

A Community Evaluation of Compliance, Commitment and Constraints towards Strategies for Minimizing the Spread of COVID-19 in Ibadan, Nigeria

¹Ana, G.R.E.E.,
^{1*}Morakinyo, O.M.,
²Adesokan, K., ¹Adejumo, M.
¹Laniyan, T.A, ²Olatoye, O.
and ¹Sridhar, M.K.C.

¹Department of Environmental Health Sciences, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, 200284, Nigeria

²Department of Veterinary Public Health, Faculty of Veterinary Medicine, University of Ibadan, Ibadan, 200284, Nigeria

E-mail: wahlemirax@gmail.com

Corresponding Author:
Morakinyo, O.M, as above

Keywords:
COVID-19, Community compliance,
Environmental factors,
Ibadan

Mots clés:
COVID-19, conformité communautaire, facteurs environnementaux,
Ibadan

Abstract

The number of infected persons from COVID-19 outbreak in Nigeria continues to increase daily in the face of proven recommended preventive measures. There is paucity of information on community compliance, constraints and commitment towards minimizing the spread of Coronavirus. Hence, this study was designed to address this gap in knowledge. Forty-eight randomly selected houses, facilities comprising majorly residential and business premises were assessed in Agbowo, Ibadan, Nigeria. On-site observations, key informant interviews and informal discussions were employed to elicit information on the use of personal protective equipment (PPE), awareness and factors responsible for the spread of COVID-19 and hygiene practices. Relatively high use of nose mask, hand-washing with soap and hand sanitizer were observed in the facilities assessed. Some participants believed that COVID-19 is a myth while a few believed it can be contracted through animals, unhygienic behaviour. Factors hindering compliance to COVID-19 guidelines include the current economic situation, inadequate knowledge and lack of belief. The level of compliance to recommended preventive measures to curtail the spread of COVID-19 is low. Government and relevant organizations should engage in more sensitization and education of masses on the preventive measures in a way and language they will understand.

Une Évaluation communautaire de la conformité, des contraintes et de l'engagement envers des stratégies visant à minimiser la propagation du COVID-19 à Ibadan, au Nigéria

Abstrait

Le nombre de personnes infectées par l'épidémie de COVID-19 au Nigéria continue d'augmenter chaque jour face aux mesures préventives recommandées éprouvées. Il y a peu d'informations sur la conformité, les contraintes et l'engagement de la communauté à minimiser la propagation du coronavirus. Par conséquent, cette étude a été conçue pour combler ce manque de connaissances. Quarante-huit maisons sélectionnées au hasard, des installations comprenant principalement des locaux résidentiels et commerciaux ont été évaluées à Agbowo, Ibadan, Nigéria. Des observations sur place, des entretiens avec des informateurs clés et des discussions informelles ont été utilisés pour obtenir des informations

sur l'utilisation des équipements de protection individuelle (EPI), la sensibilisation et les facteurs responsables de la propagation du COVID-19 et les pratiques d'hygiène. Une utilisation relativement élevée de masques nasaux, un lavage des mains avec du savon et un désinfectant pour les mains ont été observés dans les établissements évalués. Certains participants pensaient que le COVID-19 était un mythe, tandis que quelques-uns pensaient qu'il pouvait être contracté par des animaux, un comportement insalubre. Les facteurs entravant le respect des directives COVID-19 comprennent la situation économique actuelle, des connaissances insuffisantes et un manque de croyance. Le niveau de conformité aux mesures préventives recommandées pour réduire la propagation du COVID-19 est faible. Le gouvernement et les organisations compétentes devraient s'engager dans une plus grande sensibilisation et une plus grande éducation des masses sur les mesures préventives d'une manière et dans une langue qu'elles comprendront.

Introduction

The Coronavirus Disease (COVID-19) caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) has wreaked havoc in both developed and developing countries and declared a global pandemic (Singhal, 2020). It has snowballed into a global threat of international concern (WHO, 2020a, 2020b). In early December 2019, groups of patients in Wuhan, China diagnosed with viral pneumonia were reported to be infected with the novel virus (WHO, 2020c).

