






# An assessment of infection prevention and control preparedness of healthcare facilities in Nigeria in the early phase of the COVID-19 pandemic (February–May 2020)

Journal of Infection Prevention  
2022, Vol. 23(3): 101–107  
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DOI: 10.1177/17571774211060418  
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## Abstract

**Background:** Infection prevention and control (IPC) activities play a large role in preventing the transmission of SARS-CoV-2 in healthcare settings. This study describes the state of IPC preparedness within health facilities in Nigeria during the early phase of coronavirus disease (COVID-19) pandemic.

**Methods:** We carried out a cross sectional study of health facilities across Nigeria using a COVID-19 IPC checklist adapted from the U.S Centers for Disease Control and Prevention. The IPC aspects assessed were the existence of IPC committee and teams with terms of reference and workplans, IPC training, availability of personal protective equipment and having systems in place for screening, isolation and notification of COVID-19 patients. Existence of the assessed aspects was regarded as preparedness in that aspect.

**Results:** In total, 461 health facilities comprising, 350 (75.9%) private and 111 (24.1%) public health facilities participated. Only 19 (4.1%) health facilities were COVID-19 treatment centres with 68% of these being public health facilities. Public health facilities were better prepared in the areas of IPC programme with 69.7% of them having an IPC focal point versus 32.3% of private facilities. More public facilities (59.6%) had an IPC workplan versus 26.8% of private facilities. Neither the public nor the private facilities were adequately prepared for triaging, screening, and notifying suspected cases, as well as having trained staff and equipment to implement triaging.

**Conclusions:** The results highlight the need for government, organisations and policymakers to establish conducive IPC structures to reduce the risk of COVID-19 transmission in healthcare settings.

## Keywords

COVID-19, infection prevention and control, pandemic, preparedness, Nigeria

Date received: 19 February 2021; accepted: 31 August 2021

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## Introduction

On the 7th of January 2020, the Nigeria Centre for Disease Control (NCDC) initiated the National Coronavirus Preparedness Group (NCPG) as a multi-sectoral and multi-partner preparedness group with the mandate of coordinating preparedness and response for the anticipated COVID-19 outbreak within the country (Dan-Nwafor et al., 2020). Subsequently, the World Health Organization (WHO) risk assessment identified Nigeria as one of 13 countries prioritised for proactive surveillance, detection and containment of the spread of the virus due to close economic links to China (Gilbert et al., 2020; Kapata et al., 2020).

Nigeria was the third African country and the first sub-Saharan African country to report a confirmed case of COVID-19 after Egypt and Algeria (Adepoju, 2020; BBC, 2020). Following the confirmation of the first case in Nigeria on 27 February 2020, the NCPG transitioned into the COVID-19 Emergency Operations Centre (COVID-19 EOC) to coordinate the country's public health response (Nigeria Centre for Disease Control, 2020c).

Following the declaration of the COVID-19 pandemic as a Public Health Emergency of International Concern, WHO outlined public health measures to guide countries in developing national plans (World Health Organization, 2020a). Infection prevention and control was recognised as one of the critical preparedness and readiness actions to be taken by countries (World Health Organization, 2020a) in response to the pandemic. Nigeria's health infrastructure has been described as poor especially in the public health sector (Welcome, 2011). Recognising this weakness and the key role health facilities will play in the detection and safe management of suspected and confirmed cases of COVID-19, the infection prevention and control (IPC) pillar of the NCPG prioritised the assessment of the preparedness of health facilities in the country to safely identify and manage suspected or confirmed COVID-19 patients. The aim was to provide early insights into IPC capacities in health facilities, highlight gaps in IPC and identify potential resources in the country that can be leveraged upon in the response.

Nigeria has vast experience in outbreak preparedness and response, given the high burden of infectious diseases in the country. This includes the Ebola outbreak in 2014, the re-emergence of monkeypox in 2017 after 40 years without recording a case, annual Lassa fever outbreaks, among others (Dan-Nwafor et al., 2019; Simpson et al., 2020). These outbreaks have prompted the country to identify IPC as an important aspect of health systems strengthening and outbreak response. Since 2018, the Government of Nigeria through NCDC has made significant investment in the initiation and setting up of IPC structures, policies, programmes and frameworks, mainly in Lassa fever treatment centres and other public health facilities within the country. This was established through the development of IPC guidelines and training of Lassa fever treatment centre personnel on infection prevention and control practices as well as supply of IPC

materials including personal protective equipment (PPE) (Dan-Nwafor et al., 2019; Nigeria Centre for Disease Control, 2020d). However, it was not immediately clear if these structures could withstand the pressure associated with the COVID-19 pandemic, hence the need for an IPC assessment.

