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Research Article

Reporting COVID-19 Cases through the Integrated Disease Surveillance and Response Network in the Southwestern State of Nigeria: A Health Facility Survey

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Abstract

Background: Rapid case detection of suspected COVID-19 cases and reporting to designated public health authorities for investigation and other public health actions are crucial in containing and ending the COVID-19 outbreak in Nigeria. In this study, we assessed the reporting practices of healthcare workers regarding COVID-19 cases through the Integrated Disease Surveillance Response (IDSR) structure and the predictive factors in the Southwest state of Nigeria. **Methods:** A cross-sectional study design was employed in recruiting one hundred and seventeen participants for the study in two Local Government Areas of Ondo State, Southwest Nigeria. Data were collected through interviewers' administered questionnaires to the respondents, capturing their socio-demographic characteristics, knowledge of COVID-19 surveillance, and Reporting practices of COVID-19 case reporting through the IDSR structure. The data were collected between May and June 2022 and then scrutinized for completeness and analysis using IBM SPSS version 23.0 statistical software. The 95% Confidence Interval (CI) and the computed p-value were used to determine the relationship between the dependent and independent variables. Hence, the p-value of <0.05 was considered statistically significant. **Results:** We assessed 117 healthcare workers who consented to participate in the study. Seventy-one (60.7%) of the respondents were from Akure South LGA while 39.3% were recruited from Owo LGA. The mean age ± standard deviation of respondents was 38.27±10.38 years with about one-quarter (39; 33.3%) of the respondents within the age group 30-39 years. Also, about half of the respondents were nurses/Midwives in addition to community health workers who represent 35.0% of the respondents. More than half of the respondents worked in tertiary (58; 49.6%) and primary health facilities (49; 41.9%). Two-thirds, 74 (63.2%) of the respondents had good and 43 (36.8%) had a fair/poor knowledge of COVID-19 case reporting while 51 (43.6%) of the respondents have good practices of reporting COVID-19. Having a good knowledge of COVID-19 surveillance and case reporting (AOR=2.61, 95% CI=1.070-6.371) and having attended COVID-19 surveillance training (AOR=2.87, 95% CI=1.093-7.241) were significant predictive factors to good COVID-19 case reporting practices among health care professionals. **Conclusion:** Our study found poor reporting practices of COVID-19 cases by a healthcare professional to public health authorities. Hence, we recommend regular training of healthcare professionals on COVID-19 case reporting through the IDSR strategy to enhance their knowledge of disease reporting and in addition, adequate provision of designated IDSR reporting tools to further improve the reporting practices of COVID-19 cases and other IDSR priority diseases among health care professionals.

Keywords: Healthcare worker; COVID-19 case reporting; IDSR strategy; Ondo State; Nigeria

Introduction

Coronavirus Disease (COVID-19) is a disease caused by the newly emerged coronavirus SARS-CoV-2 [1]. COVID-19 is a nationally notifiable disease and reporting cases to designated public health authorities in Nigeria by healthcare workers and providers is supported by a routine case notification system through the Integrated Diseases Surveillance and Response System (IDSR), as well as other resources such as the state COVID-19 emergency call center provided through the COVID-19 response [2,3].

Public health surveillance is one of the foundations for preventing and controlling the COVID-19 pandemic [1]. This is key to rapid case detection, which is crucial in containing and ending the COVID-19 pandemic worldwide [1]. Indeed, evidence suggests that COVID-19 transmission can be slowed or stopped through effective case detection, treatment, isolation and contact tracing [4].

In December 2019, the WHO initiated the COVID-19 surveillance system to detect the novel coronavirus in countries across the world and guided countries on the operationalization of COVID-19 surveillance depending on transmission scenarios [5]. These surveillance systems could be community-based, facility-based or event-based surveillance systems [5].

In Nigeria, surveillance for COVID-19 was implemented through the IDSR structure with community-based surveillance and health facility forming the operational base for the detection and reporting of suspected cases for testing and investigation [6].