The World Health Organization (WHO) on 30 January 2020 named the COVID-19 outbreak as the sixth public health disease of international concern (Yoo, 2020). As of 2 August, 2020, the number of reported cases of COVID-19 globally totalled approximately 17,660,523 cases, with 680,894 deaths (WHO, 2020d). Nigeria reported the first case of laboratory-confirmed COVID-19 on 27 February 2020, and there have been 44,129 confirmed cases with 896 deaths as of 4 August 2020 (NCDC, 2020). In Oyo State, there have been 2,771 cases of COVID-19 recorded as at 4 August 2020 (NCDC, 2020).

The global burden of disease linked to the environment is about 13 million deaths each year (accounting for a quarter of all deaths) in addition to other health concerns such as COVID-19. In Sub-Saharan Africa, including Nigeria, more than 60% of urban dwellers live in slums (UN-Habitat, 2010), characterised with poor housing, insufficient space, unwholesome water and

sanitation. Globally, 23% of all deaths could be prevented through healthier environments including promoting safe household water storage, better hygiene measures, living in improved housing conditions and safer management of toxic substances in the home and workplace (WHO, 2019). There is a huge information deficit on the link between environmental conditions and COVID-19 in peri-urban communities in Nigeria.

Unprecedented measures have been adopted to control the rapid spread of the ravaging COVID-19 epidemic (Zhong *et al.*, 2020) across different countries of the world. However, experience from these countries demonstrated that a strategy of containment must be complemented by mitigation strategies in the face of wider community transmission with multiple foci (Heymann and Shindo, 2020). Such strategies include enhanced communication strategies to provide the population with information for self-protection, including hand washing; strict infection prevention and control measures such as safe water and sanitation at health facilities without overlooking mitigation activities such as social distancing measures.

At the outset of the COVID-19 outbreak in Nigeria, the Nigerian government instituted various non-pharmaceutical measures to curtail the spread and transmission of the disease. Non-pharmaceutical interventions have been proven to be a cheap and non-invasive method to reduce mortality and morbidity from respiratory infections (Liu *et al.*, 2020). Measures such as regular washing of hands under running water, use

of alcohol-based sanitizers, maintaining social distancing, observing respiratory etiquettes and avoiding touching of the eyes, nose and mouth are considered effective in preventing the transmission of the virus (Liu *et al.*, 2020; Machida *et al.*, 2020).

Despite the institution of different containment measures aimed at reducing the spread of COVID-19, there is paucity of information on community compliance, commitment and constraints towards strategies aimed at minimizing the spread of Coronavirus and the containment of COVID-19. Thus, this study was designed to address this gap in knowledge. The objective of this study was to assess (i) environmental conditions in Agbowo community and (ii) the level of compliance, constraints and commitment of Agbowo residents towards strategies aimed at preventing community spread of COVID-19.

Materials and Methods

Description of Study Area

The study was carried out in Agbowo (a peri-urban community) in Ibadan North Local Government Area, Ibadan. Agbowo's popularity is linked to its being strategically located contiguous to Nigeria's premier institution of higher learning, the University of Ibadan. The cosmopolitan community comprises residents who are mainly traders, students, civil servants and other professionals. The environment is currently being degraded following an increased influx of people, overstretched amenities and decrepit social infrastructure. It lies on an elevation of 230m (about 750 ft) above the sea level and about 119 km north-east of Lagos State (Sridhar and Ojediran, 1083).

Study Design

This is a descriptive cross-sectional study that employed on-site observations, key informant interviews and informal discussions to elicit information through appropriate and standardised instruments.

Study Population

The study population comprised both male and

female persons aged 18 years and above residing within Agbowo community.

Sampling

The study participants were recruited randomly from 48 locations comprising households, shops and business areas in selected streets based on their willingness to take part in the pilot community-based rapid assessment.