The purpose of this study is to describe the preparedness of health facilities in Nigeria, including those used as 'Lassa fever treatment centres', to safely manage suspected or confirmed COVID-19 patients early in the outbreak. The Lassa fever treatment centres were prioritised, given their capacity and experience in managing infectious disease cases. These facilities were expected to serve as the primary treatment locations for COVID-19 cases in the country. We assessed various aspects of IPC that are crucial in response to COVID-19. Findings can be used to inform prioritisation of actions and resource allocation aimed at improving IPC within the health facilities.

## Methods

### Study site, design and population

Nigeria is the most populous country in Africa with a population of over 200 million (World Bank, 2020). It is made up of 36 States and the Federal Capital Territory distributed across six geopolitical zones with a total of 774 Local Government Areas. Healthcare in Nigeria is delivered through orthodox and traditional means with orthodox care being provided by both public and private providers. These services are provided at three hierarchical levels: primary, secondary and tertiary (Adeyemo, 2005; Akande, 2004). The Nigeria Health Facility Registry estimates that there are 40,399 operational health facilities in Nigeria with 73% public and 27% private (Federal Ministry of Health, n.d.).

A cross sectional survey of health facilities in Nigeria was conducted between February and May 2020 to assess health facilities IPC preparedness for safely identifying and managing suspect and confirmed cases of COVID-19. This was done as a situational analysis to inform the IPC response activities. The study population comprised of health facilities in Nigeria and respondents were managers of health facilities or their representatives.

### Sampling technique and data collection

The health facilities were sampled by the snowball non-probability sampling technique, and the prospective respondents were reached by email and telephone using the WhatsApp messaging application. Respondents were then encouraged to use the snowball mechanism to recruit other Medical Directors (MDs), Chief Medical Directors and Managers of health facilities. The survey link was also shared widely among professional associations and state ministries of health through online and other established channels to ensure wider coverage amongst health facilities in Nigeria. The survey was designed to be completed by

managers of health facilities with each hospital only eligible to complete the form once.

The questionnaire used was a COVID-19 IPC readiness checklist that was adapted from the US Centers for Disease Control and Prevention (CDC) readiness checklist to suit the Nigerian context (US Centers for Disease Control and Prevention, 2020). The tool consisted of two broad sections – the first section described the participating health facilities while the second part described the administrative and operational aspect of the health facility regarding IPC readiness.

The first section included questions on the geopolitical location of the health facility, type of ownership (private vs public) with missionary hospitals being considered as private health facilities, level of care provided, whether the facility manages Lassa fever cases and if the facility was designated to handle COVID-19 cases or would transfer suspect cases to other designated treatment centres.

The administrative part assessed the existence of an IPC committee, availability of terms of reference and an IPC focal person among others while the operational aspect assessed staff training on IPC, availability of PPE and contingency plan for the restocking of PPE, provisions for alert and notification for the evacuation of suspected COVID-19 patients as well as systems for monitoring symptoms and tracking healthcare workers infection.

### Data analysis

Data from the online survey were downloaded from the Gather3 data collection platform, hosted on Linux server by eHealth Africa and cleaned and analysed with Microsoft Excel and STATA 15. Binary and categorical variables are presented as absolute and relative frequencies. We tested the null hypothesis that there is no difference in the preparedness of the public versus private health facilities and Lassa fever treatment centres versus non-Lassa fever treatment centres in the different aspects of IPC preparedness. These differences were assessed at a 5% level of significance with  $p < .05$  considered significant.

### Ethical considerations

Ethical approval for the study was granted by the Nigeria National Health Research Ethics Committee (NHREC/01/01/2007-24/08/2020). This survey was conducted as completely confidential and voluntary. Participants were identified with unique identifying information that was optional and generated by the participant (to provide feedback to the participants who desired feedback based on the assessment).

## Results

### Characteristics of participating health facilities

A total of 461 health facilities participated in the survey. The South West region of the country had the largest proportion

**Table 1.** Demographic characteristics of the respondents ( $N = 461$ ).

Characteristic	Number (%)
<b>Geopolitical zone</b>	
South West	216 (46.9)
North West	81 (17.6)
North Central	66 (14.3)
South South	53 (11.5)
South East	32 (6.9)
North East	13 (2.8)
<b>Ownership</b>	
Public	111 (24.1)
Private	350 (75.9)
<b>Type of health facility (public = 111)</b>	
Tertiary	50 (45.0)
Secondary	42 (37.8)
Primary	19 (17.2)
<b>Designated to manage COVID-19 cases</b>	
Yes	19 (4.1)
No	442 (95.9)
<b>Lassa fever treatment centre</b>	
Yes	24 (5.2)
No	437 (94.8)

(46.9%), and the North East region had the least proportion (2.8%) of respondents (Table 1). There was a total of 350 (75.9%) private and 111 (24.1%) public health facilities. The public health facilities included tertiary hospitals (45.0%), secondary hospitals (37.8%) and primary health facilities (17.2%). Only 19 (4.1%) health facilities were designated to manage COVID-19. Similarly, 24 (5.2%) of the health facilities reported being Lassa fever treatment centres.