The IDSR strategy was introduced in Nigeria in 2001 after being adopted by WHO African region member states. The IDSR strategy mandates all health care providers to have a high index of suspicion for designated notifiable diseases especially diseases with epidemic potentials using a nationally agreed surveillance case definition and report these cases as suspected cases to designated public health officials both informally (through phone calls immediately when detected) and formally (completing the designated IDSR forms immediately in addition to the case

investigation forms of the disease) [7]. Also, healthcare providers are mandated to routinely report notifiable diseases weekly and monthly using the designated IDSR 002 and IDSR 003 forms respectively [7].

Healthcare workers are present at the frontline in the fight against the highly infectious SARS-CoV-2 as they are the first contact with several suspected COVID-19 cases in their hospital [8,9]. To strengthen surveillance for COVID-19 in Nigeria, healthcare workers remain indispensable to effective reporting of suspected COVID-19 cases and referral for laboratory testing as they can detect unusual clinical manifestations and conditions using standard case definitions of COVID-19, clusters of illnesses through patient interviews and clinical judgments and even report suspected COVID-19 related deaths in the hospital settings [7]. Hence, their capacity to promptly identify, isolate, report and refer these suspected cases for laboratory testing using the COVID-19 case definition is crucial to effective control of the spread of the disease during the pandemic.

Previous outbreak reports in Nigeria have attributed failure in mandatory reporting of suspected cases of infectious diseases among healthcare workers to a lack of awareness of the existence of a surveillance network for notifiable diseases including poor knowledge of standard case definitions of notifiable diseases, the requirement for reporting, which diseases are notifiable, how, when and to whom reports should be done [7, 10].

This study seeks to assess the knowledge of healthcare workers of the COVID-19 case definition for case detection and reporting, the reporting process, and requirement in a southwest state of Nigeria.

Materials and Methods

Study Area

Nigeria is the most populous country in Africa, with an estimated population of over 160 million [11] and a growth rate of 3.8% per annum. The country has six geopolitical zones and is divided into 36 states and the federal capital territory and is further divided into 774 LGAs or districts and 8812 administrative wards [12]. Ondo State is one of the 36 states in the Federal Republic of Nigeria situated in the southwestern geopolitical zone of the country [13]. The state has 18 LGAs with three senatorial districts, including Ondo North, Central, and South with 2021 projected populations of about 5,521,833 based on the 2006 population census. The state has about 800 primary health facilities, 18 general hospitals, 6 tertiary health facilities, and several private health facilities located across all LGAs in the state [14].

Study Design, Sample Size Estimation and Sampling Method

The research design of this study is a descriptive cross-sectional study of healthcare workers in all government-owned and private hospitals in the two LGAs in Ondo State and was conducted following the procedure used by Isere et al, [8]. In this study, healthcare workers are defined as all paid and unpaid persons serving in the settings and have the potential for direct or indirect exposure to patients or their infectious secretions and materials (e.g., doctors, nurses, medical laboratory scientists, maintenance staff, clinical, volunteers, etc.) [3]. Study participants were selected using a multi-stage sampling technique. First, the list of all LGAs in the state was obtained from the state public health authorities with two LGAs (Akure South and Owo) randomly selected by balloting. Secondly, the list of all government and privately-owned hospitals was obtained from the district primary health care department from which the study participants were selected. The study population included clinical members of staff, namely medical doctors, nurses, midwives, Community Health Officers, Community Health Extension Workers, pharmacists, and medical laboratory technologists.

The study participants recruited were clinical staff who were employees of the health facility for at least 6 months before May 2022 and who gave their consent to participate in the study. For each health facility visited during the study, a list of all clinical staff on the duty roster was obtained. Then, one clinical healthcare worker was selected randomly by balloting and interviewed using a semi-structured questionnaire. However, at the tertiary health facilities with several clinical departments such as the community medicine department, and infectious disease department, one clinician or clinical staff was recruited each from these departments. To determine the sample size of the study, Fisher's formula [15] for estimating single proportions and estimation for minimum sample size was applied, and the estimated sample size was 73. Fisher's formula: $n=Z^2\ P\ (1-P)/d^2$; where: n=sample size, Z=standard deviation for a 95% confidence level (Z=1.96), and p=prevalence of the attribute which was obtained from Umeozuru, et al. [16] where 5% of health care workers reported at least one suspected COVID-19 case on an e-IDSR platform in FCT, Nigeria; while d = acceptable difference (if 5%, d=0.05); q=1- p.

