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Investigation into the procedures, reinforcing and enabling factors associated with yellow fever surveillance in a South-West State in Nigeria: A Qualitative Study

BY

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Abstract

Yellow fever is a viral hemorrhagic fever that is endemic mainly in Africa and South America. Ongoing surveillance for early case detection and reporting as being highlighted as a strategic action in the Eliminating Yellow Fever Epidemic (EYE) Strategy. Therefore, this study investigated the procedures for yellow fever surveillance, reinforcing, enabling factors, and challenges associated with the surveillance of yellow fever in Oyo State, Nigeria.

The study was a cross-sectional study that utilized a qualitative method of data collection. Purposive sampling technique was used to select 12 surveillance supervisors that participated in this study. Key Informant Interview (KII) Guide was used to obtain information from the participants. All discussion were recorded, transcribed, and thematically analyzed.

The participants had a mean age of 48 ± 7.79. Majority of the participants were female (66.7%). Majority of the participant emphasized that yellow fever case detection is carried out by healthcare workers and community informants and that reporting is immediate. Supervision at the health facility is said to be done in order of prioritization. High-priority facilities are visited weekly; medium-priority facilities are visited fortnightly, while low-priority facilities are visited monthly. Supervision to the LGA is said to be a joint strategy between the State Ministry of Health and partners. Materials such as reporting forms, sample collection materials, yellow fever guideline are provided by the state Ministry of Health with support from partners. Challenges in the surveillance of yellow fever included lack of funding, poor vaccination coverage, insufficient subject matter expert, and poor healthcare-seeking behavior.

These findings emphasize the need for continuous yellow fever surveillance in Oyo State. It is therefore recommended that government and relevant stakeholders dedicate specific funds for yellow fever surveillance, provide regular training for healthcare workers and community informant to garner the requisite skills for case detection.

Keywords: *Yellow fever, viral hemorrhagic fever, surveillance, healthcare workers, community informants*

INTRODUCTION

Yellow fever is a viral hemorrhagic fever that is endemic in the tropical region of Africa and South America (Monath & Vasconcelos, 2015). The disease is mainly transmitted through the bite of infected mosquitoes of *Aedes* and *Haemogogus* family (Nwachukwu et al., 2022). The three transmission cycles of yellow fever that has been extensively researched includes sylvatic, savannah, and urban transmission cycles. The sylvatic (jungle) transmission occurs when mosquito (*Aedes* and *Haemogogus spp)* bites the non-human primates such as monkey which is the primary reservoir of yellow fever virus. The savannah (intermediate) transmission occurs when an infected mosquito bites a human working or residing in jungle boarders while the urban transmission occurs when an infected person introduces the virus to a dense population (Abdulkadir et al., 2020).

The estimated global burden of yellow fever is reported to be over 200,000 cases and 30,000 deaths (WHO, 2023). The

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resurgence of yellow fever in Africa in 2016 has made the disease a re-emerging global threat (Ortiz-Martínez et al., 2017). Furthermore, it has been reported that about 34 countries in Africa are either endemic or have region that are endemic for yellow fever (WHO, 2023). From 2017 to 2018, a total of 132 confirmed yellow fever cases has been reported in 16 states out of the 36 states in Nigeria. (NCDC, 2023).

The advent of the Eliminating Yellow fever Epidemic (EYE) strategy has served as a framework for the prevention and control of yellow fever outbreak-affected countries including Nigeria (WHO, 2021). The strategy specifically highlighted surveillance as a sustainable intermediate and long-term action for yellow fever prevention and control. Thus, this study sought to document the procedures for yellow fever surveillance, highlight reinforcing and enabling factors underpinning yellow fever surveillance activities, and outline challenges in yellow surveillance in Oyo State.

METHODOLOGY

The study employed a cross-sectional study design using qualitative method of data collection. The target population for this study included surveillance supervisors. Purposive sampling technique was used to select 12 surveillance supervisors among which three were state supervisors, six local government supervisors, and three WHO personnel involved in surveillance activities in Oyo State. Key informant interviews (KII) guide was used to obtain relevant information from the participants. The KII questions was guided by the PRECEDE-PROCEED model. The guide had four (4) sections. Section A focused on the procedure for yellow fever surveillance in Oyo State, Section B explored reinforcing factors such as supervision and information sharing. Section C explored enabling factors related to structural needs such as data tool, logistics resources, and finance. Section D documented challenges in yellow fever surveillance. The interview was conducted with the support of two (2) research assistant. Each KII session lasted for about 25-30 minutes. Informed consent was sought from the participants before the use of recorder. Ethical approval was sought and obtained from the Babcock University Research Ethics Committee (BHUREC) with approval number BUHREC607/22.

