Knowledge of Disease Surveillance and Notification System and its Practice Among Health Practitioners in Private Health Institutions in Rivers State, Nigeria.

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Abstract

The practice of disease reporting by health practitioners in private institutions is very poor. This study examined the knowledge and practice of disease notification among private health practitioners in Rivers State, Nigeria. A descriptive cross-sectional design was utilized on a cluster sample of 162 health practitioners recruited from 132 private health facilities in Rivers State, Nigeria. Data was collected on socio-demography, knowledge of Disease Surveillance and Notification System, diseases notification and its associated challenges. Descriptive and inferential statistics was done using IBM SPSS 25 software. $\chi 2$ test and binary logistic regression analysis were used to test for associations and predictors of ever reporting at $p < 0.05$. Majority of the respondents were doctors (62.3%). About 84.0% have good knowledge of DSNS and 28.4% have ever reported, less than one-third used the appropriate tool. Factors associated with ever reporting were location ($p = 0.007$) or having a staff designated for reporting ($p < 0.001$), respondent's qualification ($p = 0.011$), having previously been trained on DSNS' ($p < 0.001$). Predictors were MBBS degree (aOR = 13.837; 95% CI = 1.130 - 169.396), having no designated staff for reporting (aOR = 0.146; 95% CI = 0.023 – 0.938), and no previous training on DSNS (aOR = 0.044; 95% CI = 0.004 – 0.526).

Knowledge of DSNS was high and its practice poor among health practitioners in private facilities in Rivers State. Having an MBBS degree, trainings on DSNS and having a designated staff for reporting were predictors of ever reporting.

Keywords: *Disease Surveillance and Notification System, Diseases notification, Surveillance, Knowledge, Practice, Private health facilities, Rivers State*.

Introduction

Disease surveillance and notification system (DSNS) is an effective and efficient tool for early detection of infectious disease outbreaks and timely interventions to interrupt disease transmission.[1-3] An effective and efficient DSNS requires the timely and accurate reporting of suspected and diagnosed cases of diseases. This is necessary for deployment of prevention and control measures to disrupt disease spread and consequently minimize the impact of the disease in terms of its morbidity and the reporting of diseases internationally is regulated by WHO based on the International Health Regulation (IHR) first published in 1969. Initially the IHR listed for notification, diseases which are likely to spread across international borders and require the application of prevention and control measures in such ways that will exert minimal interference on international travel and trade.[6] Currently, however, the emergence of diseases of Public Health Emergency of International Concern (PHEIC) are also required to be timely notified by member nations to WHO for response and action under the IHR (2005).

mortality.[2,4,5]

The reporting of diseases was un-coordinated, ineffective, and inefficient in Nigeria and other Low- and Medium-Income Countries (LMICs). This was because of the parallel vertical disease control programs and reporting system adopted by program managers.[7] A coordinated approach to reporting of disease however began in Nigeria in 1988 following the yellow fever epidemic and by 2005, the Federal Ministry of Health (FMOH) adopted the strategy for the implementation of IHR by WHO African Regional Office: The Integrated Disease Surveillance and Response (IDSR).[8]

The IDSR classified 42 notifiable diseases into three categories, epidemic prone diseases e.g. yellow fever, Cerebrospinal meningitis, Cholera, etc. for immediate reporting; diseases targeted for eradication or elimination e.g. poliomyelitis, lymphatic filariasis, Neonatal tetanus, etc. for weekly reporting, and other diseases of public health importance for routine monthly reporting e.g. Malaria, HIV/AIDS, STI, Pneumonia in under-fives, etc.[1,2,7,9,10]