Data Collection and Analysis

Data were collected using an interviewer-administered questionnaire that captured information on socio-demographic variables, knowledge of COVID-19 surveillance and case reporting practice of COVID-19 vis-à-vis IDSR in the healthcare setting. Research assistants were recruited, trained, and deployed to the field for data collection between May and June 2022. Data were

analyzed using IBM SPSS version 23.0 statistical software and were summarized using mean and standard deviation for continuous variables, frequencies, and percentages for categorical variables. A score of 1 was allocated to the correct answer by respondents for each of the 19 knowledge questions, with a total of 19 maximum scores expected to be attained by the respondents while a score of 0 was allocated to a wrong response from a respondent. An average of the total knowledge score was determined. Respondents with a score below 10 points were categorized as having poor knowledge while those with points between 10 and 14 were categorized as having fair knowledge and those with a score ≥15 were categorized as having good knowledge. Likewise, a score of "1" was allocated to the correct practice by respondents for each of the six questions on the practice of COVID-19 case reporting with a total of 6 maximum points expected to be attained by the respondents while a score of 0 was allocated to a wrong practice by a respondent. An average of the total practice score was determined, respondents with scores ≤3 points categorized as having poor practice of COVID-19 case reporting, while those with points > 3 were categorized as having good practice in the bivariate test with a p-value of <0.05.

Ethical approval

The study was conducted as part of an outbreak investigation and control hence permission to conduct the study was obtained from the State Ministry of Health (SMoH) and the district (LGA) primary Health Care Department. Informed consent was obtained from the respondents. They were made to understand that participation is voluntary and there was no consequence for non-participation. All information obtained was kept confidential.

Results

A total of 120 eligible participants were approached for the studies with 117 consenting to participate and were interviewed in the two selected LGAs with a response rate of (98%). Seventy-one (60.7%) of the respondents were from Akure South LGA while 39.3% were recruited from Owo LGA. The mean age ± standard deviation of respondents was 38.27±10.38 years with about one-quarter (39; 33.3%) of the respondents within the age group 30-39 years. Also, about half of the respondents were nurses/Midwives in addition to community health workers who represent 35.0% of the respondents. More than half of the respondents worked in tertiary (58; 49.6%) and primary health facilities (49; 41.9%). Most (95.7%) of the respondents had a tertiary level of education, and 38 (32.5%) had less than 5 years of experience as a healthcare provider (Table 1).

	Frequency	Percentage
LGA		
Akure south	71	60.7
Owo	46	39.3
Gender		
Male	24	20.5
Female	93	79.5
Age in years		
20-29	25	21.4
30-39	39	33.3
40-49	34	29.1
50-59	13	11.1
≥60	6	5.1
Profession		
Consultant	2	1.7
Medical Officer	15	12.8
Nurse/Midwife	58	49.5

*CHO	7	6.0
*CHEW	35	29.9
Type of Health Facility where respondents were recruited		
Primary	49	41.9
Secondary	10	8.5
Tertiary	58	49.6
Ownership of the Health facility where respondents were recruited		
Government	60	51.3
Private	57	48.7
Level of education		
Pre-tertiary	5	3.9
Tertiary	112	95.7
Years of experience as health worker		
< 5	38	32.5
5-10	39	33.3
11-15	14	12.0
>15	26	22.2
*CHO: Community Health Officers; CHEW: Community Health Extension Workers		

Table 1: Socio-demographic characteristics of respondents N=117.

Knowledge of COVID-19 surveillance and case reporting among Health care workers May to June 2022

Table 2 shows respondents'' knowledge about COVID-19 case reporting. Following an assessment of their knowledge about reporting COVID-19, all respondents (117; 100%) have heard about COVID-19 and knew its causative agent to be a virus. A high proportion of the respondents knew the following components of the COVID-19 surveillance case definition which include any person; with fever and difficulty in breathing (116; 99.1%), with cough, loss of smell and taste (100; 85.5%), exposed to a health facility where COVID-19 has been reported (102; 87.2%), and with travel history to a high-risk location and having a headache, body pains, sore throat and shortness of breath (114; 97.4%). Most (116; 99.1%) of the respondents knew that a suspected case of COVID-19 should be reported immediately (116; 99.1%). About less than one-quarter (30; 25.6%) knew that a suspected case of COVID-19 should be reported to the district DSNO. On aggregate, two-thirds, 74(63.2%) of the respondents had good and 43 (36.8%) had a fair/poor knowledge of COVID-19 case reporting.

