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Original Article

Knowledge and Practice of Disease Surveillance and Notification among Health Workers in Wamakko LGAof Sokoto, Nigeria

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Abstract

Background: Over time, disease outbreaks in Nigeria have been attributed to under-reporting by healthcare workers. Disease surveillance and notification are important for early detection of disease outbreaks, timely response, and reduction of morbidity and death. This study assessed the knowledge and practice of disease surveillance and notification (DSN) among health workers in public health facilities in Wamakko LGA of Sokoto State.

Methodology: A descriptive cross-sectional study was conducted among 167 healthcare workers of all cadres in six primary health facilities. Data was collected from participants selected via convenience sampling method, using an interview-based semi-structured questionnaire. Data were analyzed using descriptive and inferential statistics.

Results: Most of the participants were Community Health Extension Workers (CHEW) (34.1%). The majority were aware that some diseases required notification (98.8%), where or who to report/notify diseases (83.8%), and of the DSN system (68.9%). The practice of disease notification was also comparatively good. Educational qualification (p=0.004) and years of working experience (p=0.041) were found to be significantly associated with the level of knowledge on disease surveillance and notification. There was no significant association between the level of practice of DSN and the level of knowledge (p=0.515), work experience (p=0.303), supervision (p=0.372), and motivation/incentives to disease reporting (p=.293). The notable identified challenges to disease reporting were the non-availability of reporting forms and stationery.

Conclusions: Even though disease notification and surveillance are common in Nigeria, the practice and specific use of the surveillance and notification tools still fall short of the standard required for effective monitoring of the trend of disease and forestalling outbreaks. Regular training and revision courses on DSN for healthcare workers at the LGA level, especially on the uses of each DSN form are recommended.

Keywords: Awareness; Diseases; Notification; Sokoto; Surveillance.

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Introduction:

Disease surveillance and notification (DSN) is a continuous process of monitoring and reporting diseases at local, national, and international levels. It involves identifying, collating, analyzing, and promptly disseminating data on health-related events for public health action. [1,2] Disease surveillance and notification is an effective strategy for preventing and controlling diseases, particularly epidemic-prone ones. Early detection of disease outbreaks and prompt interventions help to reduce morbidity and mortality from infectious diseases.[3]

The resurgence of infectious diseases and the emergence of previously controlled diseases are posing unprecedented public health challenges.[4] Governments and global health leaders have established legal frameworks and requirements for countries to detect and contain disease outbreaks.[4] Any country that detects diseases classified as public health emergencies of international concern (PHEIC) must report it to the WHO within 24 hours, regardless of the location.[4]Additionally, at the state and district levels, the WHO is improving the capacity of surveillance officers.[4]

The Integrated Disease Surveillance Response (IDSR) Strategy adopted by the WHO in 1998 was aimed at integrating surveillance activities into one system within the National Health System in Nigeria.[1]Through effective use of current resources, this approach seeks to increase the nation's capacity for early disease outbreak identification.[1] It operates at every level of the health system, starting with disease detection, generating health information, and immediate notification at health facilities. Health data is then collated by DSN officers within the Local Government Area and disseminated to relevant structures at State and National levels. [1,2]

The diseases for notification are divided into three categories: diseases that are epidemic-prone (like cholera and measles), diseases that are targets for eradication or elimination (like poliomyelitis and dracunculiasis), and other diseases of public health importance (like malaria, tuberculosis, and HIV/AIDS).[4]The prevalence of communicable diseases varies, but the three most rated diseases, known as the "big three" are HIV/AIDS, TB, and malaria.[4]

Developing nations have faced significant challenges in establishing an effective system for disease surveillance and reporting. Nigeria, being one of such countries has come a long way in trying to strengthen its surveillance, notification, and reporting capabilities since the yellow fever outbreak in 1986/87.[1]According to a 2009 evaluation of IDSR implementation in Nigeria, health professionals were not trained on the clinical presentations of the five selected notifiable diseases, and 68% of the health institutions examined lacked case definitions for any of these conditions.[4]