On the IDSR system, suspected and detected cases within the communities are reported by the doctor or healthcare provider in the facility to the IDSR focal person for the facility, who reports to the Disease Surveillance and Notification Officer (DSNO) at the Local Government Health Department.[11] All reported cases within the Local Government Area (LGA) are collated, analyzed and reported by the Medical Officer of Health (MOH) to the Epidemiology Unit of the State Ministry of Health (SMOH) who similarly collates, analyses the data from the entire State and reports same to the Federal Ministry of Health (Epidemiology and Planning Research and Statistics Unit) who further analyses, responds and transmits the report to the WHO.[1,5,11] The flow of information in the IDSR system is carried out using appropriate data collection tools: Forms IDSR 001, IDSR 002 and IDSR 003, for immediate, weekly and routine reporting respectively.[8]

The doctor or healthcare provider who is a 'disease detective' and the first contact of the patient with the health system, plays a pivotal role in the reporting of notifiable diseases from the communities.[2] The doctor detects notifiable diseases using case definitions or signs and symptoms and plays a key role in the management of reported cases.[2,10] Therefore, their proper knowledge of disease notification, its processes and importance, availability of reporting tools and where to report incidences of diseases are important for the timely prevention and control of notifiable diseases.

Healthcare providers in private settings provide primary care services including treatment of communicable diseases, to sizeable proportion of population in Nigeria. Their services meet more than 50 – 80% of healthcare needs of the population.[3] In most developing countries their contributions to the national health information management system are poor. This leads to gross underestimation and under-representation of the country's disease burdens. Although healthcare providers in private facilities attend to a very large chunk of the patients in the country, they are usually excluded from most of the training programs organized for their counterparts in public health facilities.[3,4,5,9]

The knowledge and reporting of notifiable diseases among private healthcare workers in Nigeria is still low even though the awareness is high.[1] For instance, a study done in Enugu State Nigeria found that 25% of private healthcare providers knew of the reporting tools and less than 30% of them reported notifiable disease.[4] Similarly another study among physicians in a tertiary health facility in Nigeria reported a low level of knowledge (14.2%)

and practice (5.8%) of disease notification.[12] Research on disease surveillance and notification commonly focuses on healthcare workers in public health institutions therefore, this study aims at assessing the knowledge of disease surveillance and notification system and practice of disease reporting among healthcare providers in private settings in Rivers State Nigeria.

Methodology

Study area

This study was carried out in Rivers State, one of the 36 States in Nigeria. It is in the southern part of the country and is comprised of 23 Local Government Areas (LGA), three of which are urban. The State has a population growth rate of 3.4% and a current estimated population of 8,280,753 people based on the projected population of 2016.[13] These people receive healthcare services from 407 public health facilities consisting of 384 primary level, 18 secondary level and 5 tertiary level healthcare services; 147 private health facilities registered and licensed to provide medical services in the State; and unorthodox traditional methods.[14]

Majority of these privately owned health facilities are run by a single proprietor who is usually a medical doctor providing only primary care medical services. However, a few are polyclinics providing both primary and secondary care services. Each LGA has a Medical Officer of Health (MOH) and one or more Disease Surveillance and Notification Officers (DSNO) responsible for the investigation, collection of samples and collation of all cases of notifiable diseases reported within the LGA.

Study design

A descriptive cross-sectional study was employed for this study.

Study Population

Respondents were medical doctors and other healthcare workers designated to report notifiable diseases in private health facilities in Rivers State.

Sampling / data collection: A cluster sampling method was used to select respondents in private health facilities registered with the Rivers State Ministry of Health. Only 132 private clinics were accessed between April and August 2022 out of a total of 147 on the list of Hospitals/Clinics registered with the Ministry of Health in Rivers State Nigeria. It was difficult to access the remaining fifteen hospital/clinics because they were either non-functional or their medical directors could not be reached after three attempts. Data were collected using a validated interviewer administered survey questionnaire. Respondents provided information on their socio-demography, knowledge, and practice of DSNS as well as challenges experienced in reporting suspected or diagnosed case of notifiable diseases.

