

Original Research Article

Compliance with WHO recommended preventive measures against Covid-19 among a Nigerian population attending a teaching hospital

Abstract

Background: The fright and devastation that accompanied COVID-19 pandemic these past two years cannot be totally quantified. More so, the cycle of fear, panic, uncertainty and attempts at curtailment repeats itself every time the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) mutates and produces a new variant. The World Health Organization recommended personal protective measures are very important in slowing down the spread of infection. This study assessed the compliance of a Nigerian population with protective measures recommended by WHO in curbing the spread of COVID-19 infection.

Materials and Methods: A cross-sectional survey among patients attending medical outpatient in a Teaching Hospital. Interviewer administered questionnaire was used to collect data on participants demographics and compliance with WHO recommended preventive measures towards prevention of COVID-19 infection. Data analysis was carried out with Statistical Package for Social Science (SPSS) version 25 (IBM Corp., Armonk, USA). The results were presented as frequency tables and cross-tabulations. Chi-square test was carried out with consideration for statistical significance at $P < 0.05$.

Results: One hundred and ninety-six consecutive participants who gave consent were recruited for the study. There was a male predominance. Participants' age ranged between 18 and 84 years with mean age of 34.92 ± 14.10 years. Median age was 30 years. Half of participants had university education and about one tenth are professionals. About two-fifth earned less than 100 dollars monthly. Though about three-fifth of participants have heard of WHO recommended hand washing techniques for COVID-19 prevention, only two-fifth practice it. One third of participants regularly use face mask in the public and 85.2% do not practice physical distancing. Less than 10 % do not use soap and water or sanitizer to clean their hands. . The participants' attitudinal change to handwashing as a preventive measure for COVID-19 prevention was good. Participants' most practiced personal preventive measures against COVID-19 were regular washing of hands and boosting immunity with vitamins. The association between participants' demographics and WHO recommendation for hand washing in the prevention of COVID-19 showed a significant based on sex ($p = 0.04$). Females paid attention to washing of hands than males. The association between participants' demographics and use of face masks in the prevention of COVID-19 showed that education was significant in determining use ($P = 0.04$).

Conclusion: Awareness of personal preventive measures to COVID-19 in the area of washing of hands was increased among participants but there is the need to improve in the use of face masks and physical distancing.

Key words: Compliance, COVID-19, Demographics, Protective measures

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Introduction

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) discovered in Wuhan; China in December 2019 has undergone several mutations. The recent discovery of omicron variant threw the world into another cycle of uncertainties and fears especially because of information that was scanty.^{1,2}

Globally, as of 26 January, 2022, 356,955,803 confirmed cases of COVID-19, including 5,610,291 deaths have been reported to the World Health Organization (WHO).³ In addition, a total of 9,679,721,754 vaccine doses have been administered.⁴ In Africa as of January 25, 2022, there are 10,639,436 confirmed cases, 237,524 deaths and 94,293,113 vaccinated. In Nigeria, there were 252,750 confirmed cases and 3134 deaths as of January 27, 2022.⁵ Thus, there is the need to implement personal protective measures by the public in order to mitigate the spread of infection.

The World Health Organization still advocates preventive measures such as physical or social distancing, quarantining, ventilation of indoor spaces, covering mouths while coughing and sneezing, hand washing, and keeping unwashed hands away from the face. Also, the use of face masks or coverings has been recommended in public settings to minimize the risk of transmissions.⁶

Social and physical distancing measures help slow the spread of disease by stopping the chain of transmission and preventing the appearance of new ones. These measures secure physical distance between people (of at least one meter), and reduce contact with contaminated surfaces, while encouraging and sustaining virtual social connection within families and communities.⁶

Outbreaks have been reported in places where people gather such as crowded indoor settings and places of worship, fitness classes, restaurants and during choir practice.⁷⁻¹⁰ The risk of

getting COVID-19 is higher in crowded and inadequately ventilated environment where infected persons spend long period of time together in close proximity with non-infected persons. Thus, WHO recommended avoiding the 3Cs: closed, crowded and close contact. Physical distancing of at least one meter was advised and to increase the amount of natural ventilation by opening the windows and wearing of face masks if crowded and indoor settings cannot be avoided.⁶

