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### Assessment of Post-Covid-19 Hand Hygiene Compliance Among Nigeria Certificate in Education Biology Students in Zaria, Nigeria

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#### Abstract

This study titled Assessment of post-COVID-19 hand hygiene compliance among Nigeria Certificate in Education Biology Students in Zaria, Nigeria was a cross-sectional survey work. The study was guided by three research questions and three research objectives. Three hundred forty-six (346) NCE biology students were chosen at random from a population of three thousand four hundred and forty-one using the random sampling technique. The data collection instrument was a structured questionnaire titled "Students Hand-Hygiene Compliance Questionnaire (SHCQ)" which underwent validation by two science education experts from Ahmadu Bello University, Zaria. Split-half method was adopted to determine reliability which gave the reliability coefficient value of 0.77 with Spearman

rank statistics. The researchers administered the instrument to respondents over two weeks. The mean and standard deviation were used to analyse the gathered data. According to the results, the College established hand hygiene compliance during the COVID-19 era ( $X = 4.00$ , S.D. = 1.20); NCE Biology students in Zaria had low levels of post-COVID-19 hand hygiene compliance ( $X = 2.80$ , S.D. = 1.02); and there weren't many obstacles to post-COVID-19 hand hygiene compliance ( $X = 3.74$ , S.D. = 1.08). Recommendations among others include: the College management should continue to prioritize and reinforce a robust infrastructure for handwashing facilities, ensure the availability of soap and sanitizers, and conduct regular educational campaigns on proper hand hygiene practices.

**Keywords:** Assessment, Post-COVID, Hand-Hygiene, Compliance, Students

#### Introduction

One of the issues developing nations face is the prevention of infectious diseases, and one area of concern is the control of infections in learning environments where students live close to one another. The inability of governments to properly prevent, identify, and respond to emerging infectious diseases has been brought to light by the COVID-19 pandemic. Global healthcare systems have encountered immense obstacles, with different nations concentrating on containment and mitigation tactics with differing degrees of achievement (Chiyaka *et al.*, 2022) <sup>[8]</sup>. Health systems that are already under strain may get worse due to delays in detection and response. Long-term solutions are required to handle future epidemics, even while measures including social distance, contact tracing, quarantining, and lockdowns have been employed to control transmission (Azuogu *et al.*, 2016) <sup>[4]</sup>. The easiest and most efficient way to reduce the risk of infection is to practise hand cleanliness (Alghobaishi *et al.*, 2022) <sup>[3]</sup>. Because it's so simple and common, handwashing seems to be overlooked by many people (Gadigan & Tweeten, 2020) <sup>[12]</sup>. Globally, it is estimated that 3 out of 10 people (2.3 billion people) do not have access to a handwashing station with soap and water at home, and 670 million do not have a handwashing station at all (UNICEF, 2021) <sup>[22]</sup>. The majority of individuals do not realise how crucial hand washing is for preventing infections and sickness (Borchgrevink *et al.*, 2013) <sup>[6]</sup>. The World Health Organisation (WHO) places a high premium on improving hand hygiene in order to minimise infection (Gholami *et al.*, 2014) <sup>[13]</sup>. As a result, many concerns regarding hand washing compliance after the COVID-19 pandemic remain unresolved. Acute respiratory infections and diarrhoea claim the lives of half a million people year, illnesses that may have been avoided with proper hand hygiene (UNICEF, 2021) <sup>[22]</sup>.

In December 2019, there was a coronavirus illness (COVID-19) outbreak that resulted in the infection of SAR-SCoV-2, or severe acute respiratory syndrome. The outbreak was first detected in Wuhan, China and later became a global health crisis (Alghobaishi *et al.*, 2022) <sup>[3]</sup>. On March 12, 2020, the World Health Organisation (WHO) proclaimed COVID-19 to be a pandemic because of the disease's thousands of fatalities and the global spread of SARS-CoV-2 (Ciotto *et al.*, 2020) <sup>[10]</sup>.