Data analysis: All collected information were collated, cleaned, and analyzed using SPSS IBM version 25. The data were presented on frequency tables. A knowledge score which ranged from 1 - 25 was generated from the set of 25 questions on knowledge. Respondents who scored 12.5 points and above were rated as having good knowledge while those below as having poor knowledge. Practice of reporting was assessed as the proportion of respondents who have reported a suspected or diagnosed case of notifiable disease using any of the reporting tool and means of reporting a disease in the last three months. The Chi square (χ^2) test was used to assess the factors associated with reporting of notifiable diseases and binary logistic regression analysis was done to assess predictors of practice of disease reporting. Level of statistical significance was set at $P < 0.05$.

Ethical clearance

This was obtained from the Rivers State Health Research Ethics Committee of Rivers State Hospitals Management Board. A written informed consent was obtained from each respondent after explaining to them in details the nature of the study and assuring them of the confidentiality of information obtained from them.

Results

A total of 162 healthcare workers were interviewed from 132 private hospitals/clinics accessed in this study.

Table 1: Sociodemographic characteristics of respondents

Variables	Frequency (n=162)	%
Location of facility		
Urban	122	75.3
Rural	40	24.7
Age of respondents		
20-29	19	11.7
30-39	77	47.5

40-49	37	22.8
50-59	12	7.4
60 and above	17	10.5
Sex		
Male	83	51.2
Female	79	48.8
Level of education		
Primary	6	3.7
Secondary	12	7.4
Tertiary	90	55.6
Postgraduate	54	33.3
Profession		
Medical doctor	101	62.3
Med Lab Sci	9	5.6
Nurse	20	12.3
Physiotherapy	12	7.4
CHO/CHEW	6	3.7
Auxiliary nurse	7	4.3
Medical Record Officer	7	4.2
Years of work experience		
1-5	82	50.6
6-10	43	26.5
11-15	12	7.4
16-20	6	3.7
21 and above	19	11.7

n = sample size

Almost half of the respondents (n = 77; 47.5%) were aged 30 -39 years. More than half have tertiary level of education (n = 90; 55.6%) and medical doctors were 101 (62.3%). Approximately half (n = 82; 50.6%) have practiced for a period of 1 – 5 years. Three-quarter of the respondents (n = 122; 75.3%) practice in urban area. (Table 1)

Table 2: Knowledge of Disease Surveillance and Notification System (DSNS)

Variables	**Freq (n=162)**	**%**
Awareness of DSNS		
Yes	144	88.9
No	12	7.4
Not sure	6	3.7
Knowledge of DSNS		
Notifiable diseases are a list of diseases whose occurrence must be reported to the government or its health agencies	149	92.0
Disease notification involves the reporting of diagnosed or suspected cases of infectious diseases	134	82.7
Reporting of diagnosed or suspected case of infectious disease can be done daily, weekly or monthly?	124	76.5
The reporting of disease can be done via a telephone call or manually using designated forms	115	71.0
Diagnosed or suspected cases of disease in a health facility is reported to the DSNO	72	44.4
Knowledge of reporting forms		
I have seen the different forms for reporting of notifiable diseases	42	25.9
I know how to use the different types of reporting forms (n = 42)	29	69.0
Knowledge of the use of reporting forms (n =29)		
IDSR 002 form is used for weekly reporting	17	58.6
IDSR 001 form is used for immediate reporting	21	72.4
IDSR 003 form is used for monthly reporting?	18	62.1
Classification of knowledge of DSNS		
Good knowledge	136	84.0
Poor Knowledge	26	16.0

Freq = frequency, n = sample size

More than four-fifth (n = 144; 88.9%) of the respondents have the awareness of DSNS and 136 (84.0%) have good knowledge. However, only one-quarter of them (n = 42; 25.9%) have seen the tools for notification of diseases. Out of these 29 (69.0%) knew how to use it and more than half correctly knew when to use each of the reporting forms. (Table 2).