Another recommended preventive measure is keeping good hygiene. This includes ensuring that one cleans the hands regularly and thoroughly using either an alcohol-based hand rub or soap and water, thus eliminating germs that may be on the hands, including viruses.⁶ Secondly, to cover the mouth and nose with bent elbow or to cough and sneeze into a tissue and to dispose of used tissue immediately into a closed bin and wash hands. Finally, to clean and disinfect surfaces frequently especially those which are regularly touched such as door handles, faucets and phone screens.⁶

The use of face mask to cover the nose, mouth and chin was also advocated. The hands should be cleaned before wearing face masks and after taking it off, and after touching it at any time.⁶

The effectiveness of WHO advocated measures in curbing the spread of COVID-19 depends on the people's levels of adherence to them.¹¹⁻¹³ Nigerians are highly superstitious and religious people who have their own ways of handling issues.¹¹ For example, the stay-at-home measures and restrictions (i.e., compulsory lockdown) showed lower effectiveness in reducing mobility when implemented in March 30, 2020.^{14,15}

This study assessed the compliance to three of the five protective measures recommended by WHO by a group of Nigerians attending a teaching hospital in south-south, Nigeria.

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1. Standard precautions and its components
2. Highlight major WHO protective strategies against COVID-19

Methodology

The cross-sectional survey was conducted among patients attending Family Medicine outpatient clinic in University of Port Harcourt Teaching Hospital in Rivers State, South-South, Nigeria. [The study was done between November and December, 2021.](#)

Interviewer-administered questionnaire was used to collect data on participants demographics and compliance with WHO recommended personal preventive measures for prevention of spread of COVID-19 infection. Participants' hand hygiene was assessed using WHO recommendations with options such as soap and water for 40 seconds, soap and water < 40 seconds, soap & sanitizer, sanitizer 5 seconds, sanitizer 20 seconds. Face mask use was assessed with options like 'yes always' and 'yes sometimes' taken as compliance and 'no, it can't reduce spread of COVID-19' as non-compliance.

Two hundred and ten participants who gave consent were recruited for the study using simple randomization. Response rate was 93.8%.

[Inclusion criteria were participants aged 18 years who consented to the study. Exclusion criteria were participants who did not give consent.](#)

Data analysis was done with Analysis was carried out with Statistical Package for Social Science (SPSS) version 25(IBM Corp., Armonk, USA). The results were presented as frequency tables and cross-tabulations. Chi-square test was carried out with consideration for statistical significance at $P < 0.05$.

Ethical approval was given by the Hospital's ethics Committee.

Comment [PH4]: Where is your inclusion and exclusion criteria?

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Results

Table 1 shows participants' characteristics. One hundred and ninety-six participants with age ranged between 18 and 84 years with mean age of 34.92 ± 14.10 years. Half of participants had at least university education with one tenth as professionals and two-fifth earn less than what is equivalent to 100 dollars monthly.

Though about three-fifth of participants have heard of WHO recommended hand washing for COVID-19 prevention., only two-fifth practice it. One third of participants regularly use face mask in the public and 85.2% still shake hands. Less than 10 % do not use soap and water or sanitizer to clean their hands. **Table 2**

Majority of participant's attitudinal change to handwashing as a preventive measure for COVID-19 prevention was good. **Fig 1**

Most participants' personal preventive measures against COVID-19 were regular washing of hands and boosting immunity with vitamins. **Table 3**

The association between participants' demographics and WHO recommendation for hand washing in the prevention of COVID-19 showed a significant based on sex ($p=0.04$). **Table 4**

The association between participants' demographics and use of face masks in the prevention of COVID-19 showed that education was significant in determining use ($P=0.04$). **Table 5**

Discussion

Following the COVID-19 epidemic, the World Health Organization (WHO) suggested the use of five personal protective measures to help prevent the infection from spreading

throughout the population. These include using an alcohol-based hand rub (sanitizer) if hands are not visibly dirty or soap and water if hands are visibly dirty; avoiding touching the eyes, nose, and mouth; practicing respiratory hygiene by coughing or sneezing into a bent elbow or tissue and immediately discarding the tissue; wearing a medical mask if you have respiratory symptoms and performing hand hygiene after disposing of the mask; and maintaining social distancing. However, in February 2020, it was recommended that asymptomatic persons do not need to wear masks.¹⁶