Numerous nations worldwide were impacted by COVID-19, with Africa being the final continent to see the disease's effects (Ahmad & Ahmad, 2020) <sup>[1]</sup>. Despite the fact that Africa was the continent most susceptible to the catastrophic effects of COVID-19 spreading (Moore *et al.*, 2017) <sup>[19]</sup>. The pandemic's first confirmed case occurred in Egypt on February 14, 2020, while Nigeria announced its first case on February 27, 2020, involving an Italian patient who had travelled to Nigeria on February 25 by plane (WHO, 2020) <sup>[25]</sup>. The majority of COVID-19 cases that have been detected in Africa are not from China, which is the disease's epicentre, but rather were imported from the United States and Europe (Banerjee *et al.*, 2019) <sup>[5]</sup>. The COVID-19 pandemic has affected at least 1.6 million learners in more than 200 countries around the world and created the largest disruption of the education system in the history of mankind (Pokhrel & Chhetri, 2021) <sup>[20]</sup>. People around the globe were cautioned to take responsive care during the COVID-19 pandemic. The strategies that were put in place to flatten the curve and control the transmission of the disease included wearing face masks, handwashing, physical distancing and avoiding assemblies and mass gatherings (Pokhrel & Chhetri, 2021) <sup>[20]</sup>. Hand cleanliness is crucial to preventing the spread of various illnesses as well as during the COVID-19 epidemic.

The percentage of observed hand hygiene opportunities that resulted in handwashing with water and soap is known as hand hygiene compliance (UNICEF, 2021) <sup>[22]</sup>. Handwashing with alcohol-based or antimicrobial soaps is an effective way of preventing the transmission of diseases caused by microorganisms (Kumar & Lipner, 2020) <sup>[16]</sup>. World Health Organization suggested that handwashing with soap is a low-cost and most effective strategy to prevent SARS-CoV-2 transmission (WHO, 2020) <sup>[25]</sup>. Alcohol-based sanitizers are as effective as handwashing with water and soap for preventing the transmission of diseases such as coronavirus (Kumar & Lipner, 2020) <sup>[16]</sup>. According to a study, hand cleanliness combined with preventive measures including dodging crowds and donning masks helped to lower the incidence of various respiratory illnesses during the COVID-19 pandemic (Chi *et al.*, 2020) <sup>[7]</sup>. Students need to wash their hands frequently. Because it lowers the quantity of bacteria and chemicals on hands, the CDC recommends washing hands with soap and water. However, in the case that soap is not easily accessible, using a hand sanitizer containing at least 60% alcohol can help shield young students from illness and stop them from infecting others. An estimated 57% of schools worldwide offered basic hygiene services in 2019 (handwashing stations, soap, and water), 19% offered restricted services (handwashing stations with water but no soap), and 25% offered no services at all (no facilities or water at all). This suggests that 462 million pupils attended schools with no hygiene services at all, and 818 million students did not

receive even the most basic hygiene services at school (UNICEF, 2021) <sup>[22]</sup>.

The Federal Government of Nigeria (FGN)/UNICEF/Water, Sanitation and Hygiene (WASH) Programme introduced handwashing as one of the strategies for promoting hygiene in 2004. It was relaunched on May 20, 2008, as one of the programmes designed to mark the United Nations General Assembly's declaration of the International Year of Sanitation (UNICEF, 2006) <sup>[21]</sup>. As a result, hand hygiene practices are crucial not only during a pandemic but also to prevent the spread of other diseases after COVID-19. Hence, there is a need to assess compliance with handwashing hygiene post-COVID-19 period. Effective hand hygiene among Biology NCE students is very essential in preventing the spread of infections and diseases, consequently, the importance of hand hygiene among Biology NCE students cannot be overemphasized.

### Objectives of the Study

The objectives of the study are to:

1. ascertain the establishment of hand-hygiene compliance in the college during the COVID-19 pandemic era.
2. determine post-COVID-19 hand hygiene compliance level
3. identify the barriers to post-COVID-19 hand hygiene compliance.

### Research Questions

The following questions were raised to guide the study:

1. Did the College establish hand hygiene compliance during the COVID-19 Era?
2. What is the level of post-COVID-19 hand hygiene compliance among NCE Biology students in Zaria?
3. What are the barriers to post-COVID-19 hand hygiene compliance among NCE Biology students in Zaria?

### Methodology

A cross-sectional study was conducted with NCE Biology students in Zaria. The total population of NCE Biology students in the 2021/2022 academic session were three thousand four hundred and forty-one (3,441). A random sampling technique was used to select 346 students in line with Krejcie and Morgan (1970). The Researchers Hand-Hygiene Compliance Questionnaire (SHCQ), a 27-item structured three-likert scale questionnaire, was the tool used to gather data. Two specialists in scientific education from Ahmadu Bello University in Zaria validated the instrument, and the split-half approach was used to assess its reliability. The reliability coefficient value of 0.77 was derived with Spearman rank statistics. The researchers administered the instrument to the students. Data collected was analyzed using mean and standard deviation statistics.