Table 3: Practice of disease surveillance and notification

Variables	Freq (n=162)	%
Facility has a staff designated to report cases of notifiable disease	59	36.4
Have received training on disease surveillance and notification	55	34.0
Have had supervisory visit or retraining on disease notification. (n = 55)	24	43.6
Ever reported notifiable disease	46	28.4
Ever used reporting form (n = 46)		
IDSR 001 for immediate reporting	13	28.3
IDSR 002 for weekly reporting	11	23.9
IDSR 003 for monthly reporting	12	26.1
Sends monthly reports regularly	11	23.9
Seen a case of notifiable disease in the last 3 months	30	18.5
Reported a case of notifiable disease in the last 3 months. (n = 30)	23	76.7
Mode of reporting (n = 23)		
Telephone	7	30.4
Referral letter	2	8.7
Designated reporting form	4	17.4
DSN Focal person	10	43.5

Freq = frequency, n = sample size

Table 3 shows that only 46 (28.4%) respondents have ever reported a case of notifiable disease with approximately a quarter of them using the appropriate reporting form. In the last three months however, only 30 (18.5%) had seen a notifiable disease for reporting and 23 (76.7%) of them reported it, mostly through the DSNO (n = 10; 43.5%) and telephone (n = 7; 30.4%).

Table 4: Factors associated with ever reporting a notifiable disease by respondents.

Variables	Ever reporting		χ^2 test	p-value
	Yes	No		
Location of facility*				
Urban	28	94	7.203	0.007
Rural	18	22		
Sex				
Male	28	55	2.387	0.122
Female	18	61		
Highest level of education				
Primary	3	3	5.307	0.151
Secondary	6	6		
Tertiary	21	69		
Postgraduate	16	38		
Qualifications*				
MBBS	19	79	11.227	0.011
Fellowship	9	15		
PhD	5	9		
Others	13	13		
Have seen the different forms for reporting of notifiable diseases*				
Yes	20	22	11.926	0.003
No	20	77		
Have had some form of training on disease surveillance and notification*				
Yes	31	24	31.771	<0.000
No	14	88		
Facility has a staff designated to reporting cases of notifiable disease*				
Yes	29	30	20.206	<0.000
No	15	81		
Have had supervisory visit or retraining*				
Yes	19	6	15.506	<0.000
No	17	41		
Age*				
20-29	2	17		
30-39	17	60		
40-49	16	21	10.017	0.040
50-59	4	8		
60 and above	7	10		
Years of clinical practice*				
1-5	14	68		
6-10	15	28		
11-15	3	7	11.841	0.019
16-20	3	3		
21 and above	9	10		
Knowledge of DSNS				
Poor	7	19	0.033	0.856
Good	39	97		

*P < 0.05 (Statistically significant)

Table 4 shows that factors that showed statistically significant association with ever reporting a case of notifiable disease were the location of facility (χ^2 = 7.203; P = 0.007), whether the facility has a designated staff for reporting (χ^2 = 20.206, P <0.0001), respondent's qualification (χ^2 = 11.227; P = 0.011) and years of clinical practice (χ^2 = 18.841; P = 0.019) and whether the respondent has previously sighted the reporting tools (χ^2 = 11.926; P = 0.003) or had training on DSNS (χ^2 = 31.771; P < 0.0001) or received any supervisory visits or retraining (χ^2 = 15.506; P < 0.0001).

Table 5: Predictors of ever reporting a notifiable disease.

