.33	Poor
School 30	50.00	Moderate
School 31	22.22	Poor

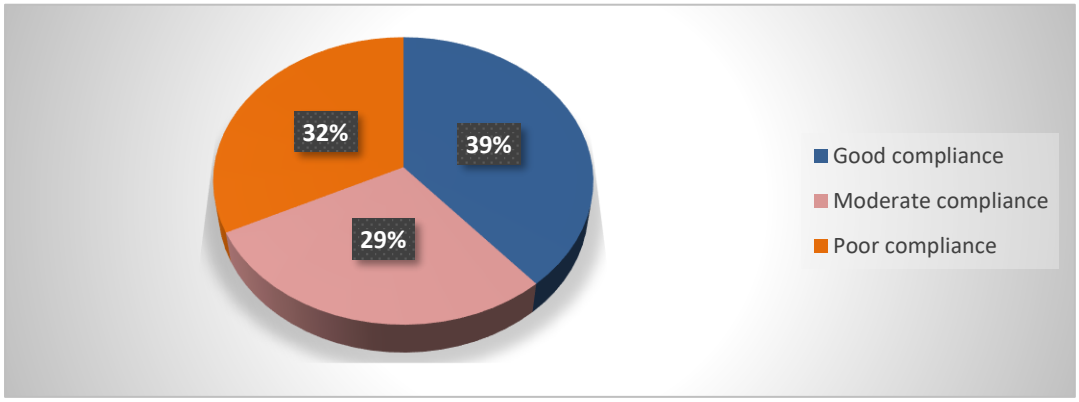
Overall compliance with standard COVID-19 precautions

Table 5 and Figure 2, reports on the overall level of compliance to standard COVID-19 precautions among all secondary schools in Nnewi North LGA of Anambra state. Out of the school sample, 12 schools (38.71%) had good compliance, 9 schools (29.03%) had moderate compliance, and 10 schools (32.26%) had poor compliance. Thus, the finding of this study revealed that the overall compliance level toward COVID-19 preventive and control measures among secondary schools in Nnewi-North LGA of Anambra state was 38.71%.

Table 5: Showing the level of compliance to standard COVID-19 precautions among all secondary schools

Level of compliance	Frequency	Percentage
Good	12	38.71
Moderate	9	29.03
Poor	10	32.26

Figure 2: Showing the level of compliance to standard COVID-19 precautions among all secondary schools



Cross tabulation analysis

Table 6 reports a cross-tabulation analysis between level of compliance and locality of school, type of school, school ownership, and gender of students; with urban schools, private-mission schools, and mixed schools having good compliance.

Table 6: Cross tabulation analysis between level of compliance and Locality of school, Type of school, School ownership and Gender of students

Variable	Level of compliance			χ^2 value	p-value
	Good	Moderate	Poor		
Locality of school					
Rural	Nil	1 (11.1)	3 (30.00)	4.40	0.111
Urban	12 (100.0)	8 (88.9)	7 (70.00)		
Day school	9 (75.0)	8 (88.9)	9 (90.0)	1.14	0.565
Day and boarding school	3 (25.0)	1 (11.1)	1 (10.0)		
School ownership					
Government	1 (8.3)	2 (22.2)	3 (30.0)	9.07	0.050*
Private	5 (41.7)	6 (66.7)	7 (70.0)		

Private-Mission	6 (50.0)	1 (11.1)	Nil		
Gender of students					
Boys only	Nil	2 (22.2)	Nil		
Girls only	2 (16.7)	1 (11.1)	1 (10.0)	5.45	0.245
Mixed school	10 (83.3)	6 (66.7)	9 (90.0)		
TOTAL	**12 (100)**	**9 (100)**	**10 (100)**		

Discussion

This study included thirty-one (31) schools with the aim of assessing the level of compliance to COVID-19 precautionary measures in secondary schools in Nnewi North LGA of Anambra state, Nigeria.