### Results

**Table 1:** Hand-hygiene compliance during the Covid-19 Era

S. No	Statements	SA	A	UN	D	SD	X	S.D
1	I consistently wash my hands with soap and water for at least 20 seconds.	162	121	8	49	5	4.12	1.17
2	I use hand sanitizer when soap and water are not readily available.	109	171	0	22	43	3.81	1.26
3	I wash my hands before eating meals.	189	119	0	14	23	4.27	1.29
4	I wash my hands after using the restroom.	166	139	2	17	21	4.19	1.20
5	I wash my hands after touching surfaces in public places (e.g., doorknobs, and handrails).	140	160	2	13	30	4.06	1.15
6	I avoid touching my face with unwashed hands.	118	169	0	32	26	3.93	1.15
7	Social gatherings and large classes were avoided during the pandemic	119	150	2	34	40	3.79	1.26
8	Covering of mouth and nose with a tissue or elbow when coughing or sneezing was enforced on campus.	119	171	6	21	28	3.96	1.27
9	I received adequate education and training on proper hand hygiene techniques in my school	142	166	0	22	15	4.15	1.02
10	Hand washing stations with soap and water are readily available on campus.	229	42	0	70	4	4.22	1.24
11	Hand sanitizers were provided in classrooms, libraries, and other communal areas.	114	149	0	22	60	3.68	1.10
12	Educational materials (posters, flyers, etc.) on hand hygiene are prominently displayed in campus facilities.	135	140	4	20	46	3.86	1.33
<b>Cumulative Mean</b>							<b>4.00</b>	<b>1.20</b>

Benchmark: Mean ≥3.0 = Accepted; Mean < 3.0= Rejected

Table 1 illustrates that the cumulative mean of all the items is 4.00, surpassing the benchmark mean of 3.0, with a standard deviation of 1.20. This indicates that the College established hand hygiene compliance during the COVID-19 era. Specifically, the majority of respondents reported consistently washing their hands with soap and water for at least 20 seconds. They also indicated that they wash their

hands before eating meals, after using the restroom, and after touching surfaces in public places (e.g., doorknobs, and handrails). Furthermore, respondents mentioned receiving adequate education and training on proper hand hygiene techniques in their school, and they found handwashing stations with soap and water readily available on campus. All of these factors received a mean score greater than 4.0.

**Table 2:** Hand-hygiene post covid-19 compliance level

S. No	Statements	SA	A	UN	D	SD	X	S.D
13	Improving hand hygiene compliance among students is important for preventing the spread of infections in Nigeria.	20	80	12	43	190	2.12	1.02
14	I wash my hands for at least 20 seconds each time with soap and water since the COVID-19 pandemic	16	42	0	149	138	1.98	0.99
15	I have used hand sanitizer more frequently since the COVID-19 pandemic.	30	120	2	34	159	2.50	1.14
16	Access to handwashing facilities with soap and water on campus is easily available post covid.	95	79	4	137	118	2.64	0.79
17	There has been an increase in the availability of hand sanitizer in public spaces on campus since the pandemic.	152	156	10	12	15	4.21	1.29
18	Changes in hand hygiene behaviours among peers post-COVID-19 improved	129	92	0	70	54	3.50	1.14
19	Adequate information on proper handwashing techniques since the COVID-19 pandemic was provided on campus.	55	22	0	119	149	2.17	1.01
20	Handwashing stations with soap and water are readily available on campus post-COVID-19	28	21	6	119	171	1.89	0.76
21	Hand sanitizers are provided in classrooms, libraries, and other public areas on campus post-COVID-19.	142	166	0	22	15	4.15	1.17
22	Educational materials (posters, flyers, etc.) on hand hygiene are prominently displayed in campus facilities post-COVID-19.	29	142	0	100	74	2.86	0.86
<b>Cumulative Mean</b>							<b>2.80</b>	<b>1.02</b>

Benchmark: Mean ≥3.0 = Accepted; Mean < 3.0= Rejected

Table 2 indicates that the cumulative mean of all the items is 2.80, which is below the benchmark mean of 3.0, with a standard deviation of 1.02. This suggests a low level of post-COVID-19 hand hygiene compliance among NCE Biology students in Zaria. Specifically, the majority of respondents

perceived that there has been an increase in the availability of hand sanitizer in public spaces on campus since the pandemic, and hand sanitizers are provided in classrooms, libraries, and other public areas on campus post-COVID-19. All of these factors received a mean score greater than 4.0.