RESULTS

Socio-demographic Characteristics of Respondents

A total of 12 Key Informant Interview (KII) was conducted during the course of this study. The 12 respondents included three (3) State Officers (the State Epidemiologist, State Disease Surveillance and Notification Officer, and State Laboratory Focal Person), three (3) Surveillance Officers from the Oyo State Word Health Organization office, and six (6) Local Government Disease Surveillance and Notification Officer (LGA DSNO) in the study area. The respondents had a mean age of 48 ± 7.79. The gender distribution showed that majority were female 8 (66.7%) while 4 (33.3%) were male. Majority 9 (75.0%) of the respondents practice Christianity as a form of religion while 3 (25.0%) are Muslims. All the respondents have a post-secondary education.

Procedure for Yellow Fever Surveillance

As regards case detection, a response that cuts across all respondents was the fact that case detection is done at the health facility and community level. It was revealed that at the community level, there are community informants trained on case definition, signs, and symptoms of yellow fever, and then report to the health facility focal person in their LGAs.

A concise response from a WHO staff is as follows;

"We have community informants in each local government that conduct case search and report to the health facility".

"We have a total of 3,510 community informants in the 351 wards in the 33 LGAs in Oyo state." (30 years old, WHO Staff).

One of the LGA DSNO stated;

"We have some people on ground called community informants who look for these cases and report." (57 years old, LGA DSNO).

It was further reported that at the facility level, there are designated facilities called focal sites across the 33 LGA of Oyo State. The focal sites have surveillance actors called focal persons. These focal persons conduct Active Case Search (ACS) to identify cases of yellow fever in the Outpatient and Inpatient records of the health facility.

One of the LGA DSNO revealed that;

"The focal persons are well trained at the health facility level and any time they see cases that looks like yellow fever, they promptly alert the DSNO." (44 years old LGA DSNO).

At the LGA level, the LGA DSNO is the surveillance supervisor for all priority diseases. A quote from one of the State officers is as follows;

"We have LGA DSNO and Assistant at the 33 LGA of the state, to whom the focal persons at the health facilities report to" (53 years old, SE).

Some participants emphasized that surveillance activities is an ongoing process and that cases can be reported at any time by any person.

A WHO personnel stated that;

"We also have private practitioners, nurses, patent medicine vendors, traditional birth attendants, unorthodox centers, herbalists that we engage and train once a year. They practically conduct passive surveillance which means they report cases when they come to them" (30 years old, WHO personnel).

A response that stood out was from one of the state officers explained that;

"Case detection is based on case definition of yellow fever. Surveillance officers have been trained on detection" (55 years old, SDSNO).

As regards notification and reporting, it was made clear that notification of yellow fever suspected case is immediate, and the process of notification follows the IDSR guideline for reporting. The responses that were received included;

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One of the LGA DSNO stating that;
"As soon as suspected cases are being detected by the community informants from their different levels, they quickly go to their focal persons since community informants are attached to focal persons. The focal persons will then report to the LGA DSNO. Immediately the DSNO is notified, he/she goes with sample collection kits for immediate sample collection" (56 years old, LGA DSNO).

The DSNO said that;
"Yellow fever surveillance keys into the national surveillance protocol. We have the surveillance by which the reporting of any priority disease starts from the community, we have community informants to the facilities where we have the focal persons and then to the LGAs where we have LGA DSNOs. All these reporting tools for priority diseases including yellow fever involves filling IDSR001A and IDSR 001B." (55 years old, SDSNO).

The DSNO further stated that;
"…When case is suspected, the notification goes to the LGA DSNO, and sample is collected and taken to the central public health laboratory in Lagos" (55 years old, SDSNO).

One of the WHO personnel asserted as follows;
"Notification is immediate, once a case of YF is detected, they fill the case investigation form immediately." (52-year-old, WHO personnel).

Another WHO personnel stated that;
"For the past 5 years, over 70% of LGAs in the State has reported at least one suspected case of yellow fever, and once the cases have the case definition, we have designated medical laboratory scientists that have been trained to collect samples. They collect the blood samples for yellow fever and it is transported to the State and from the State to the laboratory." (30 years old, WHO personnel).