Based on the results obtained from the study, 12 schools (38.71%) had good compliance, 9 schools (29.03%) had moderate compliance, and 10 schools (32.26%) had poor compliance. The finding of this study thus revealed that the overall compliance level toward COVID-19 preventive and control measures among secondary schools in Nnewi-North LGA of Anambra state was 38.71%. This is a very poor compliance level because strict high- level compliance is required to prevent and control the COVID-19 pandemic. The possible reason for this low compliance level may be due to infrastructural deficits within the schools and inadequate enforcement of the COVID-19 preventive and control measures from the concerned government authorities' side.

Compliance with COVID-19 preventive measures based on WHO checklist varied substantially with all the different domains. Based on the results, all schools were able to orientate their students, teachers, staff, and community on COVID-19 and its mitigative measures (100%) while the least compliance was with regards to fencing and manned gates, classroom spacing, and the presence of a school clinic (each have 64.52% level of non-compliance).

Schools were able to achieve 100% compliance with regards sensitization on COVID-19 because of the pathogenicity, attack rates, and method of transmission of the disease. These factors thus made COVID-19 a major public health disease and a big subject of discussion. COVID-19 is a respiratory infection that is transmitted easily by human contact. Children have high transmission potential as they are often in close contact with one another as compared to adults. In addition, schools are centres for learning and COVID-19 and its effects can easily be taught in schools.

With regards to the least domain of compliance being fencing and manned gates, classroom spacing, and the presence of a school clinic, this can be attributed to the fact that most schools were built in a pre-COVID era. They didn't factor that a deadly pandemic will ravage the world, so the spaces and other infrastructures are still those that were built before the pandemic. It will be difficult to practice social distancing with the available fixed classroom spacing. Also, financial constraints might be a limiting factor and a reason why some schools may not be able to build more classrooms and enlarge the available space or practice alternate classes hence making the practice of social distancing a herculean task.

Among the main domains, the highest level of compliance was with regards to availability of handwashing points – 27 schools (87.1%). This is similar to a study conducted among food and drink establishments Ethiopia that had a compliance rate of 89.2% [8]. A comparable study conducted in Benue State, Nigeria, employing the same guidelines as this research, revealed that most assessed schools failed to meet the required standards for water, sanitation, and hygiene (WASH) infrastructure and social distancing, particularly in classrooms. However, that study focused exclusively on public schools and

encompassed both primary and secondary institutions [9]. Prior to the COVID-19 pandemic, Nigerian schools faced significant challenges in providing basic amenities, including potable running water for handwashing and sanitation. Approximately 33% of Nigerian school children lacked access to sufficient water for daily hygiene needs [10]. The pandemic exacerbated this issue, highlighting the urgency of addressing these deficiencies.

The least level of compliance among the main domains was seen with regards to wearing a face mask as 14 schools (45.16%). This is mainly because most individuals in secondary schools are children who at one point or the other during school hours will remove their nose mask from their faces due to their perceived discomfort while wearing the face masks.

Compliance rates varied significantly by school ownership. A statistically significant difference was observed in compliance rates between government and private schools, with government schools demonstrating significantly lesser compliance (p-value = 0.05). Based on school ownership, about half of the government schools had poor compliance (3 out of 6 government schools) while most of the private schools had good compliance (6 out of 7 private schools). This can be attributed to the fact that most government schools are poorly funded by the government. Some are even in dilapidated states coupled with the fact that a lot of them are very cheap and thus are always overcrowded. With these, it is difficult to practice some of the COVID-19 preventive measures stated in the guidelines. The private schools had a better level of compliance compared to the government schools because they are privately owned and are well-funded. Also, private establishments tend to be more law-abiding because their owners wouldn't want their establishments to be closed, nor their license revoked.

A similar study conducted among primary schools in the South-West region of Nigeria reported comparable findings. The study revealed that only 21 schools (21%) demonstrated good compliance with COVID-19 guidelines, while 79 schools (79%) showed poor compliance. Notably, the compliance rate varied significantly by school type, with 15 private schools (30% of private schools and 71.4% of compliant schools) and 6 public schools (12% of public schools and 28.6% of compliant schools) achieving good compliance, a difference that was statistically significant [11].