Data Collection Methods

The onsite observation checklist comprised six indicators namely hand care facility, water treatment facilities, solid waste management facility, waste-water disposal, occupancy ratio and use of Personal Protective Equipment (PPE). The indicators were assessed on the field using a set of ranked parameters. The interview schedule was made up of ten sets of questions covering knowledge and perception about COVID-19, environmental predisposing factors, veterinary exposure factors, and practices associated with the control and containment of the disease. In addition to the structured instruments, participants were also allowed to express their views in informal recorded sessions on salient issues bothering the community transmission of the disease and the challenges faced in managing the public health scourge.

Data management and statistical analysis

Data were cleaned up, entered and processed using SPSS version 22. All the parameters measured from the on-site observations were analysed descriptively and using chi square. The interviews were transcribed verbatim, categorised and analysed thematically.

Results

Description of the locations, occupancy and use of PPEs

Table 1 presents information on the occupancy ratio and the use of PPEs in the facilities visited. Nose masks were used in only 21 (43.8%) of the facilities while hand gloves were worn in 7(14.6%) as depicted in Figure 1.

Table 1: Occupancy and Use of Personal Protective Equipment

Variables	Number (%)
Occupancy	
>10 persons in home setting	9 (18.8)
>10 persons at office reception	5 (10.4)
>10 persons at office setting	2 (4.2)
>10 persons at public facility	2 (4.2)

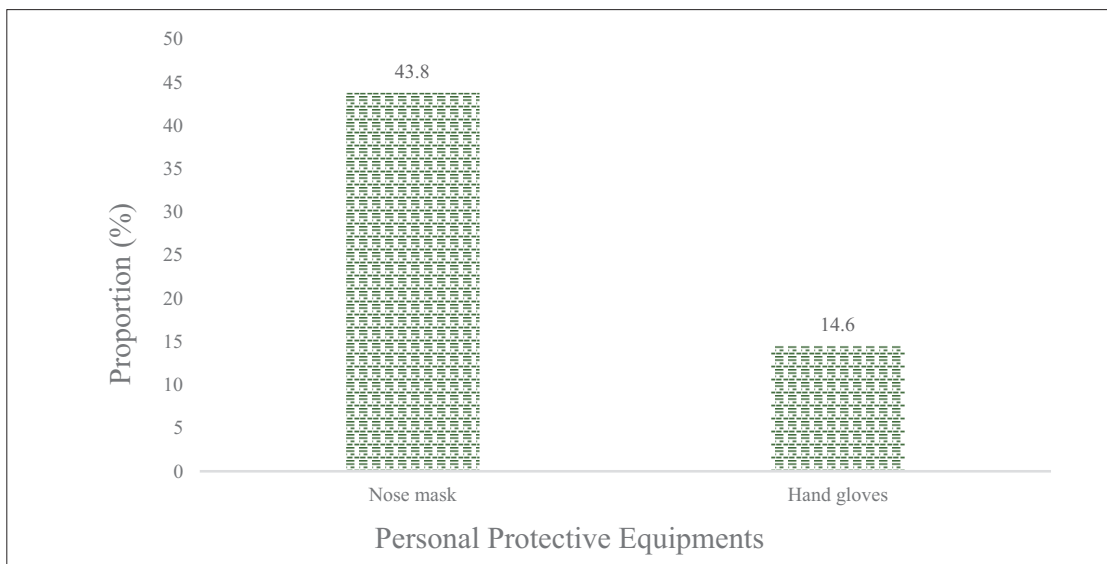


Figure 1: Use of personal protective equipment

Awareness of COVID-19 Infection

The participants expressed similar views on their awareness about COVID-19 pandemic. It was reported that COVID-19 is a deadly disease caused by a virus with a high mortality rate. While the disease was viewed as an infectious disease from poor environmental management, some participants still believed that coronavirus was not real.