	Yes n (%)	No n (%)
Ever heard about COVID-19		
Yes	117 (100.0)	0 (0.0)
No	0	0.0
Causative agent of COVID-19		
Virus	117 (100.0)	0 (0.0)
Bacteria	0(0.0)	117 (100.0)
Fungi	0(0.0)	117 (100.0)
Which should be reported as a COVID-19 case	**True**	**False**
Any person with a fever and difficulty breathing	116 (99.1)	1 (0.9)
Any person with cough, loss of smell and taste	100 (85.5)	17 (14.5)
Any person with a cough and close contact with a confirmed case of COVID-19	114 (97.4)	3 (2.6)
Any person exposed to a health facility where COVID-19 has been reported	102 (87.2)	15 (12.8)
Any person with diabetes	13 (11.1)	104 (88.9)
Any person without a travel history to an area with COVID-19 transmission and having a high fever	61 (52.1)	56 (47.9)
Any person with a travel history to a high-risk location, having a headache, body pains, sore throat and shortness of breath	114 (97.4)	3 (2.6)
Any person with a history of fever in the last 2 weeks with chills, body pain, headache	77 (65.8)	40 (34.2)
Any health worker with respiratory illness and with recent contact with a patient with travel history/respiratory symptoms	109 (93.2)	8 (6.8)
Any person with hypertension and heart disease	14 (12.0)	103 (88.0)
Any person with pneumonia	22 (18.8)	95 (81.2)
Any recorded death in the health facility	9 (7.7)	108 (92.3)
Any person with renal disorder	11 (9.4)	106 (90.6)
Any person with malaria	21 (17.9)	96 (82.1)
Any person without symptoms but who had contact with a confirmed case	71 (60.7)	46 (39.3)
When should a suspected case of COVID-19 be reported		
Immediately	116 (99.1)	1 (0.9)
Within 14 days	1 (0.9)	100 (99.1)
Who should you report a suspected case of COVID-19		
DSNO	30 (25.6)	87 (74.4)
NCDC	80 (68.4)	37 (31.6)
*Others	7 (6.0)	110 (94.0)
*State surveillance team, State Ministry of Health, Referral Treatment Officers, Lab officers		

Table 2: Knowledge of COVID-19 case reporting among respondents N=117.

Practices of reporting COVID-19 and other notifiable diseases among Health care workers from May to June, 2022

In Table 3, 95 (81.2%) of the respondents reported to have received formal training on COVID-19 surveillance, with 82 (86.3%) respondents reporting to have received such training either virtually or physically. Ninety-nine (84.6%) of the respondents had the COVID-19 case definition chart/posters displayed at their health facility as a job aid to guide case detection and reporting. A majority (85; 72.6%) said they report notifiable diseases including COVID-19 cases by phone call and then complete the designated IDSR forms. A high proportion (109; 93.2%) of respondents reported that they report notifiable infectious diseases like COVID-19 immediately. About two-thirds (81; 69.2%) of the respondents did not have blank copies of the IDSR forms at the time of this assessment and 82 (70.1%) have completed IDSR forms at the health facility at the time of this assessment. Thirty-nine (33.3%) of the respondents have suspected at least one case of COVID-19 in the last two months.

Regarding the use of the OPD register for case detection and reporting of notifiable diseases, 111 (94.9%) of the respondents had an OPD register at their health facility, 37 (33.3%) had reviewed the register for active case surveillance and case finding, 9 (23.3%) reported that they identified suspected cases of COVID-19 from their reviews, and 8 (7.2%) reviewed the OPD register in the last 24 hours. In general, 51 (43.6%) of the respondents have good practices reporting COVID-19.