Despite the recognized importance of disease surveillance and notifications, the strategy has suffered a lot of setbacks and challenges. These include a lack of awareness amongst lower cadre healthcare workers, lack of feedback from the focal personnel, lack of case definitions, and problems of logistic support including lack of offices for the majority of surveillance units. Others are inadequate and poor funding, inadequate and poor transport facilities, late reporting, and lack of specially standardized IDSR reporting forms at surveillance units. [5,6] The problem of lack of training on collection and reporting has been noted to result in low-quality data from incorrect and incomplete filling of IDSR forms. [6,7]

The Federal Ministry of Health has acknowledged the need for an effective IDSR system to efficiently gather and transmit data on notifiable diseases.[4] However, this vision has not been effectively implemented at both State and Local Government Area levels. Healthcare workers in both the public and private sectors receive little or no training, leading to ineffective planning, implementation, and monitoring of the program.[4] The unavailability of timely disease surveillance data hinders decision-makers from identifying problems, formulating evidence-based policies, and allocating scarce resources optimally.

Despite the high prevalence of infectious diseases in the Northern part of Nigeria, little to no study has been conducted in Sokoto State. This study assessed the knowledge and practice of disease surveillance and notification among health workers in public health facilities in Wamakko LGA of Sokoto State. The study sought to identify factors influencing disease surveillance practices and the challenges faced by healthcare workers. The findings provide baseline data for comparison with other studies and may encourage policymakers to prioritize training and retraining of surveillance officers for effective network strategies.

Methodology:

The study location was Sokoto State, Northwest Nigeria. The state lies between latitudes 4° and 6° North and longitudes 11°30` to 13° 50` East, with a total land area of 28,232.37 square kilometers. It shares borders with the Niger Republic to the north, Kebbi State to the west and south, and Zamfara State to the east. It has 23 Local Government Areas, and as of 2022, it had an estimated population of more than 6.3 million.[8]

Wamakko LGA is one of the largest local governments in Sokoto state. It is a semi-urban town doubling as the administrative center for Wamako LGA, and Kalambaina is one of the districts in Wamakko. It has 6 Primary Health Cares, 49 health posts and health clinics, a Mobile Police Clinic, a University Staff Clinic, and Usmanu Danfodiyo University Teaching Hospital (UDUTH) Sokoto serving the healthcare needs of people at the primary health level up to the tertiary health level.

This was a descriptive cross-sectional study among healthcare workers primarily in charge of Disease Surveillance Notification or record keeping in public health institutions (primary healthcare facilities). All cadre of health care workers; doctors, nurses/midwives, Community Health Officers (CHO), Community health extension workers (CHEWS), and health record officers in charge of DSN in the six primary health facilities in Wamakko LGA were included in this study.

Inclusion criteria

The participants included in the study in each of the designated primary health facilities worked for at least a minimum of 6 months at that level of health care system.

Exclusion criteria

Those Healthcare workers without consent and the health facility that declined participation were excluded from the study.

Substitutes for the designated health worker in charge of DSN who were unavailable for whatever reason.

The sample size was calculated using the Cochrane formula $N = (Z\alpha)^2Pq/d$.[9] Using a prevalence of 88.9% from a previous study by Nnebue *et al,*[10] Zα of 1.96 (at Type 1 error of5%); desired level of precision of 5%; the calculated sample size was 151.6. The addition of a 10% non-response rate gave a minimum sample size of 167. A convenience sampling technique was used to select the study participants. This method was considered because the total staff strength of the 6 primary healthcare centers in the entire LGA was 178.