“It is a virus caused by poor care for the environment”

“According to report, the COVID-19 is a deadly disease but I don't really believe it exist”

Factors responsible for the spread of COVID-19

The main factors reported to be the cause of COVID-19 were "chemicals released from China", "virus" and "lack of hygiene practice". Describing spiritual reasons as a factor responsible for the spread of COVID-19, a participant mentioned that

the sin of the ancestors incurred God's wrath and inflicts the earth with COVID-19 as a form of punishment. Furthermore, another participant revealed that there were rumours around the world that the installation of a 5G satellite was responsible. Some of the participants' viewpoints are quoted below:

“I heard chemicals were released from China that resulted in COVID-19”
“Sin is responsible, the sin of the old ancestors is a major cause of the disease as a form of punishment as the vengeance of God” *“... there are a lot of rumours about it, some are saying it is caused by the installation of 5G satellite”*

“... it is a form of Bioweapon introduced by China to assume world power”

However, the major mode of spread of COVID-19 mentioned by participants was through physical contact with an infected person or hard surface.

“Touching one another or places from an infected individual and being in contact with an infected person”

Measures to reduce the spread

Measures to reduce the spread of COVID-19 as reported by participants include the use of face masks, drinking of hot water, observation of high personal hygiene and good nutrition to boost the immune system. Also, observing physical distancing and obeying all preventive measures itemized by the health personnel were mentioned.

Respondents' views are presented below:

“...take hot water for drinking and using face mask”
“Physical distancing, observing high personal hygiene, good nutrition to boost the immune system”

“We can only control COVID-19 through prayer...”

Air Pollution Sources

Sources of air pollution within the settings visited were observed and presented in Table 2. Generator emissions were observed to be highly present, moderately present and present in 6 (12.5%), 7 (14.5%) and 12 (25.0%) of the facilities respectively.

Water sources, wastewater and solid waste management practices

Table 3 presents the findings of the observation on water sources, wastewater management and solid waste management practices. The available and functional water sources were shallow well (16.7%), deep well (37.5%), borehole (58.3%) and central supply (18.8%) and vendor supply (2.1%).

Table 2: Air pollution sources

Air pollution sources	Highly present (%)	Moderately present (%)	Present (%)	Absent (%)
Generator emission	6 (12.5)	7 (14.6)	12 (25.0)	23 (47.9)
Kerosene stove smoke	4 (8.3)	4 (8.3)	8 (16.7)	32 (66.7)
Firewood smoke	1 (2.1)	1 (2.1)	7 (14.6)	39 (81.3)
Refuse burning	0 (0.0)	5 (10.4)	7 (14.6)	36 (75.0)
Fungal spore	0 (0.0)	0 (0.0)	7 (14.6)	41 (85.4)

Table 3. Water sources, wastewater and solid waste management practices

Variables	AF (%)	ANF (%)	Absent (%)
<i>Water sources</i>			
Shallow Well	8 (16.7)	4 (8.3)	36 (75.0)
Deep well	18 (37.5)	1 (2.1)	29 (60.4)
Borehole	28 (58.3)	2 (4.2)	18 (37.5)
Central supply	9 (18.8)	1 (2.1)	38 (79.2)
Vendor supply	1 (2.1)	1 (2.1)	46 (95.8)
<i>Wastewater management facility</i>			
Hand washings	17 (35.4)	1 (2.1)	30 (62.5)
Kitchen washings	11 (22.9)	2 (4.2)	35 (72.9)
Toilet wastewater	12 (25.0)	2 (4.2)	34 (70.8)
Storm water	5 (10.4)	0 (0.0)	43 (89.6)
Farm wastewater			
<i>Solid waste management facility</i>			
Home refuse bin	30 (62.5)	4 (8.3)	14 (29.2)
Neighbourhood refuse bin	9 (18.8)	2 (4.2)	37 (77.1)
Central management facility	14 (29.2)	1 (2.1)	33 (68.8)

Note: AF= Available and Functional; ANF= Available and Not Functional;

The wastewater management facility was present and functional for the treatment of hand washing wastewater, kitchen washings, toilet wastewater and storm water in 17 (35.4%), 11 (22.9%), 12 (25.0%) and 5 (10.4%) of the facility observed, respectively as shown in supplementary 2. Home refuse bin was present and functional in 30 (62.5%) of the facilities. Littering of waste was

also found in some locations (see supplementary 3). Hand washing stand with water only was present in 4 (8.3%) of the facilities while hand washing stand with soap was present in 6 (12.5%) of the facilities (see supplementary 4). Hand sanitizer and disposable tissue were highly present in 6 (12.5%) and 1 (2.1%) of the facilities respectively as depicted in Figure 2.