Covid-19 cases in Nigeria to date accounts for 7% of all confirmed cases worldwide.¹⁷ However, this is under reported as there are undetected imported cases as well as unreported potential contacts of identified cases in the community.¹⁷ The instruction from Nigeria Centre for Disease Control (NCDC) to practice WHO recommended personal measures, was initially adhered to by Nigerians but the majority stopped wearing facemasks because of their belief that Corona virus does not exist in the country because of the high tropical temperatures.¹⁷ The question is if those who stopped the use of face masks were correct in their assumptions or if there are other factors present among Africans that made the case fatality to be low? There is the need to do further researches to evaluate the effectiveness of public mask-wearing in protecting healthy individuals from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the causative agent of coronavirus disease (COVID-19) among Nigerians.^{18,19} The prevalence of regular facemask use in this study was 35.2% and statistical significance analysis showed that education was associated with use. Participants who had at least tertiary education wore face masks. This is comparable to a study done in Germany that also reported that a university degree increased the likelihood of wearing mask among their participants.²⁰

Only about two-fifth (38.3%) regularly follow WHO recommended handwashing preventive measure techniques. A study done in Thailand reported that the risk for SARS-CoV-2

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infection was negatively associated with personal protective measures with crude odd ratios decreasing among those who washed hands often (0.19), those wearing a mask all the time during contact with a COVID-19 patient (0.16) and those who maintain a distance of >1m from a COVID-19 patient (0.08).²¹ Other studies reported the effectiveness of mask wearing in influenza-like illness, SARS infection and SARS-CoV-2 infection.²²⁻²⁵

Frequent hand washing has been shown to be very effective in reducing spread of infection.²⁶

Hand washing is a simple, low-cost intervention that have been proven to reduce transmission of epidemic respiratory viruses. A hand soap solution (1:49) has been reported to have some effect (≥ 3.6 log₁₀ reduction of viral infectivity) against SARS-CoV-2 in 5 min.²⁷

Although SARS-CoV-2 has never been detected on hands of the public population yet, it is reasonable to assume that the hand contamination by droplets from others may take place in the public with an unknown viral load.²⁸ Thus, decontamination of hands, especially after returning home from public places with many close contacts and potentially infected people is highly recommended.

WHO-recommended hand rubs based on 75% iso-propanol or 80% ethanol (both v/v) was found to inactivate SARS-CoV-2 in a study done to evaluate the effects of different concentrations of the original and modified WHO formulations I and II; ethanol, and 2-propanol for virucidal activity.²⁹ Similarly, another study done to investigate the activity of various disinfectants against SARS-CoV-2 using the sputum of a patient diagnosed with SARS in the isolation unit of Frankfurt University Hospital, Germany, reported that propanol-based hand rub was found to inactivate SARS-CoV-2.³⁰ The use of alcohol-based hand rub on a clean hand for decontamination has been reported to be effective against nosocomial pathogens including bacteria and yeasts and it is also better tolerated dermally.³¹⁻
³³ The prevalence of handwashing and use of sanitizer in this study was 93.4%.

Comment [PH8]: The discussion did not capture all your results....Meanwhile there were 5 WHO measures but you assess only two....Dont you think you should adjust your title to reflect only the two done

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In this study, more females than males practiced WHO recommendation for hand washing while education influenced the use of face masks among the participants. This compares with the study done among 10 sub-Saharan African countries that reported that handwashing was influenced by age, gender and education. Younger, males and less educated participants had reduced odd of handwashing.³⁴ Other studies also reported an obvious gender distinction regarding the perception, behavior, and effectiveness of hand-washing.^{35,36} This maybe because females pay more attention to personal hygiene than males and thus are more likely to follow hand-washing recommendations.

Physical distancing is an important measure in controlling COVID-19, but the exact distance to observe and for the duration of time that is safe are unclear. WHO recommended avoiding the 3Cs: closed, crowded and close contact and the practice of physical distancing of at least one meter. Furthermore, it has been advised to increase the amount of natural ventilation by opening the windows and wearing face masks if crowded and indoor settings cannot be avoided.⁶

However, a study reported that rules that stipulated a single specific physical distance of 1 or 2 meters between individuals in order to reduce the transmission of SARS-CoV-2, are based on an outdated, dichotomous notion of respiratory droplet size which overlooked the physics of respiratory emissions.³⁷ In respiratory emissions, droplets of all sizes are trapped and moved by the exhaled moist and hot turbulent gas cloud that keeps them concentrated as it carries them over meters in a few seconds.^{38,39} After which, the cloud slows sufficiently and the ventilation, specific patterns of airflow, type of activity, viral load of the emitter, duration of exposure, and susceptibility of an individual to infection become very important.^{38,39}