### IPC programme preparedness

Table 2 shows preparedness regarding IPC personnel, work organisation and policies. Most of the public health facilities (69.7%) reported having an IPC focal point compared to the private facilities (32.3%). The difference in proportion was found to be statistically significant ( $p < .001$ , Table 2). A greater proportion of public than private health facilities reported having a functional IPC committee and focal points with terms of reference and workplans in place. In response to the availability of an updated IPC policy consistent with the NCDC or WHO COVID-19 IPC guidance, there was no difference between public and private health facilities with only 54.5% of public and 51.5% of private having updated their policy.

Further preparedness in terms of handling suspected and confirmed COVID-19 cases is as shown in Table 3. Table 3 shows that 51.5% of public and 53.5% of private health facilities had reviewed procedures for identifying and isolating suspected COVID-19 patients. Less than half of the public (39.4%) and private (29.8%) facilities had conducted staff training and positioned material and

**Table 2.** IPC programme preparedness among the health facilities in Nigeria during the early phase of COVID-19 response ( $N = 461$ ).

Variable	Public	Private	<i>p</i> -value
HF* has an IPC focal point	69 (69.7%)	117 (32.3%)	<.001
HF has an IPC committee with responsibility and due authority	65 (65.7%)	77 (21.3%)	<.001
Terms of reference available for the IPC focal persons	58 (58.6%)	86 (23.8%)	<.001
IPC focal point has a work plan on IPC activities	59 (59.6%)	97 (26.8%)	<.001
HF has an updated IPC policy consistent with the NCDC OR WHO COVID-19 IPC guidance	54 (54.5%)	187 (51.7%)	.610

**Table 3.** IPC practices preparedness among the health facilities in Nigeria during the early phase of COVID-19 response ( $n = 461$ ).

Variable	Public	Private	<i>p</i> -value
HF has reviewed procedures for identifying and isolating suspected COVID-19 cases	51 (51.5%)	194 (53.5%)	.714
HF has trained staff and equipment to implement the Screen-Isolate-Notify procedure in line with the NCDC or WHO COVID-19 guidance?	39 (39.4%)	108 (29.8%)	.071
HF has appropriately designated holding and isolation areas for suspected COVID-19 patients	38 (38.4%)	65 (18%)	<.001
HF has arrangements for the safe transport of a confirmed or suspected case of COVID-19 to a designated treatment centre	36 (41.9%)	102 (28.7%)	.003
HF has assessed the availability of personal protective equipment (PPE) and other IPC supplies	64 (64.6%)	244 (67.4%)	.606
HF has made contingency plans to provide sufficient PPEs as may be required	54 (54.5%)	193 (53.3%)	.828

HF = health facility.

equipment to implement the Screen-Isolate-Notify procedure in line with NCDC or WHO COVID-19 guidance. Similarly, more than half of the public and private health facilities assessed did not have appropriate designated holding and isolation areas for suspected COVID-19 cases. The majority of public (64.4%) and private (67.4%) health facilities had assessed their availability of PPE and other IPC supplies as well as having made contingency plans to provide sufficient PPE as may be required. From the health facilities that were not designated COVID-19 treatment centres ( $N = 442$ ), only 41.9% of public and 28.7% of private had planned for the safe transport of a confirmed or suspected case of COVID-19 to a designated treatment centre, with this difference being statistically significant.

Preparedness for communication, laboratory capacity, monitoring of and management of healthcare workers exposed to COVID-19 patients.

Finally, IPC preparedness was assessed in terms of communication, laboratory services, monitoring and management of healthcare workers with potential for exposure to COVID-19. Table 4 shows that 88.9% of public and 76.8% of private health facilities had contact details of the State Ministry of Health (MoH) and NCDC to contact when suspected COVID-19 cases are identified. However, less than half of the public (44.4%) and private (28.2%) had laboratory

expertise and equipment for specimen collection, storage and transport to the designated reference laboratory. In addition, fewer than half of the public (35.5%) and (42.8%) private facilities had reviewed policies and procedures for monitoring and managing potential exposure to COVID-19 by healthcare workers.