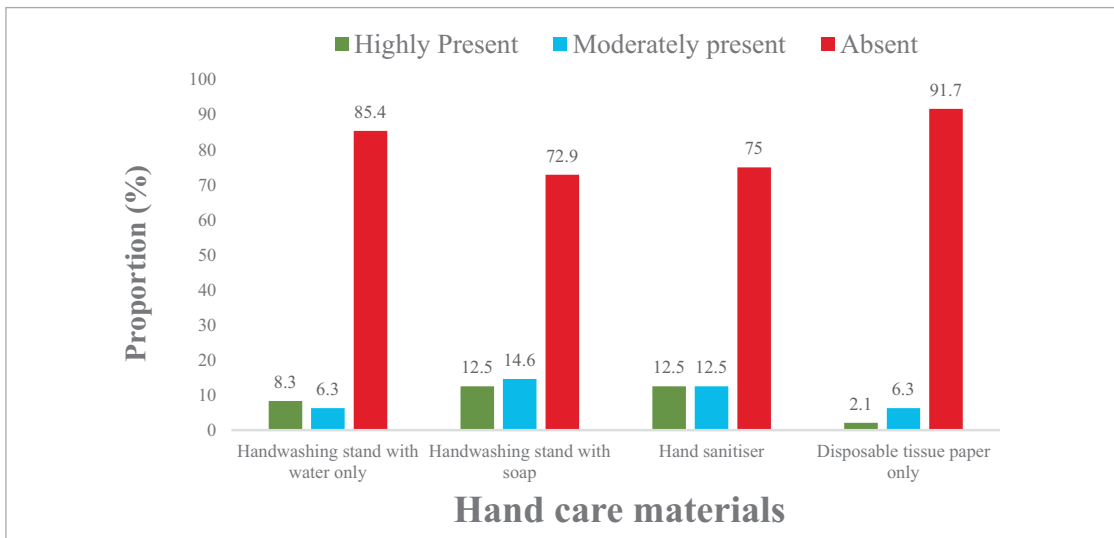


Figure 2: Presence of hand care materials

Table 4. Factors associated with the use of nose mask

Hand care	Use of nose mask		Fisher's Exact Chi square	p-value
	Yes (%)	No (%)		
<i>Hand washing stand with water only</i>				
Present	5 (23.8)	2 (7.4)	7.125	0.028*
Absent	16 (76.2)	25 (92.6)		
<i>Hand washing stand with soap/sanitizer</i>				
Present	10 (47.6)	3 (11.1)	7.808	0.015*
Absent	11 (52.4)	24 (88.9)		
<i>Hand sanitizer</i>				
Present	9 (42.9)	3 (11.1)	9.418	0.007*
Absent	12 (57.1)	24 (88.9)		
<i>Occupancy</i>				
<i>>10 persons at office reception</i>				
Yes	3 (14.3)	2 (7.4)	0.599	0.439
No	18 (85.7)	25 (92.6)		
<i>>10 persons at an office setting</i>				
Yes	2 (9.5)	0 (0.0)	2.683	0.186
No	19 (90.5)	27 (100.0)		
<i>>10 persons in a home setting</i>				
Yes	5 (23.8)	4 (14.8)	0.627	0.477
No	16 (76.2)	23 (85.2)		
<i>>10 persons at public facility</i>				
Yes	1 (4.8)	1 (3.7)	0.033	0.856
No	20 (95.2)	26 (96.3)		

*Significant at p ≤ 0.05

However, possession of various hand care materials varied by nose mask use as presented in Table 4. Nose mask use was significantly higher among people in the facilities that have hand washing stand with water only ($p= 0.028$). The proportion of nose mask use was significantly higher among people in the facility that have hand washing stand with soap/sanitizer ($p=0.015$). Similarly, the use of a nose mask was significantly higher among people in the facility that possess hand sanitizers ($p=0.007$).