Variables	aOR	95% C. I		p-value
		Lower	Upper	
Location of Facility (Urban)	.635	0.076	5.287	0.674
Qualification				
MBBS	13.837	1.130	169.396*	0.040
Fellow-ship	2.928	0.205	41.880	0.429
PhD	27.325	0.532	1402.963	0.100
Others				Ref
Have seen reporting forms				
No	0.226	0.038	1.333	0.101
Facility has a designated Staff				
No	0.146	0.023	0.938*	0.043
Have had training on DSN				
No	0.044	0.004	0.526*	0.014
Had supervisory visit				
No	1.023	0.139	7.515	0.982
Age				0.993
20 - 29	0.000	0.000	-	0.998
30 – 39	0.000	0.000	-	0.998
40 – 49	0.000	0.000	-	0.998
50 – 59	0.000	0.000	-	0.998
60 and above				Ref
Years of clinical practice				0.230
1 – 5	201630259256515616.000	0.000	-	0.998
6 – 10	440178901078181840.000	0.000	-	0.998
11 – 15	141002038525435136.000	0.000	-	0.998
20 – 25	0.003	0.000	1.153	0.056
Above 25				Ref
Constant	423.040			0.011

Variable(s) entered on step 1: location of facility, qualification, have seen reporting form, facility has a designated staff, have had training on DSN, had supervisory visit, age, years of clinical practice.
*Statistically significant

Table 5 shows that the qualification of respondents, whether the facility has a designated staff for reporting or has had training on DSNS were predictors of ever reporting a notifiable disease. Respondents who have MBBS degree were about 14 times more likely to report cases of notifiable disease compared to those with other degrees (aOR = 13.837; 95% CI = 1.130 – 169.396); facilities that do not have a staff designated to report notifiable diseases are about 7 times less likely to report a notifiable disease (aOR = 0.146; 95% CI = 0.023 – 0. 938) while respondents who have had no previous training on DSNS were 23 times less likely to report a notifiable disease (aOR = 0.044; 95% CI = 0.004 – 0. 526).

Table 6: Challenges with reporting of notifiable diseases

Challenges	Freq*(n=46)	%
There is no logistic support for reporting of cases	33	71.7
There are no/poor motivation of staff reporting cases	30	65.2
Filling the reporting forms is difficult and takes time	28	60.9
There is no feedback on reported cases	27	58.7
Staff have little or no skill to report cases	26	56.5
The information required on the form are too many	25	54.3
The appropriate reporting forms are not available in our health facility	23	50.0
There are no supervision and monitoring from government	20	43.5

The data collected is not used by government/other agencies	20	43.5
I have never seen a case of notifiable disease at our health facility	16	34.8
I do not know how to use the reporting forms	16	34.8
I am too busy to report suspected or diagnosed cases	15	32.6
I don't know who or where to report cases to	13	28.3

*Multiple option; Freq = frequency; n = respondents who have ever reported a notifiable disease

The most common challenges were lack of logistic support for reporting cases (n = 33; 71.7%). Poor staff motivation (n = 30; 65.2%) and difficulty with filling the forms for reporting (n = 28; 60.9%) Table 6.

Discussion

There is an increasing occurrence of infectious disease outbreaks and epidemics worldwide. Successful prevention and control of epidemic prone diseases depends largely on disease notifications by healthcare provider and particularly those in private health facilities who provide 50 – 80% of primary care services [3,8, 9, 15] This study looked at knowledge of DSNS and the practice of reporting of notifiable diseases among healthcare providers in private health institutions in Rivers State Nigeria. Our results show a very high level of awareness and knowledge of DSNS among health workers in private health institutions. Over four-fifth of the respondents have the awareness (89%) and good knowledge (84%) of DSNS. Furthermore, 92% of the respondents knew that DSNS targets a list of diseases which when suspected or diagnosed must be reported, either immediately, weekly, or monthly using designated forms or telephone calls to health officers in charge of the LGA. Less than one-half (44.4%) of the respondents however knew that suspected or diagnosed cases should be reported to the DSNO. This very high level of awareness and knowledge of DSNS in this study could be due to the high level of education of the respondents, majority of whom are medical doctors and about a third of them holding a postgraduate medical qualification.