**Table 3:** Barriers to Hand-hygiene Compliance Post Covid-19

S. No	Statements	SA	A	UN	D	SD	X	S.D
23	Lack of access to soap and running water is a barrier to practicing hand hygiene on campus	171	129	7	20	18	4.20	1.20
24	Hand sanitizer is not readily available when needed.	154	156	13	7	15	4.24	1.15
25	I forget to wash my hands or use hand sanitizer.	201	22	14	64	44	3.79	0.95
26	Peer pressure or social norms discourage practising hand hygiene practice.	119	149	0	22	55	3.74	1.26
27	I believe that hand hygiene is not necessary for preventing the spread of infections.	21	102	6	188	28	2.71	0.84
<b>Cumulative Mean</b>							<b>3.74</b>	<b>1.08</b>

Benchmark: Mean ≥3.0 = Accepted; Mean < 3.0= Rejected

Table 3 indicates that the cumulative mean of all the items is 3.74, surpassing the benchmark mean of 3.0, with a standard deviation of 1.08. This suggests that there are relatively few barriers to post-COVID-19 hand hygiene compliance among NCE Biology students in Zaria. Specifically, the majority of

respondents perceived that lack of access to soap and running water was a barrier to practising hand hygiene on campus, and hand sanitizer was not readily available when needed. All of these factors have a mean score greater than 4.0.

### Summary Of Findings

1. The College established hand hygiene compliance during the COVID-19 era ( $X = 4.00$ ,  $S.D = 1.20$ ).
2. There was a low level of post-COVID-19 hand hygiene compliance among NCE Biology students in Zaria ( $X = 2.80$ ,  $S.D = 1.02$ ).
3. There are relatively few barriers to post-COVID-19 hand hygiene compliance among NCE Biology students in Zaria ( $X = 3.74$ ,  $S.D = 1.08$ ).

### Discussion

The findings in Table 1 indicate that the College successfully established hand hygiene compliance protocols during the COVID-19 era. The high cumulative mean score of 4.00, which shows a strong adherence to hand hygiene habits among the respondents, supports this. The implementation of hand hygiene measures during the pandemic reflects the College's proactive approach to mitigating the spread of infections within its community. This is in line with the work of Kampf *et al.* (2020)<sup>[15]</sup>, who posited that hand hygiene is recognized as one of the most effective measures for preventing the transmission of infectious diseases, including COVID-19. Similarly, the studies of Lau *et al.*, (2020)<sup>[17]</sup> echo the emphasis placed on hand hygiene as a crucial preventive measure during pandemics. Studies have shown that effective hand hygiene practices can significantly reduce the spread of contagious illnesses in various settings, including educational institutions (Aiello *et al.*, 2020)<sup>[2]</sup>. The high compliance observed may be attributed to increased awareness and public health campaigns emphasizing the importance of hand hygiene during the pandemic (Vindigni *et al.*, 2021)<sup>[23]</sup>. Additionally, the implementation of strict hygiene protocols and the availability of hand-washing facilities in the College likely contributed to the observed compliance levels (Jefferson *et al.*, 2021)<sup>[14]</sup>. The College's emphasis on consistent handwashing, provision of handwashing stations, and education on proper hand hygiene techniques aligns with recommendations from international health agencies like the Centres for Disease Control and Prevention (CDC) and the World Health Organisation (WHO). Furthermore, the establishment of hand hygiene compliance during the COVID-19 era highlights the College's commitment to ensuring the health and safety of its students and staff. By prioritizing hand hygiene, the College demonstrates proactive leadership in fostering a healthy campus environment.

Results in Table 2 concern the level of post-COVID-19 hand hygiene compliance among NCE Biology students in Zaria, with a cumulative mean score of 2.80, falling below the benchmark mean of 3.0. This indicates a suboptimal adherence to hand hygiene practices among the student population following the COVID-19 pandemic. The observed low compliance rates may stem from various factors, including insufficient understanding how crucial good hand hygiene is to stopping the spread of infectious diseases. Research by Ahmed *et al.* (2021) emphasizes the critical role of knowledge and awareness campaigns in promoting hand hygiene practices among students, highlighting the need for targeted educational interventions. Additionally, the availability and accessibility of handwashing facilities and hand sanitizer on campus may influence compliance rates. Studies by Larson *et al.* (2020) and Mukherjee *et al.* (2021) underscore the importance of

convenient access to hand hygiene resources in fostering compliance among individuals. Studies by Aiello *et al.*, (2020)<sup>[2]</sup> posited that without sustained efforts to promote and enforce hand hygiene practices, there is a risk of increased transmission of infectious diseases within the College community. This decline in compliance post-pandemic is consistent with research indicating that adherence to preventive measures tends to wane once the immediate threat diminishes (Dreibelbis *et al.*, 2020)<sup>[11]</sup>. Factors such as pandemic fatigue, reduced perceived risk, and complacency may contribute to this decrease in compliance (Lau *et al.*, 2020)<sup>[17]</sup>. However, despite efforts to enhance hand hygiene infrastructure, barriers such as inadequate resources or competing priorities may hinder students' ability to practice proper hand hygiene consistently. To enhance hand hygiene compliance in educational settings, more study is required to examine the unique difficulties experienced by NCE Biology students in Zaria and to provide treatments that are specifically targeted to their needs.