Pet ownership, management and contact with humans

Dog, cat, goat and chicken were the pet animals found in 9 (18.8%), 2 (4.2%), 4 (8.3%) and 6 (12.5%) of the facilities respectively as presented in Table 5. The in-depth interview revealed that both domestic and household animals may predispose the public to COVID-19 given the current inadequate scientific proof to validate the aetiology of the disease.

"...Can in a way be involved in the transmission of disease when they are not vaccinated"
"Scientifically no information, but the animal may be at risk without our knowledge since it is a novel virus"

Moreover, there was a well-built environment (pen) for the pets in 5 (10.4%) of the facilities and the pen was suited for easy cleaning in 4 (8.3%) of the facilities. In 2 (4.2%) of the facilities, there was evidence of pet care and proper animal waste disposal was found in 2 (4.2%) of the facilities. Evidence of animal-human cohabiting was observed in 4 (8.3%) of the facilities.

Factors militating against compliance with control measures

Ignorance, negligence, lack of belief, inadequate knowledge, inadequate information, hunger and survival, the present economic situation of the country as well as high cost of the required materials were the most common factors stated by most of the participants. Also, the inability to conduct a high number of tests, people's orientation to compliance, lack of information, cultural orientation, religious background and literacy level were also mentioned. One of the participants revealed that a face mask could be inconvenient because it prevents adequate respiration.

"Inadequate education/knowledge among masses about the disease"
"Increase in the price of materials needed such as face masks and hand sanitizers"

Table 5: Pet ownership, management and animal-human contact

Pet ownership	Number (%)
Dog	9 (18.8)
Chicken	6 (12.5)
Goat	4 (8.3)
Cat	2 (4.2)
<i>Pet and pen management</i>	
Well-built environment	5 (10.4)
Pen suited for easy cleaning	4 (8.3)
Evidence of pet care	2 (4.2)
Proper animal waste disposal	2 (4.2)
<i>Animal-human contacts</i>	
Handling animal products/waste without PPEs	7 (14.6)
Handling animals with bare hands	4 (8.3)
Co-habitation	4 (8.3)

"Respiratory inconvenience with face mask"

"Peoples orientation to compliance, lack of information, cultural orientation, religious background and literacy level could be some factor"

Commitment to the containment effort

Participants' reported that some of the ways the people could become committed to the COVID-19 containment efforts. Sensitization, education of the masses on preventive measures, provision of required materials. enforcement of the preventive guidelines was also mentioned as a possible ways through which people can be committed to the containment efforts. During an interview, one participant stated that the production of face mask that allows adequate respiration could improve people's willingness to use the face mask. Another participant suggested that the government should provide palliatives for people so as to enforce stay-at-home order. It was emphasized that any sensitization program should be communicated in the local languages people would understand and that the government should be sincere with information.

"Produce a face mask that allows adequate respiration"

"By putting measures in place which allow people to wash their hands, practice social distancing, etc."

"By enforcing laws and whoever disobeys would be punished"

"By sensitization and communication in the language they understand; Government should be sincere with information to build trust within citizen for compliance"

Discussion

The present study investigated the compliance of a typical peri-urban community in Ibadan, Oyo State Nigeria to some of the strategies towards minimizing the spread of coronaviruses and containment of COVID-19. Overall, the findings revealed that the level of compliance, commitment and containment of the spread of

COVID-19 is low in the study area.

From the present study, though some participants were aware that the disease is caused by a virus that is deadly, there are still major awareness gaps that could militate against the global drive at containing the disease. This becomes imperative considering some misgivings as regards the reality of the COVID-19 pandemic among a considerable percentage of the study populations. Previous reports have shown that people's compliance with control measures is affected by their awareness and attitudes towards the disease (Zhong *et al.*, 2020). Our findings are similar to previous reports that showed that a considerable proportion of people are still not fully aware of major facts about COVID-19 pandemic (Pandey *et al.*, 2020; Wolf *et al.*, 2020).