Reinforcing Factors (Supervision and Information)
Some participants explained that the health facilities in each LGA have been prioritized into three groups and each of the priority level has a specific structure for supervision. The three prioritizations are high priority, medium priority, and low priority. Responses included;

One of the LGA DSNO interviewed said that;
"We have high, medium, and low facilities. These are the ways of prioritization. For high, it is four times in a month, the medium is just twice, and the low is once in a month. At the community level, we go there when we have a health facility around the place, we supervise the community as many times as possible. We visit the community informants." (52 years old, LGA DSNO).

Another LGA DSNO affirmed the aforementioned fact by saying;
"Normally for high facilities, supervision is done weekly, the medium is done twice in a month and for low facilities is done once in a month." (44 years old, LGA DSNO).

"…We supervised the community informants by calling them and we visit the community twice in a month." (48 years old, LGA DSNO).

As regards supervision at the LGA level, the DSNO also reiterated that;

"The LGA supervises their community informants through the surveillance focal persons. Focal persons are in charge of following up with the community informants but at the same time, the DSNO does that as well." (55 years old, SDSNO).

A response that stood out in the supervision section was from one of the LGA DSNO;

The LGA DSNO stated that;
"The supervision on yellow fever is as low as anything because there's no provision from any end, we are only riding on the back of others like AFP, measles etc, that is why we count it as part of our responsibility. There is no additional or special stipend for that".

"… There is no schedule for YF supervision alone, we collectively gather all the cases together such as AFP, measles, and yellow fever together" (56 years old, LGA DSNO).

However, for supervision from the state level to the LGA. It was made clear that there is a joint supervision strategy by the State Ministry of Health and WHO. Information garnered from participants were as follows;

One of the state officers said that;
"Usually, we do joint supervisions with our partners, such as WHO that are supporting us with yellow fever surveillance in the State." (53 years old, SE).

The DSNO said that;
"From the State, there is a supervisory plan and one is in conjunction with WHO because the state does not have enough logistics. So we call it joint supportive supervision." (55 years old, SDSNO).

A response from one of the WHO personnel include;
"At the LGA level, we have technical officers in WHO and the SMOH who conduct routine supportive supervision to LGAs based on their surveillance performance, so LGAs that have gaps in YF surveillance are prioritized and facilities with gaps as well are also prioritized in their LGAs".

"…Also, LGAs with history of YF outbreaks are also prioritized and the DSNOs' offices are the first point of contact for supportive supervision, making sure that active surveillance is going on in that LGA." (52 years old, WHO personnel).

As regards the flow of information and how feedback is being provided at each level. The responses from the interview revealed that the state gives feedback to the LGA and the LGA also gives feedback to the personnels at the health facilities and the community informants as at when due. The State and WHO officers reported that there is a monthly and quarterly surveillance meeting where feedback is being

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provided to all the LGA DSNOs. Information gathered from the participants were as follows;

One of the WHO personnel said that;
"Every month, at the state level, all the DSNOs are invited to the state for monthly review meeting, and for each quarter, their assistants are invited along. During the meeting, feedback is presented showing their surveillance performances with respect to the number of cases detected by LGA and the indicator for performance, at least each LGA should have at least two suspected cases of yellow ever *for every 100,000 population. So, they see their performance and positivity rate of the samples collected and tested, and when the results are out, it's being sent to WHO and the State".*

"…The State in collaboration with WHO has already developed a template for printing the result and it's being shared among the DSNOs at the end of each quarter who will be given three copies, one for their office, one for the health facility closest to the residents of the case and one for the case him/herself." (30 years old, WHO personnel).

"When we send samples to Lagos for testing, we communicate the result back to the LGA that brought the sample of the suspected cases as soon as we get the result." (53 years old, SE).

The DSNO also said that;
"When we have the result, it is shared with WHO. Previously during their meetings, we share the hard copy but now we use the electronic reporting. We share to the LGA DSNO who in turn gives the reporting facility so as to get back to the client." (55 years old, SDSNO).

Responses regarding information sharing within the LGA included;
"For instance, in my LGA, this year I have reported 2 suspected yellow fever cases, and as soon as we were given the feedback that they were negative, I have to tell the focal person. Through the focal person, the community informant will get the information that the case suspected is negative" (57 years old, LGA DSNO)

Another LGA DSNO said that;
"When the result is received immediately from WHO, State or NCDC, we give the health facilities feedback firstly through a phone call and we give them a copy of the result when the result is out" (44 years old, LGA DSNO).