	Frequency	Percentage
Ever had any training on COVID-19 surveillance		
Yes	95	81.2
No	22	18.8
Type of COVID-19 training attended		
Discussion with Colleagues	5	5.3
On the job	8	8.4
Formal training (Virtual or Physical)	82	86.3
Are COVID-19 surveillance case definition charts/posters displayed at the health facility as job aid for case reporting		
Yes	99	84.6
No	18	15.4
How are notifiable diseases reported in the clinic?		
Wait for the visitation of the surveillance officer	1	0.9
Report using IDSR forms only	31	26.5
A phone call to the designated officer and then complete the IDSR forms if available	85	72.6
How often are epidemic-prone notifiable diseases such as COVID-19 reported in the health facility?		
Immediately when seen	109	93.2
Weekly	5	4.3
Monthly	1	0.9
None reporting	2	1.7
Type of blank copies of IDSR forms available in the health facility		
IDSR 001 A	6	5.1
IDSR 001B	2	1.7

IDSR 001C	7	6.0
IDSR 002	2	1.7
All forms above	19	16.3
None of the IDSR forms	81	69.2
Are there completed copies of IDSR forms in the health facility for the past 12 months?		
Yes	35	29.9
No	82	70.1
Types of IDSR forms completed	**N=35**	
IDSR 001 A	9	25.7
IDSR 001 B	0	0.0
IDSR 001 C	0	0.0
IDSR 002	10	28.5
IDSR 003	3	8.5
IDSR 002 and 003	13	37.1
All the forms above	0	0.0
Have you suspected at least one case of COVID-19 using the COVID-19 case definition in the last two months prior to the study?		
Yes	39	33.3
No	78	66.7
Have OPD or inpatient register at the health facility		
Yes	111	94.9
No	6	5.1
Ever reviewed OPD or inpatients register for active surveillance of COVID-19 cases in the last two months? (N= 111)		
Yes	37	33.3
No	74	66.7
Was a suspected case of COVID-19 found in the register reviewed at the health facility for the last two months prior to the study?	N=37	
Yes	9	23.3
No	28	75.7
When last was the clinic patient register reviewed for the detection of suspected cases of COVID-19 in the last two months prior to the study? (N=111)		
Last 24 hours	8	7.2
2- 7 days ago	20	18.0
More than a week	9	8.1
Never reviewed	74	66.7

Table 3: Practices of reporting COVID-19 and other notifiable diseases among respondents.

Factors influencing reporting of COVID-19 Cases among Respondents

Table 4 shows both bivariate and multivariate or logistic regression analysis of factors affecting the practice of reporting COVID-19 cases. On the bivariate analysis, factors such as gender, professional, ownership of health facility, knowledge of COVID-19 case reporting and training of respondents on COVID-19 surveillance and case reporting significantly influence reporting COVID-19 cases, while only knowledge of COVID-19 case reporting and trainings of respondents on COVID-19 case reporting significantly influenced practice of reporting in the logistic regression analysis. A higher proportion (62.5%) of males had good practice compared to 38.7% of the females (p=0.036, adjusted odds ratio=1.91). More (57.1%) of the personnel that was non-clinicians had good practices of reporting COVID-19 cases compared to the clinicians (36.0%) (p=0.027, adjusted odds ratio=1.56). A higher proportion (56.7%) of participants from government-owned health facilities had good practices of reporting cases compared to those from private health facilities (p=0.003, adjusted odds ratio=2.22). Respondents who had good knowledge of COVID-19 case reporting had higher good practice of reporting compared to those with poor knowledge (p= 0.003, adjusted odds ratio=2.61) while a higher proportion of respondents (58.9%) who had received training on COVID-19 case reporting and surveillance had good COVID-19 case reporting practice compared to the respondents who had not received trainings (45.5%) (p=0.004, adjusted odds ratio=2.87).

	Practice of COVID-19 case reporting		Total	p-value	Unadjusted odds ratio	adjusted odds ratio	95% CI
	Good	Poor					
+Gender							
Male	15 (62.5)	9 (37.5)	24	0.036	2.64	1.91	0.688-5.286
*Female	36 (38.7)	57 (61.3)	93				
Age in years							
< 40	27 (42.2)	37 (57.8)	64	0.737	1.13		
≥ 40	24 (45.3)	29 (54.7)	53				
+Profession							
Other Clinical Staff	24 (57.1)	18 (42.9)	42	0.027	2.37	1.56	0. 637-4.308
*Physicians	27 (36.0)	48 (64.0)	75				
Educational status							
Tertiary	49 (43.8)	63 (56.2)	112	0.869	1.17		
Lower than tertiary	2 (40.0)	3 (60.0)	5				
Years of experience							
≤ 10	34 (44.2)	43 (55.8)	77	0.864	1.07		
> 10	17 (42.5)	23 (57.5)	46				
+Type of health facility							
Primary	26 (53.1)	23 (46.9)	49	0.193	2.60	1.01	0.176-5.808
Tertiary	22 (37.9)	36 (62.1)	58		1.42	1.09	0.379-3.116
*Secondary	3 (30.0)	7 (70.0)	10				