Our finding is consistent with the findings among health workers in South-eastern Nigeria where 89.1% of them knew what disease reporting was and 93.9% its importance.[5] Among private medical practitioners in Enugu Nigeria, 82% of them have the awareness and 71.1% had good knowledge of disease surveillance and reporting.[3] Similarly in South-western Nigeria, 80% of private medical practitioners have good knowledge of disease notification.[9]

Other studies have reported a much lower level of awareness and knowledge of DSN. For instance, 51.1% of laboratory scientist working in private health facilities in Lagos have good knowledge of disease notification, 41.1% of doctors in private practice in Taraba State have knowledge of DSN while less than 30% of health workers in private facilities in Enugu were found to have the knowledge of notifiable diseases, the tools for reporting and where it should be reported.[4,7,10]

The reporting of notifiable disease was found to be very poor and below the > 80% recommended by WHO and CDC assessment protocols. Our study showed that only 28.4% of respondents have ever reported a suspected or diagnosed notifiable disease. This low level of reporting of notifiable study despite high level of knowledge may be due to challenges in reporting suspected or diagnosed cases. The top three challenges in ever reporting of notifiable diseases in our study were lack of logistic support for reporting, poor staff motivation and the cumbersome nature of filling the reporting forms. Lack of training, motivation and feedback, weak supervision, complex reporting tools, lack of willingness to report and non-availability of reporting materials has also been given as challenges with disease notification in similar studies.[4,5,7,10]

Although our finding is a farther improvement of the 5.8% reported among physicians in a tertiary hospital in Nigeria, 13.7% among private laboratory scientist in Lagos State Nigeria and 15% among health workers in private primary care facilities in Enugu State, it compares well with the 25.2% reported in South-eastern Nigeria but lower than 53.3% in Osun State Nigeria and 60% in Taraba State, Nigeria. [4,7,9,10,12]

Furthermore, 18.5% of our respondents have seen a case of notifiable disease in the last three months and 76.7% of them reported (current reporting of notifiable disease). The method of reporting was through DSNO (43.5%), via telephone (30.4%) and using IDSR forms (17.4%). In related studies it was

reported that 57.3% of health workers in private health institutions in Enugu State correctly notified diseases using the DSNO while in Osun State, 38.3% of health workers currently notified diseases through appropriate local health authorities.[3,9] In this study the use of appropriate reporting tool for notification of diseases among those who have ever reported was also poor. Only 28.3% of them appropriately did so using IDSR 001 for immediate reporting, 23.9% used IDSR 002 for weekly reporting and 26.1% used IDSR 003 for monthly reporting.

A statistically significant association was also found between ever reporting a case of notifiable disease and location of facility ($p = 0.007$) and whether the facility has a designated staff for reporting ($p < 0.000$); respondent's age ($p = 0.04$), years of clinical practice ($p = 0.019$), qualification ($p = 0.011$) and whether the respondent has previously sighted a reporting tool ($p = 0.003$) or received training on DSNS ($p < 0.000$) or has had any supervisory visits ($p < 0.000$). Furthermore, predictors of ever reporting a case of notifiable disease were found to be respondents' qualification, availability of a staff designated to report notifiable disease and whether staff have been previously trained on DSNS. Respondents with MBBS degree were about 14 times more likely to have reported a case of notifiable disease compared to those with other qualifications (aOR = 13.837; 95% CI = 1.130 = 169.396), facilities without a designated staff for reporting are about seven times less likely to report a notifiable disease (aOR = 0.146; 95% CI = 0.023 – 0.938) and those who have not been previously trained on DSNS were about 23 times less likely to report such cases (aOR = 0.044; 95% CI = 0.004 – 0.526). Other studies have reported supervision and motivation, awareness of IDSR and its policy as well as sighting the notification forms as predictors of ever reporting were.[4,7]

Conclusion

The awareness and knowledge of DSNS and its reporting forms is high however the practice of disease notification is very low among health workers in private health institutions in Rivers State. Predictors of ever reporting of notifiable diseases were 'having an MBBS degree', 'previous trainings on DSNS' and the 'facility having a designated staff for reporting of notifiable diseases.'