The authors proposed graded recommendations that better reflect the multiple factors that combine to determine risk instead of single, fixed physical distance rules, as this will not only

provide greater protection in the highest risk settings but also enhance greater freedom in lower risk settings and thus, potentially enable a return towards normality in some aspects of social and economic life.^{38,39}

Eighty two percent of our study participants do not practice physical distancing. This is not surprising as compliance with physical distancing directives has become a challenge as many failed in its adherence either due to ignorance or complete defiance.⁴⁰ Several cases of partial or zero adherence have been reported in most public places such as banks where customers seeking to gain access into banking halls clustered outside, among celebrities, some of who hosted house parties and on national television that displayed non—compliance with international standards during burial of some eminent Nigerian who died from COVID-19.⁴¹

Conclusion

There has been an improvement in handwashing since COVID-19 outbreak among the study population though the prevalence of face mask use was low. There remains room for improvement in use of WHO recommended personal protective measures.

Limitation

This study only assessed three out of the five WHO-recommended preventive measures against COVID-19.

Acknowledgement

All participants who consented to be part of the study

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any

litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

References

1. Musa SS, Bello UM, Zhao S, Abdullahi ZU, Lawan MA, He D. Vertical Transmission of SARS-CoV-2: A Systematic Review of Systematic Reviews. *Viruses* 2021 ;13(9):1877.
2. Priniski JH, Holyoak KJ. A darkening spring: How preexisting distrust shaped COVID-19 skepticism. *PLoS One*. 2022 ;17(1): e0263191.
3. World Health Organization. COVID-19. Available at <https://covid19.who.int/>. Accessed Mar 21, 2022.
4. Africa CDC. Coronavirus Disease 2019 (COVID-19). Available at <https://africacdc.org/Covid-19>. Accessed Mar 21, 2022
5. NCDC. Covid-19 Nigeria. Available at <https://covid19.ncdc.gov.ng/>. Accessed Mar 21, 2022.
6. World Health Organization. (2020). Rational use of personal protective equipment (PPE) for coronavirus disease (COVID-19): interim guidance, 19 March 2020. World Health Organization. <https://apps.who.int/iris/handle/10665/331498>. License: CC BY-NC-SA 3.0 IGO. Accessed Jan 24, 2022.
7. Saber Y, Anas K. COVID-19 pandemic: it is time to temporarily close places of worship and to suspend religious gatherings, *Journal of Travel Medicine*, 2021; 28 (2): taaa065
8. Lendacki FR, Teran RA, Gretsch S, Fricchione MJ, Kerins JL. COVID-19 Outbreak Among Attendees of an Exercise Facility - Chicago, Illinois. *Morb Mortal Wkly Rep*. 2021;70(9):321-325.

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9. Lu J, Gu J, Li K, et al. COVID-19 Outbreak Associated with Air Conditioning in Restaurant, Guangzhou, China, 2020. *Emerg Infect Dis.* 2020;26(7):1628-1631.
10. Charlotte N. High rate of SARS-CoV-2 transmission due to choir practice in France at the beginning of the COVID-19 pandemic. *Journal of Voice.* 2020.
11. Masaki M, Itaru N, Reiko S, Tomoki N, Tomoya H, Tomoko T, Yuko O, Noritoshi F, Hiroyuki K, Takako K, Hidehiro W, Shigeru I. Adoption of personal protective measures by ordinary citizens during the COVID-19 outbreak in Japan. *International Journal of Infectious Diseases* 2020 ;(94):139-144.
12. Gerber MM, Cuadrado C, Figueiredo A, Crispi F, Jimenez-Moya G, Andrare V. Taking care of each other: How can we increase compliance with personal protective measures during the COVID-19 pandemic in Chile. *Political Psychology* 2021; 42 (5):863-880.
13. Machida M, Nakamura I, Saito R, Nakaya T, Hanibuchi T, Takamiya T, Odagiri Y, Fukushima N, Kikuchi H, Amagasa S, Kojima T, Watanabe H, Inoue S. Incorrect Use of Face Masks during the Current COVID-19 Pandemic among the General Public in Japan. *Int J Environ Res Public Health.* 2020;17(18):6484.
14. Ajide KB, Ibrahim RL, Alimi OY. Estimating the impacts of lockdown on Covid-19 cases in Nigeria, *Transportation Research Interdisciplinary Perspectives* 2020; 7: 100217.
15. Iboi E, Sharomi OO, Ngonghala C, Gumel AB. Mathematical Modeling and Analysis of COVID-19 pandemic in Nigeria. *Mathematics Biosciences and Engineering* 2020; 17 (6): 7192-7220.
16. World Health Organization. Rational use of personal protective equipment for coronavirus disease (COVID-19): interim guidance, 27 February 2020. [cited 2022 Mar 3]. <https://apps.who.int/iris/handle/10665/331215>.