The data show that out of the 461 respondents, 24 (5.2%) were Lassa fever treatment centres. Table 5 shows the preparedness of these centres compared to the non-Lassa fever treatment centres. In terms of having an IPC focal point and committee that has the responsibility and due authority, over 90% of Lassa fever treatment centres had these in place compared to only 37% of non-treatment centres and these differences were statistically significant. However, on COVID-19 specific areas such as having appropriately designated holding and isolation areas for suspected COVID-19 patients (having trained staff and equipment to implement the Screen, Isolate, Notify procedures) there was no significant difference between Lassa fever treatment centres and non-treatment centres with less than have of either category being prepared in these areas.

## Discussion

This study assessed the IPC readiness of Nigerian healthcare facilities to deal with the COVID-19 pandemic in the early

**Table 4.** Laboratory and health worker monitoring preparedness among the health facilities in Nigeria during the early phase of COVID-19 response (n=461).

Variable	Public	Private	p-value
HF has contact details of State MoH and NCDC officials to contact when suspected COVID-19 patients are identified	88 (88.9%)	278 (76.8%)	.008
HF has laboratory expertise and equipment for specimen collection, storage and transport to designated reference laboratory	44 (44.4%)	102 (28.2%)	.002
HF has reviewed policies and procedures for monitoring and managing Healthcare workers with potential for exposure to COVID-19	35 (35.4%)	155 (42.8%)	.181

**Table 5.** IPC preparedness among the health facilities in Nigeria during the early phase of COVID-19 response (n=461) disaggregated by Lassa treatment status.

Variable	Lassa fever centres (n=24)	Non-Lassa fever centres (n=437)	p-value
HF has an IPC focal point	24 (100%)	162 (37%)	<.000
HF has an IPC committee with responsibility and due authority	22 (92%)	120 (27.5%)	<.000
HF has reviewed procedures for identifying and isolating suspected COVID-19 cases	11 (45.8%)	234 (53.5%)	.461
HF has trained staff and equipment to implement the Screen-Isolate-Notify procedure in line with the NCDC or WHO COVID-19 guidance?	10 (41.6%)	137 (31.4%)	.291
HF has appropriately designated holding and isolation areas for suspected COVID-19 patients	9 (37.5%)	94 (21.5%)	.067
HF has reviewed policies and procedures for monitoring and managing healthcare workers with the potential for exposure to COVID-19	11 (45.8%)	179 (41%)	.637

phase of the outbreak. Assessing the readiness of health facilities is a key element of outbreak preparedness, and initial capacity assessments are central to WHO guidelines for country-level response to COVID-19 (World Health Organization, 2020). Overall, public health facilities were better prepared than private health facilities, especially in the availability of a functional IPC programme, presence of an IPC focal point and an active IPC committee. With regards to IPC practices such as triaging, screening and notification of suspected cases as well as having trained staff and equipment to implement triaging, both public and health facilities were inadequately prepared.

Early identification and reporting of an epidemic are important to contain an infection and form the basis for subsequent IPC interventions. This study shows that many of the health facilities did not have the early identification systems such as the ability to screen patients for COVID-19, to isolate suspected cases and to notify the appropriate public health authorities. This lack of capacity posed a threat to the spread of COVID-19 cases within such facilities. Although 50% of the facilities reported an assessment of their PPE availability and the presence of a contingency plan, it is a source of concern

that nearly half of the health facilities have not carried out this critical process. The availability of PPE such as face masks is important in the control of transmission of the virus causing COVID-19 and a contingency plan is equally essential, given the anticipated global shortage of PPE in the global response (World Health Organization, 2020). A preparedness study done in 2014 to assess the preparedness of hospitals across several countries to manage Ebola virus disease found that Nigeria lacked both essential PPE and periodic training on the use of PPE (Tartari et al., 2015). The findings from this assessment indicate that the situation has not improved significantly. A less than 100% availability of PPE means that healthcare workers are likely to be exposed to infections. Juxtaposing this exposure risk to the finding that few facilities had reviewed policies and procedures for monitoring and managing healthcare workers with potential for exposure to COVID-19 implies that if healthcare workers get infected, there is no system in place to quickly identify them and further limit spread in both the hospital and community. A case series of early COVID-19 infections in Wuhan, China, reported that 29% of cases were healthcare workers who probably got infected in hospital (Wang et al., 2020). Data published by

NCDC on its open-source real-time electronic health surveillance database known as Surveillance, Outbreak Response Management and Analysis System show that 26%, 16% and 6% of confirmed cases in March, April and May respectively were healthcare workers ([Helmholtz Centre for Infection Research, 2020](#)).