The study also showed that the level of compliance with the use of PPEs was low despite the directive of the Federal Government of Nigeria that the use of face masks in public settings such as offices are mandatory. According to MacIntyre *et al.* (2015), wearing a mask at source is a control measure largely to stop the process of discharge of droplets, since large droplets condense to smaller aerosol particles that can float for a longer period in air.

Moreover, only very few of the facilities visited made provisions for hand washing and using sanitizers. Bieu *et al.* (2020) posited that since the virus is highly contagious via respiratory route (droplets from infected persons, widely spread by coughing or sneezing) and via contact with contaminated surfaces, community transmission and spread can be reduced through the practice of regular and diligent hand hygiene. Proper hand washing is essential to preventing COVID-19 transmission (WHO, 2020e). Moreover, while there was no evidence of source of air pollution in the majority of the facilities surveyed, our findings revealed generator emission, kerosene stove smoke as well as refuse burning formed the major sources that were present. Many of the underlying health conditions that increases the risk of death in COVID-19 infected persons are the same conditions that have previously been linked with long-term

exposure to poor air quality. With COVID-19 being a respiratory disease and the SARS-COV-2 having the ability to survive in the air for some time, it will be imperative to establish the link between air pollution and COVID-19 related deaths (Zhu *et al.*, 2020).

Our findings also showed evidence of animal-human cohabitation in some of the facilities surveyed. Available evidences from elsewhere revealed that animals might be an important reservoir of the virus (Almendros 2020a). The SARS-CoV-2 infection has been detected in two dogs from Hong Kong (Almendros 2020a) while two cats, one from Belgium and the other from Hong Kong have also tested positive for SARS-CoV-2 (American Veterinary Medical Association, 2020). While bats appear as the natural reservoir or source of origin for SARS-CoV-2 (Li *et al.* 2020), it is pertinent to state that the infection is through an intermediate host yet to be substantiated with recent investigations on pangolins, ferrets and possibly snakes. It is therefore important that cautions must be exercised when handling pet animals while adequate hygiene should also be maintained.

Our study, however, has some limitations. The first is the number of facilities studied is relatively small. More facilities could have probably provided better insights. This notwithstanding, we believe that the information provided in this study would go a long way to serve as a basis for proper and informed control strategies. Two, the present study was cross-sectional without opportunity for the cause-and-effect type of findings; interventional studies could have provided more empirical data for better control strategies. Overall, our findings established important gaps and constraints regarding people's compliance with preventive strategies against COVID-19 as well as indicated measures for improved commitments towards ongoing strategies.

Conclusion

Out of the 48 facilities visited participants were observed to have a high compliance level in the use of nose masks. While most facilities had hand-washing basins, soap with disposal issues.

Many believed that the spread of the disease is from physical contact and through animal transmission while some still see the disease as a myth or wrath from God. The lack of belief and not knowing the gravity of the spread of COVID-19 was found to be part of the reason for the increased community transmission within the four months. More sensitization and education of the masses especially should be done in local languages and in a manner, people will understand. Enforcement of the preventive guidelines such as proper use of nose mask, physical distancing as well as hand washing with a hygienic environment should be put in place by the government.

List of abbreviations

COVID-19: Coronavirus disease; WHO: World Health Organisation; PPE: Personal Protective Equipment.

Acknowledgements

The authors are very grateful to the local community for granting informed consent and permission to access information readily. We are also very grateful to the research assistants mostly students from the departments of Environmental Health Sciences and the Veterinary Public Health for their diligence and dexterity in the course of data gathering and processing.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Authors' contributions

GA conceived the study; GA, OM, KA, MA, TL, OO and MS developed the research questions and designed the study. OM, TL and MS wrote

the background section; GA wrote the methodology, MA analysed the data wrote the result section while KA and OO wrote the discussion section. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Consent for publication

Not applicable.

Ethics approval and consent to participate

An informed consent was obtained from all the study participants after describing to them all the issues related to the study in details at the point of data collection. Each consented participant was made to sign an appropriate agreement form before the interview.

Authors' information

¹Department of Environmental Health Sciences, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Nigeria.

²Department of Veterinary Public Health, Faculty of Veterinary Medicine, University of Ibadan, Ibadan, Nigeria.

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