+Ownership of health facility							
Government	34 (56.7)	26 (43.3)	60	0.003	3.05	2.22	0.753-6.514
*Private	17 (29.8)	40 (70.2)	57				
+Knowledge of COVID-19 case reporting							
Good	40 (54.1)	34 (45.9)	74	0.003	3.39	2.61	1.070-6.371
*Poor	11 (25.6)	32 (74.4)	43				
+Received any training on COVID-19 surveillance							
Yes	56 (58.9)	39 (41.1)	95	0.004	3.82	2.87	1.093-7.241
*No	10 (45.5)	12 (54.5)	22				

*Reference category in the logistic regression model; + Variables significant at <0.2 in the bivariate analysis, and included in the logistic regression model

Table 4: Factors influencing reporting of COVID-19 cases among respondents.

Respondents with good knowledge of COVID-19 case reporting were two times more likely to report COVID-19 cases compared to those with poor knowledge (adjusted odds ratio= 2.61, 95% CI= 1.070-6.371) likewise respondents who had been trained on COVID-19 surveillance and case reporting compared to the respondents who had not been trained (adjusted odds ratio= 2.87, 95% CI= 1.093-7.241).

Discussion

The findings from our study, where we reported a higher proportion of female respondents compared to males are consistent with previous studies in Nigeria and other African countries. Chimsimbe et al [17] in their study on an evaluation of the notifiable disease surveillance system in the Chegutu district, Zimbabwe, 2022: a cross-sectional study reported that of the 46 respondents, 83% were females. Similarly, Fatiregun, et al [18] and Isere et al [8] have reported a higher proportion of female respondents respectively in their separate studies among the healthcare workforce in Ondo state, Nigeria. This is likely to reflect the differential roles of gender in the health profession (Fatiregun et al [18] and Isere et al [8]. Most of the respondents were nurses, midwives, community health workers and were less than 50 years of age, a finding that is consistent with Fatiregun et al. [18] who have implemented a health facility survey previously in Ondo state, Nigeria.

Furthermore, our study found two-thirds of healthcare workers who participated in the study had good knowledge of COVID-19 case reporting with a very high proportion of the respondents having good knowledge of each component of the COVID-19 surveillance case definition for detecting and reporting COVID-19 cases to designated public health authorities for prompt public health action. This finding is consistent with Emmanuel et al [19] in a similar study in a neighboring state in Nigeria which reported that 98.3% of health workers evaluated had good knowledge of surveillance case definition and case reporting for COVID-19.

The high proportion of respondents with good knowledge of COVID-19 case reporting in this study could be attributed to the several trainings the respondents have had during the COVID-19 outbreak. Most of the respondents (81.2%) in the study reported that they have had at least one training on COVID-19 surveillance and case reporting. However, a key concern is the outcome of respondents in this study highlighting that COVID-19 cases detected in the health facility should be reported directly to the national disease surveillance coordinating agency (The Nigeria Centre for Disease Control). This might have been wrongly communicated during the COVID-19 outbreak training as there were instances where emergency toll-free numbers were provided to the public to call the NCDC directly for members of the public experiencing COVID-19-related symptoms as a form of participatory surveillance to strengthen case detection during the pandemic. After receiving such a report, the NCDC follows up with the State and Local Government Area (LGA) surveillance team for proper investigation and public health action [20]. However, in line with IDSR strategy implementation in Nigeria, all healthcare workers are mandated to report notifiable diseases including COVID-19 cases to designated LGA surveillance authorities who investigate the cases and report to state surveillance officials for

onward reporting to the NCDC [2, 7]. This could be corrected through subsequent training of healthcare workers on surveillance for COVID-19 or through other IDSR training platforms.