Data was collected by the investigators using an adapted semi-structured, interviewer-administered questionnaire with four sections. Section one included questions on the socio-demographic characteristics and work experience of the respondents. Section two was on the knowledge of disease surveillance and notification, including awareness of the notifiable disease, prior training on DSN, knowledge of the uses of each IDSR form, and the uses of the collected data. Section three was on the DSN practices of the

respondents. This section included questions on the availability and supply of the IDSR forms to respondents' facilities, the respondents' and their facility's involvement in DSN, and where the IDSR forms generated in each facility were sent. Section four was on the challenges encountered by respondents on DSN.

Data was analyzed using Statistical Packages for Social Sciences (SPSS) version 25. Continuous variables were summarized using means and standard deviation (SD). Categorical variables were summarized as frequencies and percentages. The knowledge score was calculated from 7 questions in the section on knowledge of IDSR in the research instrument and converted to percentages. Respondents who had a score of < 60% were said to have poor knowledge, while those with a score of ≥60% were said to have good knowledge.[11] The practice score was calculated from 5 questions (8 variables) in the section on practice of IDSR in the research instrument. The scores obtained were then converted to percentages. Respondents who had a score of < 60% were said to have poor practice, while those with a score of ≥60% were said to have good practice. Test for statistical associations between variables and univariate analysis was performed using Chi-square. Differences were considered statistically significant if *p* was less than 0.05.

Ethical clearance for this study was obtained from the research and ethical committee of the Sokoto State Ministry of Health (SSMoH). Clearance was also sought from the LGA Health Authority. Furthermore, written informed consent was obtained from the participants. The details were explained to them. The principles of confidentiality and anonymity were ensured. Above all, participation in the study was voluntary.

Results:

The socio-demographic characteristics of the participants are shown in Table 1. The mean age was 36.56 years (± 9.20). Most of the health workers were Community Health Extension Workers (CHEW) 57(34.1%). The modal years of working experience of the health workers was 5-9 years in 76(45.5%).

Table 1: Sociodemographic characteristics of the respondents

Variables	Frequency (n=167)	Percentage (100%)
Age (years)		
20 - 29	40	24.0
30 - 39	52	31.1
40 – 49	55	32.9
50 – 59	20	12.0
Mean ± SD = 36.6 ± 9.2		
Gender		
Male	36	21.6
Female	131	78.4
Highest level of education		
Secondary	6	3.6
Tertiary	140	83.8
Postgraduate	21	12.6

Occupation		
Doctor	16	9.6
Nurse	46	27.5
Midwife	24	14.4
CHEW	57	34.1
CHO	14	8.4
Record officer	10	6.0
Work experience (years)		
<5	31	18.6
5-9	76	45.5
≥10	60	35.9
Average daily patients seen		
<10	34	20.4
≥10	133	79.6

Table 2 shows the knowledge of disease surveillance and notification. The majority 132(82%) of the respondents had good knowledge of disease surveillance and notification, including awareness of notifiable diseases 164(98.2%), where or who to report/notify diseases 140(83.8%), and knowledge of the DSN system 115(68.9%). More than two-thirds 117(70.1%) have attended a course/training on IDSR, of which most had training in the last 2-3 years. About half of the respondents 90 (53.9%) knew what Form 002 was used for. However, less than half of the health workers could accurately identify the use of Form 001 62(37.1%) and Form 003 49(29.3%).

Table 2: Knowledge of healthcare workers on disease surveillance and notification

Variables	Frequency (n=167)	Percentage (100%)
Aware of notifiable diseases		
Yes	164	98.2
No	3	1.8
Aware that some diseases require notification		
Yes	165	98.8
No	2	1.2
Aware of where or who to report/notify diseases		
Yes	140	83.8
No	27	16.2
Attended a course/training on IDSR		
Yes	117	70.1
No	50	29.9
Aware of DSN system		
Yes	115	68.9
No	52	31.1
Most current training on DSN (years)		
None	50	29.9
1	32	19.2
2-3	62	37.1
>3	23	13.8