17. Dan-Nwafor C, Ochu CL, Elimian K, Oladejo J, Ilori E, Umeokonkwo C et al. Nigeria's public health response to the COVID-19 pandemic: J Glob Health. 2020; 10(2):020399. doi:10.7189/jogh.10.020399.
18. Greenhalgh T, Schmid MB, Czypionka T, Bassler D, Gruer L. Face masks for the public during the covid-19 crisis. BMJ. 2020;369.
19. Cheng KK, Lam TH, Leung CC. Wearing face masks in the community during the COVID-19 pandemic: altruism and solidarity. Lancet. 2020; S0140-6736(20)30918-1.
20. Rieger MO. To wear or not to wear? Factors influencing wearing face masks in Germany during the COVID-19 pandemic. Social Health and Behaviour 2020;3(2):50-54.
21. Doung-Ngern P, Suphanchaimat R, Panjangampathana A, Janekrongtham C, Ruampoom D, Daochaeng N et al. Case-Control Study of Use of Personal Protective Measures and Risk for SARS-CoV 2 Infection, Thailand. Emerg Infect Dis. 2020 ;26(11):2607-2616.
22. Wu J, Xu F, Zhou W, Feikin DR, Lin CY, He X, et al. Risk factors for SARS among persons without known contact with SARS patients, Beijing, China. Emerg Infect Dis. 2004; 10:210–6.
23. Lau JT, Tsui H, Lau M, Yang X. SARS transmission, risk factors, and prevention in Hong Kong. Emerg Infect Dis. 2004; 10:587–92.
24. Wang Y, Tian H, Zhang L, Zhang M, Guo D, Wu W, et al. Reduction of secondary transmission of SARS-CoV-2 in households by face mask use, disinfection and social distancing: a cohort study in Beijing, China. BMJ Glob Health. 2020;5: e002794.
25. Chu DK, Akl EA, Duda S, Solo K, Yaacoub S, Schünemann HJ, et al.; COVID-19 Systematic Urgent Review Group Effort (SURGE) study authors. Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-

- CoV-2 and COVID-19: a systematic review and meta-analysis. *Lancet*. 2020; 395:1973–87.
26. Jefferson T, Del Mar C, Dooley L, Ferroni E, Al-Ansary LA, Bawazeer GA, et al. Physical interventions to interrupt or reduce the spread of respiratory viruses: systematic review. *BMJ*. 2009;339.
27. Turner RB, Biedermann KA, Morgan JM, Keswick B, Ertel KD, Barker MF. Efficacy of organic acids in hand cleansers for prevention of rhinovirus infections. *Antimicrob Agents Chemother* 2004; 48:2595-8
28. Chin A.W.H., Chu J.T.S., Perera M.R.A., Hui K.P.Y., Yen H.L., Chan M.C.W. Stability of SARS-CoV-2 in different environmental conditions. *Lancet Microbe*. 2020;1: E10.
29. Kratzel A., Todt D., V'Kovski P., Steiner S., Gultom M., Thao T.T.N. Inactivation of severe acute respiratory syndrome coronavirus 2 by WHO-recommended hand rub formulations and alcohols. *Emerg Infect Dis*. 2020; 26:1592–1595.
30. Rabenau H.F., Kampf G., Cinatl J., Doerr H.W. Efficacy of various disinfectants against SARS coronavirus. *J Hosp Infect*. 2005; 61:107–111.
31. WHO. WHO; Geneva: 2009. WHO guidelines on hand hygiene in health care. First global patient safety challenge clean care is safer care. [cited 2022 Mar 3].
32. Kampf G, Brüggemann Y, Kaba HEJ, Steinmann J, Pfaender S, Scheithauer S, et al. Potential sources, modes of transmission and effectiveness of prevention measures against SARS-CoV-2. *J Hosp Infect*. 2020;106(4):678-697. doi: 10.1016/j.jhin.2020.09.022.
33. Lotfi M, Hamblin MR, Rezaei N. COVID-19: Transmission, prevention, and potential therapeutic opportunities. *Clin Chim Acta*. 2020; 508:254-266. doi: 10.1016/ j.cca.2020.05.044.