Recommendation

Healthcare workers in private health institutions should be motivated to report notifiable diseases by their inclusion in training programs on DSNS organized for health workers in public health facilities. Furthermore, reporting tools should be simplified to reduce the difficulty of completing reporting forms and private health facilities should be encouraged to have a designated staff for the reporting of suspected or diagnosed cases of notifiable diseases in their facilities to the DSNO in the LGA.

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References

1. Nnebue CC, Onwasigwe CN, Adogu, PO, Onyeonoro UU. Awareness and knowledge of disease surveillance and notification by health-care workers and availability of facility records in Anambra state, Nigeria. *Nigerian Medical Journal*. 2012; 53:220-5.

2. Isere EE, Fatiregun AA, Ajayi IO. An overview of disease surveillance and notification system in Nigeria and the roles of clinicians in disease outbreak prevention and control. *Nigerian Medical Journal*. 2015; 56(3): 161-8.

3. Chime OH, Ogugua IJ, Obionu IM, Ezenwosu IL, Ibiok CN, Ochie CN, *et al*. Assessment of knowledge and practice of disease surveillance and notification among health workers in private hospitals in Enugu State, Nigeria. *Niger J Med*. 2021; 30:693-700.

4. Aniwada EC, Obionu CN. Disease Surveillance and Notification, Knowledge and Practice among Private and Public Primary Health Care Workers in Enugu State, Nigeria: A Comparative Study. *British Journal of*

Medicine & Medical Research. 2016; 13(3): 1-10.
5. Iwu AC, Diwe FC, Merenu IA, Duru CB, Uwakwe KA. Assessment of disease reporting among health care workers in a South- Eastern State, Nigeria. *Int J Community Med Public Health.* 2016; 3(10):2766-2774
6. WHO. International Health Regulation, 2005: Areas of work for implementation. WHO/CDS/EPR/IHR/2007.1 June 2007.
7. Dairo MD, Leye-Adebayo S, Olatule AF. Awareness and reporting of notifiable diseases among private laboratory scientists in Lagos, Southwest Nigeria. *Healthcare in Low-resource Settings.* 2018; 6 (1) https://doi.10.4081/hls.2018.7106.
8. Makinde OA, Odimegwu CO. Compliance with disease surveillance and notification by private health providers in South-West Nigeria. *Pan African Medical Journal*. 2020; 35:114.
9. Adebimpe WO, Oluremi AS. Knowledge and practice of disease notification among private medical practitioners in Osun State, Southwestern Nigeria. *Niger J Gen Pract.* 2019; 17:16-22
10. Atinge S, Rimande J, Bulndi IG. Knowledge and Practice of Disease Surveillance and Notification among Doctors in Taraba State, North-East Nigeria. *Journal of Medicine & Biomedical Research.* 2019; 18: 46 - 54
11. Ibrahim LM, Okudo I, Stephen M, Ogundiran O, Pantuvo JS, Oyaole DR, et al. Electronic reporting of integrated disease surveillance and response: lessons learned from northeast, Nigeria, 2019. *BMC Public Health.* 2021; 21:916
12. Abdulraheem LS, Monehin JO, Akanbi AA, Onajole AT, Bamgbala AO. Disease Notification Among Physicians in a Nigerian Tertiary Health Institution. *Nigerian Medical Practitioner*. 2004; 45 (6): 111-115
13. RSMOH. Rivers State Health Statistics Bulletin 2018 -2019. Health Management Information System Unit, Department of Planning, Research and Statistics, Port Harcourt. 2020.
14. RSMOH Rivers State Health Statistical Report 2018. Health Management Information System Unit, Department of Planning, Research and Statistics. Port Harcourt**.** 2019.
15. Benson FG, Levin J, Rispel LC. Health care providers' compliance with the notifiable diseases surveillance system in South Africa. *PLoS ONE*. 2018; 13(4): e0195194. https://doi.org/10.1371/journal.pone.0195194