Findings in Table 3 indicate that there are relatively few barriers to post-COVID-19 hand hygiene compliance among NCE Biology students in Zaria. Despite some challenges, such as access to soap and running water, the overall mean score of 3.74 suggests that barriers to hand hygiene compliance are minimal. The perception of barriers to hand hygiene, such as the lack of access to soap and running water, underscores the importance of infrastructure and resource availability in promoting hand hygiene practices. These findings are in line with that of Vivas *et al.* (2020)<sup>[24]</sup>, where they posited that inadequate access to handwashing facilities remains a significant barrier to hand hygiene compliance, particularly in resource-constrained settings. The findings of Vindigni *et al.*, (2021)<sup>[23]</sup> indicates that students perceive few obstacles to practicing good hand hygiene. However, addressing any remaining barriers is crucial to improving compliance rates. Jefferson *et al.*, (2021)<sup>[14]</sup> also highlighted the importance of addressing perceived barriers, such as lack of access to handwashing facilities, inconvenience, and misconceptions about hand hygiene practices. Interventions targeting these barriers can effectively improve compliance rates and contribute to overall public health (Dreibelbis *et al.*, 2020)<sup>[11]</sup>. However, the fact that these barriers received mean scores greater than 4.0 indicates that they are not insurmountable obstacles to hand hygiene compliance among NCE Biology students. Strategies such as increasing the availability of handwashing facilities and ensuring a steady supply of hand sanitizer can help address these challenges and further improve hand hygiene compliance rates. Overall, the findings suggest that while there are some barriers to hand hygiene compliance among NCE Biology students in Zaria, they are not significant enough to impede overall compliance levels. Continued efforts to address these barriers and promote hand hygiene awareness can further enhance compliance rates and contribute to a healthier campus environment.

### Conclusion

The findings of this study offer a nuanced understanding of hand hygiene compliance among NCE Biology students in Zaria, shedding light on their behaviours and attitudes towards hygiene practices, especially in light of the COVID-19 pandemic. The results underscore a commendable level of adherence to hand hygiene protocols among students,

indicating a collective effort towards maintaining cleanliness and mitigating the risk of infection transmission within the College community. One of the key takeaways from the study is the effective establishment of hand hygiene protocols by the College amidst the challenges posed by the pandemic. The College's proactive approach to promoting hand hygiene, including the implementation of educational campaigns and the provision of handwashing facilities and sanitizers, reflects a strong commitment to ensuring the health and safety of its students and staff. This proactive stance aligns with recommendations from global health organizations, emphasizing the importance of hand hygiene as a vital precaution against the spread of infectious illnesses such as COVID-19.

Despite encountering some barriers, such as limited access to soap and running water, the overall compliance rates among students remain notably high. This speaks to the resilience and adaptability of the student population in overcoming challenges and prioritizing health and hygiene practices. The positive attitude towards hand hygiene observed among students is indicative of a broader cultural shift towards recognizing the importance of preventive measures in safeguarding public health. Moreover, the findings highlight the need for continued efforts to address existing barriers and further enhance hand hygiene compliance among students. Strategies aimed at improving infrastructure, such as increasing the availability of handwashing facilities and ensuring a steady supply of soap and sanitizers, can help alleviate challenges related to access. Additionally, ongoing education and awareness campaigns tailored to the unique needs and preferences of students can reinforce positive behaviours and foster a culture of hygiene within the College community. The findings underscore the effectiveness of the College's initiatives in promoting hand hygiene compliance among NCE Biology students in Zaria. The College can further intensify its efforts to establish a secure and healthy environment for learning and living by expanding on these insights and putting evidence-based initiatives into practice.

### Recommendations

The findings led to the recommendations that were made below:

1. Given the commendable establishment of hand hygiene compliance protocols during the COVID-19 era, the College management should continue to prioritize and reinforce a robust infrastructure for handwashing facilities, ensuring the availability of soap and sanitizers, and conducting regular educational campaigns on proper hand hygiene practices.
2. The College management should make efforts to improve post-COVID-19 hand hygiene compliance among NCE Biology students in Zaria through targeted awareness campaigns, enhancing accessibility to hand hygiene resources, and addressing specific barriers hindering consistent practice.
3. While the findings indicate relatively few barriers to post-COVID-19 hand hygiene compliance among students, efforts should be made by the Management to address any existing challenges and minimize their impact.

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