34. Olapeju B, Hendrickson ZM, Rosen JG, Shattuck D, Storey JD, Krenn S. Trends in handwashing behaviours for COVID-19 prevention: Longitudinal evidence from online surveys in 10 sub-Saharan African countries. *PLOS Global Public Health* 2021; 1(11): e0000049.
35. Park JH, Cheong HK, Son DY, Kim SU, Ha CM. Perceptions and behaviors related to hand hygiene for the prevention of H1N1 influenza transmission among Korean university students during the peak pandemic period. *BMC Infect. Dis.* 2010; 10: 222.
36. Rubin GJ, Amlôt R, Page L, Wessely S. Public perceptions, anxiety, and behaviour change in relation to the swine flu outbreak: Cross sectional telephone survey. *BMJ* 2009; 339: b265.
37. Jones NR, Qureshi ZU, Temple RJ, Larwood JPJ, Greenhalgh T, Bourouiba L. Two metres or one: what is the evidence for physical distancing in covid-19? *BMJ* 2020;370:m3223
38. Bourouiba L, Dehandschoewercker E, Bush John WM. Violent expiratory events: on coughing and sneezing. *J Fluid Mech* 2014; 745:537-563.
39. Bourouiba L. Turbulent Gas Clouds and Respiratory Pathogen Emissions: Potential Implications for Reducing Transmission of COVID-19. *JAMA.* 2020;323(18):1837–1838.
40. Agusi ER, Ijoma SI, Nnochin CS, Njoku-Achu NO, Nwosuh CI, Meseko CA. The COVID-19 pandemic and social distancing in Nigeria: ignorance or defiance. *Pan Afr Med J.* 2020;35(Suppl 2):52.
41. Iwuoha VC, Aniche ET. Covid-19 lockdown and physical distancing policies are elitist: towards an indigenous (Afro-centred) approach to containing the pandemic in sub-urban slums in Nigeria, *Local Environment* 2020; 25(8): 631-640.

Tables

Table1. Participants' characteristics

Comment [PH11]: Remove grid lines from all the table....Check other article for a standard table design

Variables	Frequency	Percentage
Sex		
Female	79	40.3
Male	117	59.7
Age group (years)		
10-20	18	9.2
21-30	81	41.3
31-40	49	25.0
41-50	22	11.2
51-60	8	4.1
61-70	14	7.1
>70	4	2.0
Mean age \pm SD = 34.92\pm14.10 years		
Tribe		
Hausa	8	4.1
Igbo	76	38.8
Yoruba	10	5.1
South-South	102	52.0
Marital status		
Single	101	51.5
Married	88	44.9
Divorced/Separated	7	3.6
Education		
Secondary and below	46	23.5
Diploma	52	26.5
Bachelor	85	43.4
Master/PhD	13	6.6
Profession		
Students	52	26.5
Self-employed	84	42.8
Professionals	18	9.2
Civil servants	26	13.3
Retiree	16	8.2
Monthly income		
<50,000 naira	88	44.9
51,000-100,000 naira	55	28.1
101,000-200,000 naira	34	17.3
201,000-400,000 naira	15	7.7
>400,000 naira	4	2.0
Total	196	100.0

Table 2. Participants' use of personal protective measures against COVID-19 as recommended by WHO

Variables	Frequency	Percentage
Have you heard of WHO recommendation for hand washing?		
Yes	113	57.7
No	83	42.3
Do you follow WHO recommendation for hand washing		
Yes always	75	38.3
Sometimes	54	27.5
Rarely	64	32.7
Never	3	1.5
Regular public use of face mask		
Yes always	69	35.2
Yes sometimes	102	52.0
No, it can't reduce spread of COVID-19	21	10.7
Never	4	2.0
Do you still shake hands during this Covid-era?		
Yes always	38	19.4
Yes Often	43	21.9
Yes sometimes	86	43.9
No, I don't	29	14.8
Hand hygiene (Use of soap and water and use of sanitizers)		
Soap and water for 40 seconds	72	36.7
Soap and water < 40 seconds	63	32.1
Soap & sanitizer	25	12.8
Sanitizer 5 seconds	17	8.7
Sanitizer 20 seconds	6	3.1
Neither use soap nor sanitizer	13	6.6
Total	196	100.0