Aware of what the IDSR forms are used for		
Form 001	62	37.1
Form 002	90	53.9
Form 003	49	29.3
Uses of IDSR data		
Identification of changes in disease trend	128	76.6
Disease prevention and control	116	69.5
Statistics and planning	97	58.1
Detection and notification of disease outbreaks	117	70.1
Record and reference purposes	109	65.3
Research purposes	106	63.5
Initiation and monitoring of interventions	113	67.7
For reporting to DSNO or other authorities	98	58.7
For health education or advocacy	108	64.7
Knowledge score		
Poor knowledge (<60%)	30	18.0
Good knowledge (≥60%)	137	82.0

As regards the disease surveillance and notification practices among the healthcare workers (Table 3), less than a tenth of the respondents sent the DSN Form 003 appropriately to the state Disease Surveillance and Notification Officer (DSNO). Among the health workers whose facilities were involved in reporting, 92(71.9%) had reported a disease using the available DSN Forms. More than half of the respondents 78(60.9%) had a person designated for disease surveillance and notification in their facility. In general, the majority of the health workers 115(89.8%) had good practices of disease surveillance and notification.

Table 3: Disease surveillance and notification practices among healthcare workers

Variables	**Frequency (n=167)**	**Percentage (100%)**
IDSR forms are available in our health facility		
Yes	128	76.6
No	39	23.4
Where DSN form 003 is sent to	**N=128**	
FMoH	5	3.9
LGA chairman	11	8.6
LGA DSNO	100	78.1
State DSNO	12	9.4
How often a DSN form 003 is sent from your facility	**N=128**	
Daily	9	7.0
Weekly	55	43.0
Bi-weekly	19	14.8
Monthly	45	35.2
There is regularity in the supply of DSN forms to my facility		
Yes	128	76.5
-Always	96	(75.0)
-Occasionally	32	(25.0)
No	39	23.4

This facility is involved in reporting		
Yes	128	76.6
No	39	23.4
Ever reported any disease using IDSR forms	**N=128**	
Yes	92	71.9
No	36	28.1
IDSR data collection is supervised by LGA staff	**N=128**	
Yes	45	35.2
No	83	64.8
There is a designated person for DSN in the facility	**N=128**	
Yes	78	60.9
No	50	39.1
Practice score	**N=128**	
Poor practice (<60%)	13	10.2
Good practice (≥60%)	115	89.8

The identified challenges to disease surveillance and notification among healthcare workers include the unavailability of the reporting forms, no motivation/or incentives to reporting officers, and lack of training on DSN (Table 4).

Table 4: Challenges of disease surveillance and notification among healthcare workers.

Variables	Frequency (n=167)	Percentage (100%)
Lack of forms	5	66.5
No motivation/incentives	11	49.1
No training on DSN	100	47.9

The relationship between socio-demographic characteristics and knowledge of healthcare workers on disease surveillance and notification is shown in Table 5. Educational qualification (χ^2=17.530, p=0.004) and working experience (years) (χ^2=6.370, p=0.041) were found to be significantly associated with the level of knowledge of respondents on disease surveillance and notification.

Table 5: Relationship between socio-demographic characteristics and knowledge of healthcare workers on disease surveillance and notification

Socio-demographics	Level of knowledge		X^2 value	p-value
	Good knowledge n(%)	Poor knowledge n(%)		
Age (years)			7.776	.051
20 - 29	9(30.0)	31(22.6)		
30 - 39	14(46.7)	38(27.7)		
40 – 49	4(13.3)	51(37.2)		
≥50	3(10.0)	17(12.4)		

Gender			1.542	.214
Male	9(30.0)	27(19.7)		
Female	21(70.0)	110(80.3)		
Educational qualifications			17.530	**.004**
Doctor	0(0.0)	16(11.7)		
Nurse	7(23.3)	39(28.5)		
Midwife	5(16.7)	19(13.9)		
CHEW	8(26.7)	49(35.8)		
CHO	4(13.3)	10(7.3)		
Record Officer	6(20.0)	4(2.9)		
Work experience (Years)			6.370	**.041**
<5	6(20.0)	25(18.2)		
5-9	19(63.3)	57(41.6)		
≥10	5(16.7)	55(40.1)		