Enabling Factors (Infrastructure, Logistics resource, and Finance)
This section examined how reporting forms, sample collection materials, and yellow fever guideline are provided for the surveillance officers. Also, it examined the schedule for training for surveillance officers and how surveillance is financed.

The responses on how reporting forms are being provided to the LGA shows that the State Ministry of Health, and partners such as WHO and NCDC provides the reporting form. Therefore, the state gives the form to the LGA and the LGA team shares it with health facilities within their local government area. Responses on this subject were as detailed below;

One of the WHO personnel said that;
"…Forms are provided by the government (SMOH) and NCDC and is being sent to the State. At the beginning of each year when the first surveillance review meeting is held, it's being distributed to the LGA DSNOs based on the number of their health facilities".

"…The three major IDSR forms that are required are the IDSR 001A, B and C, IDSR 002 and IDSR 003".

"…IDSR 002 is the weekly reporting form where each health facility and the LGA at large indicates the number of cases that were detected for that week and IDSR 003 is the monthly form. ISDR 001A is the investigation form for suspected cases of yellow fever, IDSR 001B is the laboratory form and IDSR 001C is for the line list of suspected cases." (30 years old, WHO personnel).

The DSNO said that;
"*We have the old one and the new one. NCDC was responsible for providing the old ones though not sufficient. WHO is planning to support in that line.*" *(55 years old, SDSNO).*

The LGA DSNOs corresponded by saying that;
"The WHO and State do provide the forms for us, and we distribute them to the health care workers, all the health facilities within the LGA" (48 years old, LGA DSNO)

"We normally give them the forms already prepared from the SMOH and WHO. All information is being collected through that IDSR forms." (46 years old, LGA DSNO).

For sample collection materials, all the participants emphasized that they are provided by the State Ministry of Health and supported by WHO.

Typical responses included;
"The state provides sample collection materials to the LGA team through the support of partners such as WHO."(53 years old, SE).

"WHO or State provides the sample bottles and other materials generally."(45-year-old SLFP).

A WHO personnel said that;
"…They are provided by the state through the State Ministry of Health and in some instances, supported by WHO and it is being provided to the DSNOs the same period when the forms are being distributed" (52 years old, WHO focal person).

One of the LGA DSNO said that;
"We are getting all our sample collection materials through the SMOH, WHO, and through that we give it to them for immediate sample collection." (44 years old, LGA DSNO).

For the provision of yellow fever guideline to healthcare workers and community informants, majority of the responses also affirms that the State Ministry of Health provides the guideline to the LGA with the support of partners such as

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WHO and NCDC. The LGA team then shares with the health facilities in their respective LGA. Typical responses included;

One LGA DSNO said that;
"It is given to every health caregiver which are the focal persons through the SMOH and WHO" (56 years old, LGA DSNO).

Another response from a LGA DSNO;
"We have guidelines on yellow fever. The State, WHO, NCDC provide it for us, and they are being given to the health facility." (57 years old, LGA DSNO).

"…The yellow fever guideline is provided through the NCDC, the support of the state" (44 years old, LGA DSNO).

One of the state officers said that;
"We have the national guidelines from NCDC, so we have the guidelines that the state use to guide its activities, and it is also shared with the LGA team" (53 years old, SE).

One of the WHO personnel stated that;
"Once there is any new update and it's been provided by federal ministry of health, it's been distributed directly through the office of the State Epidemiologist and State DSNO to the LGA DSNOs who then distributes accordingly to their health facilities" (40 years old, WHO personnel).

The responses to the question on the provision of training to LGA team revealed that training is being conducted for focal persons and community informant ones annually. Likewise, the State officers affirmed that the monthly surveillance meeting is also leveraged upon and sometimes serves as a training platform for the LGA DSNOs.

The DSNO said that;
"We conduct training for the focal persons and community informants yearly and we also train the DSNOs during their monthly review meeting." (55 years old, SDSNO).

"Training is done annually. We also leverage on monthly meetings we organize for DSNOs to update them and look at the challenges and gaps." (53 years old, SE).

Some of the LGA DSNOs also said that they conduct on-the-job training for their focal persons sometimes when they go for visit.

The LGA DSNOs stated as follows;
"…The community informants were trained and giving information on all those priority diseases. It is done whenever we go for ACS. It is an on-the-job training. WHO also trains them annually." (48 years old, LGA DSNO).

"…Our healthcare workers and community informants do have the training once in a year." (56 years old, LGA DSNO).
"…WHO and State trains the DSNOs, healthcare workers, and community informants yearly. Also, whenever we go for ACS, we sensitize them on case definition and case detection." (46 years old, LGA DSNO).