Fig 1. Participants' attitudinal change to hand washing since COVID-19

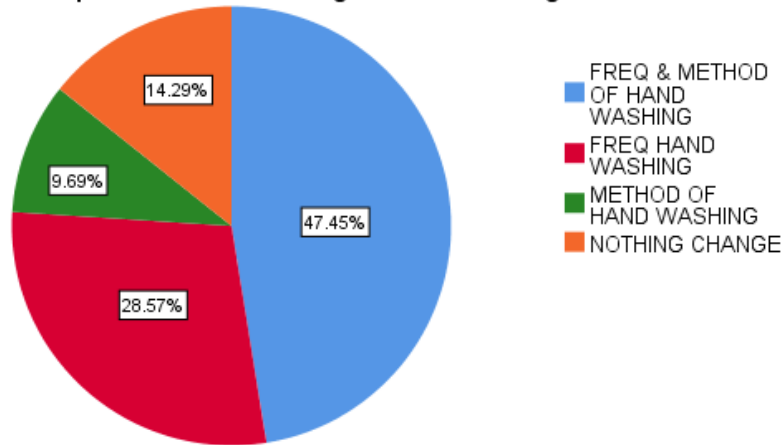


Table 3. Participants' personal preventive measures against COVID-19

Variables	Frequency	Percentage
What can be done to prevent contacting COVID-19		
1. Regular washing of hands	72	36.7
2. Boosting immunity with vitamins	25	12.8
3. Mouthwash	1	0.5
4. Vaccine	6	3.1
5. Social distancing	7	3.6
1&2	15	7.7
1&3	7	3.6
1&5	9	4.6
2&5	22	11.2
1&6	6	3.1
1-3	2	1.0
1,2&4	2	1.0
1,2&5	18	9.2
1,2,4,5	1	0.5
1-5	3	1.5
Total	196	100.0

Table 4. Association between participants' demographics and WHO hand washing recommendations for COVID-19 prevention

Variables	N (%) Hand washing with soap and water 40 seconds	N (%) Soap & water < 40 seconds	N (%) Soap & water sanitizer	N (%) Sanitizer for 5 seconds	N (%) Sanitizer for 20 seconds	N (%) No washing of hands	N (%) Total	χ^2	P
Sex								14.16	0.05
Female	29 (39.2)	26 (40.6)	11 (44.0)	11 (64.7)	0 (0.0)	2 (20.0)	79 (40.3)		
Male	45 (60.8)	38 (59.4)	14 (56.0)	6 (35.3)	6 (100.0)	8 (80.0)	117 (59.7)		
Age group (years)								37.82	0.66
10-20	7 (9.5)	7 (10.9)	2 (8.0)	0 (0.0)	2 (33.3)	0 (0.0)	18 (9.2)		
21-30	24 (32.4)	29 (45.3)	11 (44.0)	9 (52.9)	1 (16.7)	7 (70.0)	81 (41.3)		
31-40	21 (28.4)	13 (20.3)	5 (20.0)	8 (47.1)	1 (16.7)	1 (16.7)	49 (25.0)		
41-50	8 (10.8)	8 (12.5)	3 (12.0)	0 (0.0)	1 (16.7)	2 (20.0)	22 (11.2)		
51-60	6 (8.1)	1 (1.6)	1 (4.0)	0 (0.0)	0 (0.0)	0 (0.0)	8 (4.1)		
61-70	6 (8.1)	4 (6.3)	3 (12.0)	0 (0.0)	1 (16.7)	0 (0.0)	14 (7.1)		
>70	2 (2.7)	2 (3.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (2.0)		
Education								16.40	0.75
Secondary & below	15 (20.3)	17 (26.6)	6 (24.0)	2 (11.8)	3 (50.0)	3 (30.0)	46 (23.5)		
Diploma	22 (29.7)	13 (20.3)	7 (28.0)	6 (35.3)	2 (33.3)	2 (20.0)	52 (62.5)		
Bachelor	32 (43.2)	30 (46.9)	9 (36.0)	8 (47.1)	1 (16.7)	5 (50.0)	85 (43.4)		
Master/PhD	5 (6.8)	4 (6.3)	3 (12.0)	1 (5.9)	0 (0.0)	0 (0.0)	13 (6.6)		
Profession								37.41	0.11
Students	15 (20.3)	23 (35.9)	6 (24.0)	3 (17.6)	2 (33.3)	3 (30.0)	52 (26.5)		
Self-employed	37 (50.0)	24 (37.5)	11 (44.0)	8 (47.1)	2 (33.3)	2 (20.0)	84 (42.9)		
Professionals	5 (6.8)	7 (10.9)	2 (8.0)	0 (0.0)	1 (16.7)	3 (30.0)	18 (9.2)		
Civil servants	8 (10.8)	5 (7.8)	5 (20.0)	6 (35.3)	1 (16.7)	1 (10.0)	26 (13.3)		
Retiree	9 (12.2)	5 (7.8)	1 (4.0)	0 (0.0)	0 (0.0)	1 (10.0)	16 (8.2)		
Monthly income								17.47	0.94
<50,000 naira	28 (37.8)	31 (48.4)	13 (52.0)	7 (41.2)	3 (50.0)	6 (60.0)	88 (44.9)		
51,000-100,000 naira	19 (25.7)	15 (23.4)	7 (28.0)	9 (52.9)	2 (33.3)	3 (30.0)	55 (28.1)		