Table 6 shows the factors that influence disease surveillance and notification practices among healthcare workers using logistic regression. No significant association was found between the level of practice of DSN and the level of knowledge (p=.515), work experience (years) (p=.303), DSN training attendance (p=.417) supervision (p=.372), and motivation/Incentives to disease reporting (p=.293). However, those who had poor knowledge of disease surveillance and notification (OR:1.719, CI:0.337, 8.771), who did not attend training (OR:1.685, CI:0.478, 5.945), had no supervision (OR:0.563, CI:0.159, 1.990), who lacked motivation (OR:2.309, CI:0.486, 10.975) were less likely to have good practice of DSN.

Table 6: Factors that influence disease surveillance and notification practices among healthcare workers

Variable	**Level of practice**			
	Poor practice n(%)	**Good practice n(%)**	**Adjusted OR (95% CI)**	**p-value**
Level of knowledge				
Poor knowledge	2 (36.4)	11 (20.0)	1.72 (0.3, 8.8)	.515
Good knowledge	11 (63.6)	104 (80.0)		
Work experience (years)				
<5	4 (30.8)	21 (18.1)		.303
5-9	6 (46.2)	42 (36.2)	1.3 (3.4, 5.2)	
≥10	3 (20.0)	53 (45.7)	3.3 (0.7, 16.04)	
Attended a training				
No	4 (36.4)	24 (20.9)	1.7 (0.5, 5.9)	.417
Yes	9 (63.6)	91 (79.1)		
Supervision				
No	4 (36.4)	23 (20.0)	0.6 (0.2, 2.0)	.372
Yes	9 (63.6)	92 (80.0)		
Motivation/Incentives				
No	11 (84.6)	81 (70.4)	2.3 (0.5, 11.0)	.293
Yes	2 (15.4)	34 (29.6)		

Discussion:

In this study, the majority of healthcare workers were Community Health Extension Workers (CHEW), with only a small number of doctors involved. This finding aligns with a previous study conducted by Aniwada and Obionu.[4] Furthermore, a Situation Assessment of Human Resources in the Public Health Sector in Nigeria revealed that CHOs/CHEWs are predominantly found in primary health facilities.[12]

This study found a high level of awareness of the DSN system in Nigeria, with 68.9% of respondents being aware of its existence. This contrasts with previous reports in Abuja and northern Nigeria, where only 38.2% and 9.8% of healthcare personnel respectively, were aware of the national disease surveillance system. [13,14] The higher awareness may be due to participation in workshops and training sessions on DSN.

However, the knowledge of the uses of individual Integrated Disease Surveillance and Response (IDSR) forms was found to be poor. Only 37.1% of healthcare personnel knew that the IDSR001 form was used for immediate/case-based reporting, 53.9% knew the use of the IDSR002 form, while only 29.3% knew what the IDSR003 form was used for. This is similar to a study in Anambra state, which reported low knowledge regarding the specific uses of IDSR forms: 33.3% for IDSR001 form, 31.1% forIDSR002 form, and 33.7% for IDSR003 form.[10]

Healthcare professionals have to report designated diseases to authorities for public health interventions. In this study, 41.1% of health workers demonstrated good knowledge of Disease Surveillance and Notification (DSN), which is higher than a 2014 study in Benin City, where only 51.8% of resident doctors had good knowledge about DSN.[15] In terms of knowledge of IDSR data use in epidemic-prone diseases or the detection of disease outbreaks, 70.1% of health workers demonstrated good knowledge, aligning with a 2015 study in Oyo State.[16] The good understanding of the utilization of IDSR in epidemic-prone diseases or the reporting of disease outbreaks is not surprising and could be attributed to the fact that such knowledge can be readily acquired by various healthcare professionals, as these diseases are typically severe and possess the potential to result in significant morbidity and mortality.[16]