The compliance with the COVID-19 guidelines in schools, as reported by this study is similar to the result from another study conducted in Kaduna State, Nigeria, in 2021, revealed a concerning trend in COVID-19 guideline compliance in schools. A staggering 73% of schools lacked necessary materials and supplies to meet COVID-19 prevention guidelines, leaving only 27% of schools with adequate resources [12]. This disparity highlights the need for targeted support to ensure all schools can provide a safe environment for students and staff. The findings from Kaduna State echo broader concerns about COVID-19 compliance in Nigerian schools.

The low compliance rate observed in this study contrasts with findings from a study conducted in Ogun State, Nigeria, where a remarkably high 93.7% of schools reportedly demonstrated good compliance with COVID-19 prevention and control guidelines [13].However, it is noteworthy that the assessment criteria used in the Ogun State study were self-developed by the authors, which may limit comparability with the present study.

From the observation carried out in these schools, the factors affecting compliance to COVID-19 preventive measures in secondary schools in Nnewi North LGA of Anambra state, Nigeria includes difficulty in wearing facemasks by students, insufficient funding, inability to achieve recommended spacing, community perception, and unverified information.

Conclusion

This study highlighted the level of compliance to COVID-19 preventive measures among secondary schools in Nnewi North Local Government Area of Anambra State, Nigeria and likewise examined the factors that affected compliance with standard precautions among these secondary schools.

The overall compliance level was found to be 38.71%. This is a very poor compliance level because strict high – level compliance is required to prevent and control the COVID-19 pandemic.

Compliance with COVID-19 preventive measures based on WHO checklist varied substantially with all the different domains. Based on the study, all schools were able to orientate their students, teachers, staff, and community on COVID-19 and its mitigative measures while the least compliance were with regards to fencing and manned gates, classroom spacing, and the presence of a school clinic. As scientists continue to develop and refine guidelines to prevent the spread of COVID-19, parallel efforts are underway to create effective vaccines, crucial for limiting transmission and controlling the pandemic. Research suggests a significant correlation between COVID-19 compliance rates and vaccine acceptance among individuals. A study in Southern Nigeria found that 57% of participants were willing to receive a COVID-19 vaccine [14], indicating potential higher acceptance rates in populations with high compliance, such as private schools. Conversely, public schools may face additional challenges in promoting vaccine acceptance and compliance.

Based on the findings of this study, among the main domains, the highest level of compliance was with regards to the availability of handwashing points while the least compliant was with regards to wearing a face mask.

The common restraining factors against compliance to standard COVID-19 preventive measures included the fact that the students are children and thus wouldn't always wear their masks, school ownership, attitude towards, and risk perception of COVID-19 and these factors significantly influenced the adherence of each school towards COVID-19 mitigation measures.

Recommendation

Strategies and policies: It is highly recommended that all the concerned local authorities should design and enforce specific strategies that could make secondary schools to comply to COVID-19 preventive and control measures to safeguard the school community at large.

Sensitization and education: It is crucial to track adherence responses to the COVID-19 measures, scale up the community's awareness of COVID-19 prevention and mitigation strategies through appropriate information outlets such as mainstream media on prevention strategies of COVID-19, and rely on updating information from TV, radio, and healthcare workers about COVID-19.

Costs of compliance: The costs of compliance must also be considered. An estimate for each school should be drawn with the prices of supplies needed for hand hygiene, disinfectants, hand soap, face masks, hand sanitizers, etc. Freewill donations from the government and from private individuals can help with the costs of these supplies. However, prices are rising rapidly because of increased demand during COVID-19, especially for hand rub, which is unlikely to be available in sufficient quantities on the open market. WHO recommends two formulations for local production of hand rub, but countries will need support to do this on a large scale, with proper quality assessment [15]. To these supply costs, one would need to add costs for resources for additional training and behaviour-change activities to support implementation.

Health education, seminars, and training on standard precautions should be organized frequently to keep the school community updated on the current practices of standard precautions. Students and staff should

also be sensitized towards the use of face masks and the importance of wearing them despite the perceived discomfort.

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