101,000-200,000 naira	16 (21.6)	12 (18.8)	3 (12.0)	1 (5.9)	1 (16.7)	1 (10.0)	34 (17.3)
201,000-400,000 naira	8 (10.8)	5 (7.8)	2 (8.0)	0 (0.0)	0 (0.0)	0 (0.0)	15 (7.7)
>400,000 naira	3 (4.1)	1 (1.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (2.0)
Total	74 (100.0)	64 (100.0)	25 (100.0)	17 (100.0)	6 (100.0)	10 (100.0)	196 (100.0)

Table 5. Association between participants' demographics and use of face mask

Variables	N (%) Regular use of face masks Yes, always	N (%) Yes, sometimes	N (%) No. it can't reduce spread	N (%) Total	χ^2	P
Sex					2.17	0.54
Female	27 (37.5)	46 (44.7)	6 (28.6)	79 (40.3)		
Male	45 (62.5)	57 (55.3)	15 (71.4)	117 (59.7)		
Age group (years)					14.00	0.73
10-20	9 (12.5)	7 (6.8)	2 (9.5)	18 (9.2)		
21-30	31 (43.1)	42 (51.9)	8 (38.1)	81 (41.3)		
31-40	12 (16.7)	29 (28.2)	8 (38.1)	49(25.0)		
41-50	8 (11.1)	14 (13.6)	0 (0.0)	22 (11.2)		
51-60	4 (5.6)	4 (3.9)	0 (0.0)	8 (4.1)		
61-70	7 (9.7)	5 (4.9)	2 (9.5)	14 (7.1)		
>70	1 (1.4)	2 (1.9)	1 (4.8)	4 (2.0)		
Education					17.37	0.04*
Secondary & below	13 (18.1)	26 (25.2)	7 (33.3)	46 (23.5)		
Diploma	15 (20.8)	28 (27.2)	9 (42.9)	52 (26.5)		
Bachelor	37 (51.4)	43 (41.7)	5 (23.8)	85(43.4)		
Master/PhD	7 (9.7)	6 (5.8)	0 (0.0)	13 (6.6)		
Profession					8.79	0.72
Students	20 (27.8)	26 (52.2)	6 (28.6)	52 (26.5)		
Self-employed	28 (38.9)	49 (46.6)	7 (33.3)	84 (42.9)		
Professionals	5 (6.9)	11 (10.7)	2 (9.5)	18 (9.2)		
Civil servants	11 (15.3)	12 (11.7)	3 (14.3)	26 (13.3)		
Retiree	8 (11.1)	5 (4.9)	3 (14.3)	16 (8.2)		
Monthly income					13.30	0.35
<50,000 naira	27 (37.5)	47 (45.6)	14 (66.7)	88 (44.9)		
51,000-100,000 naira	19 (34.5)	32 (31.1)	4 (19.0)	55 (82.1)		
101,000-200,000 naira	14 (19.3)	17 (16.5)	3 (14.3)	34 (17.3)		
201,000-400,000 naira	9 (12.5)	6 (5.8)	0 (0.0)	15 (7.7)		
>400,000 naira	3 (4.2)	1 (1.0)	0 (0.0)	4 (2.0)		
Total	74 (100.0)	64 (100.0)	25 (100.0)	17 (100.0)		