The study found that participants had a good understanding of Integrated Disease Surveillance and Response (IDSR) and Disease Surveillance and Notification (DSN) but had a poor understanding of the forms used in disease notification. This may be attributed to irregular re-training exercises on DSN, the complexity of the forms, and the lack of feedback from the collating centers at the state level. Recommendations for addressing these challenges include the incorporation of periodic practical training exercises, simplification of the various IDSR forms, ensuring resource accessibility, and establishment of feedback mechanisms. Tailoring these solutions to the participants' specific context will enhance their understanding and facilitate effective implementation of IDSR and DSN.

This study found that most facilities had IDSR003 forms for monthly reporting, while IDSR001 and IDSR002 forms were not available. A previous study's checklist revealed that IDSR001 and IDSR002 forms were the forms available in most primary healthcare facilities.[17] In the study, 71.9% of health workers reported diseases, with 60.9% having designated persons responsible for the DSN.[17] This could be attributed to their permanent employment, sufficient manpower, and lower work pressure on the reporting officers. Around 76.6% of respondents reported a regular supply of DSN forms, albeit IDSR003, which is consistent with a previous study by Aniwada and Obionu, which also found that most public facilities had a regular supply of IDSR forms, particularly IDSR003, while only a few private facilities had the forms.[4]

This study found that 43.0% of respondents reported weekly DSN forms, which is consistent with other studies where the DSN forms were majorly returned to the disease surveillance officers weekly.[5] However, challenges persist in the IDSR system, with the non-availability of forms being the greatest challenge. Inadequate reporting forms and stationery, reported by 66.5% of respondents, significantly

contributed to the non-reporting of outbreaks. This issue has been documented in previous studies in Nigeria and Uganda, where a lack of reporting forms has been cited as a reason for not reporting notifiable diseases. [10,18]

The study found that most health workers attended training sessions on Disease Surveillance and Notification (DSN), which is consistent with similar studies in Osun and Ekiti States, where 76.2% of healthcare workers had received training on DSN.[5] However, low rates of training participation were reported in other parts of Nigeria and Africa.[6,19-24] Studies in other African countries and Jordan have also identified a lack of trained personnel as a factor contributing to poor IDSR performance.[24-26] Overall, this study found that most of the health workers in Wamakko local government area of Sokoto state had good practice of DSN, consistent with their good knowledge of DSN. In contrast, a study among doctors in Benin City reported poor practice of DSN among 89.7% of the participants.[15]

In this study, no significant relationship was observed between training and DSN practice, and supervision and motivation/incentives were not found to affect or be associated with regular reporting or practice of disease surveillance and notification. This contrasts with a study where supervision and motivation were identified as factors responsible for regular reporting among public health workers.[4] Supportive supervision has been reported to improve staff performance and ensure adherence to set standards in Nigeria and Ghana. [5,14,20,27]

The study reveals a gap between training attendance and knowledge about the forms among participants, suggesting inadequate training on IDSR and DSN forms. The training may have focused on theoretical concepts rather than comprehensive guidance. Insufficient practical exercises, limited training duration, and lack of post-training support could also contribute to participants' poor knowledge. To address these issues, the training curriculum should include dedicated sections on form completion and incorporation of practical exercises. There is also a need for the establishment of post-training support mechanisms like mentoring or refresher courses. This will bridge the gap between training attendance and form-related knowledge, facilitating better implementation of IDSR and DSN processes.

The study highlights the role of Community Health Extension Workers (CHEWs) and their high awareness of the Disease Surveillance and Notification (DSN) system among healthcare workers in Sokoto state, Nigeria. However, the depth of knowledge about specific uses of IDSR forms is relatively poor. The identified challenges include the non-availability of reporting forms and stationery, which significantly impact on outbreak reporting. This study also highlights the need to strengthen the system by increasing awareness among health workers, improving reporting infrastructure, utilizing electronic systems, and allocating adequate resources.

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