Since 2017, NCDC has made significant efforts to control and respond to yearly Lassa fever outbreaks. This includes strengthening IPC in health facilities identified as Lassa fever treatment centres. This study found that apart from the IPC programme, such as the presence of an IPC focal point or IPC committee, both Lassa fever and non-Lassa fever treatment facilities did not have the required IPC practices for COVID-19 response. This finding was contrary to expectations that Lassa treatment centres should be better prepared to handle COVID-19 cases, given their involvement in the treatment of highly infectious viral haemorrhagic fever. Personnel in Lassa fever treatment centres have received training and institutional support to strengthen IPC in the last 4 years.

Our findings highlight the limited preparedness of health facilities in the early phase of the COVID-19 pandemic in Nigeria. It showed that health facilities did not have the infrastructural and policy guidelines to safely identify and manage suspected and confirmed cases of COVID-19 patients as well as to prevent SARS-CoV-2 infection among healthcare workers. It also revealed a gap in the implementation of IPC in the different levels of health service provision. The finding guided the National Public Health Institute (NCDC) in intensifying advocacy for IPC and actual prepositioning of IPC materials to support the health workers in the various hospitals. It also prompted the active distribution of available policy document and training of health workers on the IPC and use of PPEs ([Nigeria Centre for Disease Control, 2020a, 2020b](#)).

Given the urgent need to improve IPC as part of Nigeria's COVID-19 response, findings from this study were immediately used to develop interventions. The low level of IPC preparedness reported among the private health facilities within the country prompted a conversation with the Association of General and Private Medical Practitioners as well as the Guild of MDs who are representative groups of private healthcare practitioners in Nigeria. Following this engagement, private health facilities requested NCDC's support in organising general and COVID-19 specific training for health workers ([Nigeria Centre for Disease Control, 2020a](#)). Similarly, the response to the question on whether health facilities had contact details of the state MoH and NCDC officials who they could contact when suspected COVID-19 cases are identified, informed the subsequent strategy where these contact details were provided to all healthcare facilities for better coordination.

This study has methodological limitations that must be taken into consideration when interpreting the findings. There was a low response among public health facilities. However, the public health facilities that responded had all

the tiers of the health system represented and can be used as proxies of public health facilities although they may slightly differ in some characteristics. Moreover, a large proportion (10.9%) of the public health facilities that responded are the tertiary facilities that were also designated to manage COVID-19. Reasons for non-response are not known but we could probably attribute it to time factor and poor information and communication technology infrastructure especially in rural areas and in public health facilities. Since this was an online survey directed at heads of health facilities, there is a possibility of social desirability bias wherein the chief executives may want their facilities to appear compliant ([Larson, 2019](#)). This was mitigated by not including facility names in the data collected. A physical assessment would have been more appropriate but was deprioritized due to the physical distancing demands of the pandemic. Whereas the generalisability of the results is challenged by non-probability sampling, the findings of this assessment have provided a basis of IPC engagement with the public and private healthcare facilities in Nigeria.

In summary, we found that at the early phase of the pandemic, health facilities in the country had limited IPC capacity for COVID-19. Nevertheless, the pandemic provided an opportunity to strengthen crucial aspects of the health-care system that have been previously overlooked. These aspects include the IPC infrastructure and the formation of active IPC committees to provide much needed leadership. These improvements will likely prove to be valuable not only in the short-term response to COVID-19 but also in the fight against other infectious diseases and antimicrobial resistance.

## Conclusion

The level of IPC preparedness in healthcare facilities in Nigeria was generally low at the onset of the COVID-19 pandemic, especially in private health facilities. Major gaps identified were in the areas of triaging, trained personnel, equipment, PPEs and IPC governance. Health facilities that were providing treatment services of Lassa fever had higher levels of IPC programme structure but not IPC practices within healthcare settings. The NCDC will continue working with public and private health facilities to improve the capacity, leadership and governance for IPC.

## Acknowledgements

The authors wish to acknowledge the Nigeria Centre for Disease Control and all the participating health facilities for their support during the data collection and throughout the study.

## Authors' contributions

TO conceptualised the study; II and TO were involved in the data collection and field monitoring; JG, CDU and TO conducted the data analysis and interpretation; TO, SA, II, JG and CDU drafted the manuscript; BO, OI, TA, AH, JD, OA, JA, JO, CE, EI, PI and CO reviewed and revised the manuscript. CO and CI played supervisory roles. All authors approved the final version of the manuscript.

## Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

## Consent for publication


Not applicable.

## Availability of data and material

The data associated with this study is available from the corresponding author on reasonable request.

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