In addition, the proportion of respondents reporting good knowledge of COVID-19 case reporting notwithstanding, the practice of COVID-19 case reporting using the case definition was suboptimal among our respondents. Previous studies have documented poor disease-reporting practices among healthcare professionals in Nigeria [21-23]. Lafond et al [20] in their study reported that only two-thirds of physicians assessed on notifiable diseases had reported a notifiable disease prior to their study.

Similarly, Iwu et al [23] in their study on assessment of disease reporting among health care workers in a southeastern state, Nigeria reported that only 26% of their respondents had ever reported a notifiable disease to designated Public Health authorities. Also, Emmanuel et al [19] found in their study on.

More studies have reported poor reporting practices of notifiable diseases among healthcare professionals in Nigeria [19, 23,24]. Several reasons documented in the literature for the poor disease reporting practices among health care professionals such as unavailability of IDSR reporting tools, lack of training on COVID-19 surveillance and other surveillance-related procedures, poor knowledge of disease surveillance case definition and reporting procedures might also be attributed to the findings in our study [24]. Our study found a significant proportion of health professionals lacking IDSR and other surveillance reporting tools for reporting COVID-19 and other notifiable diseases. Also, a good proportion of our respondents reported not having had training on COVID-19 surveillance and case reporting and lacked understanding of the stipulated IDSR reporting procedure [2,7].

Furthermore, our study found that having a good knowledge of COVID-19 surveillance and case reporting and having attended COVID-19 surveillance training were significant predictive factors to good COVID-19 case reporting practices among healthcare professionals. This finding is consistent with previous studies, which have assessed reporting practices of healthcare workers of designated notifiable diseases in Nigeria [20, 25-26]. Dairo, et al [26] from their study on reporting epidemic-prone diseases in a neighboring southwest state of Nigeria reported training of health care professionals on surveillance and reporting (OR=7.92; CI=1.65-37.92) and knowledge of surveillance dataflow and procedure (OR=4.80; CI=1.64-14.10) as key predictors of good reporting practice of epidemic-prone diseases among health care workers.

The implication of our finding of poor COVID-19 case reporting practices among healthcare workers on the ongoing COVID-19 outbreak response is that several potential COVID-19 cases will be unreported for investigation and documentation by public health authorities with the true picture of the COVID-19 incidence not ascertained thereby misguiding policy makers in decision making with respect to making policy that will be impactful in the control of COVID-19 in Nigeria.

Limitations of the Study

The study has the following limitations. Firstly, there may be an information bias given that some aspects of the collected data were self-reported. In addition, social desirability bias might have occurred in some instances because healthcare workers may respond to interview questions in a way that they believe is socially acceptable rather than being completely accurate. However, probing questions were asked to ensure correct responses where possible. Secondly, poor documentation and archiving of data and information at the healthcare facilities were also observed during the data review and lastly, this study is a cross-sectional study therefore temporal relationship could not be established.

Conclusion

Rapid detection of COVID-19 cases using the surveillance case definition and immediate reporting to designated public health authorities by health care professionals for further investigation and public health action is key to ending the ongoing COVID-19 outbreak in Nigeria. However, our study found poor reporting practices of COVID-19 cases by healthcare professionals to public health authorities with having good knowledge of COVID-19 surveillance and having been trained on COVID-19 case reporting as predictive factors enhancing good COVID-19 case reporting practices among healthcare professionals.

Hence, we recommend regular training of healthcare professionals on COVID-19 case reporting through the IDSR strategy to enhance their knowledge of disease reporting and in addition, adequate provision of designated IDSR reporting tools to further improve the reporting practices of COVID-19 cases and other IDSR priority diseases among health care professionals.

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Declaration of Competing Interest

The authors declare that they have no competing interest in the conduct and publication of this work.

Ethical Approval

The study was conducted as part of an outbreak investigation and control hence permission to conduct the study was obtained from the State Ministry of Health (SMoH) and the district

(LGA) primary Health Care Department. Informed consent was obtained from the respondents. They were made to understand that participation is voluntary and there was no consequence for non-participation. All information obtained was kept confidential.

Authors' Contributions

Author EEI conceived the study and statistical analysis plan. Authors EEI, MTO, SF, AMA, TOO, GTM, NEO and AEA supervised the data collection process, statistical analysis and drafted the first draft of the manuscript. All authors contributed to the writing and approval of the final manuscript.

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