The response of one of the WHO personnel stood out, where he said that;

"In the spirit of integration, the training is not solely for yellow fever, but on other IDSR priority diseases. It is conducted annually, not only for LGA team that is, the LIO, DSNO, PHC coordinator, surveillance focal person, community informants, healthcare workers from other non-reporting sites but also for pharmacists, nurses, private practitioners, medical doctors, PMVs, and other orthodox health personnel" (30 years old, WHO personnel).

The responses to how yellow fever surveillance is being financed revealed that yellow fever surveillance does not have any special budget or allocation, however, the system rides on financing of other epidermic-prone diseases such as measles. The information garnered were as follows;

The DSNO stated;
"We leverage on measle surveillance. WHO provides funds for measle sample transportation, but there is no provision for YF and that's why we are not having expected number of suspected cases." (55 years old, SDSNO).

One of the WHO personnel said that;
"Partners, WHO to be precise is financing YF surveillance but not solely YF. It rides on the financing of measles surveillance." (52 years old, WHO personnel).

The LGA DSNOs explained that;
"There is no finance from LGA, nothing (48 years old, LGA DSNO)"

"We rely on God and with the full determination that we have accepted the job. No financial support from any LGA chairman, but we decide to do it as part of our job." (56 years old, LGA DSNO).

Challenges In Yellow Fever Surveillance
The challenges mentioned during the course of this interview were lack of funding, poor vaccination coverage, insufficient political support, attitude of community members in terms of demand for healthcare, poor access to healthcare, lack of sufficient training for surveillance actors, sample management in terms of turnaround time. The responses received from participants are encapsulated below;

The DSNO asserted that;
"We have challenge with subject matter experts. We don't have entomologists and the likes of them in our technical working group. Also, yellow fever surveillance is receiving less attention because one confirmed case is an outbreak and the support needed is not available. Lack of budget is a challenge. People in surveillance do not have access to the political heads that will key into it and the people that have the access do not have the adequate information used to drive yellow fever surveillance." (55 years old, SDSNO).

Other responses included;
"We still have challenges with our sample management. Samples are delayed before getting to the laboratory and results takes time before being communicated." (45 years old, SLFP).

One of the WHO personnel said that;

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"The turn-around time of results. The State does not have a lab well equipped for test for confirmation of yellow fever."
"…then it takes up to about 2 weeks before the results comes around and by then, if the result happens to be positive sometimes the cases are lost to follow up." (30 years old, WHO personnel).

Another WHO personnel affirmed that;
"The vaccination coverage for yellow fever is suboptimal. The demand for healthcare is also low among the community members and some don't have access to healthcare".

"…insufficient political support for yellow fever surveillance nationally is also a challenge" (52 years old, WHO personnel).

DISCUSSION

In this study, it was established that healthcare workers and community informants play a pivotal role in yellow fever surveillance. The study revealed that the community informants are responsible for case detection at the community level while the healthcare workers are responsible for case detection at the health facility. This is in tandem with the study by Amare et al. (2023) where healthcare workers and community volunteers were instrumental to screening and case detection of tuberculosis. The study revealed that in identifying cases, the case definition for yellow fever is used, and this serves as a guide for the personnel. Kasolo et al. (2013) agreed that the use of standard case definitions is a standardized form of identifying suspected cases and that it helps healthcare workers across all levels. Likewise, the study of Toda et al. (2018) showed that adequate knowledge of standard case definition will support healthcare workers in reporting diseases adequately. As regards reporting, this study revealed that any suspected case of yellow fever is reported to the next level immediately and investigation commences.

Reinforcing factors identified in this study focused on supervision and information sharing. The analyzed responses showed that supervision at the health facility is done following the prioritization of health facilities. The prioritization included high, medium, and low priority. High-priority health facilities are visited every week, medium-priority health facilities are visited fortnightly, while low low-priority health facilities are visited once every month. Furthermore, supervision by state official to the LGA level is done using a joint supervisory plan between the State Ministry of Health (SMOH) and WHO team. As regards Information sharing, it was said that various platforms including monthly meetings are used to provide feedback to the LGA team. Likewise, results of yellow fever received from the laboratory are shared from the state down to the LGA DSNOs, to the health facility focal persons, and then to the patients.

Enabling factors investigated in the study showed that materials such as reporting forms, sample collection materials, and the yellow fever guideline is provided by the SMOH and other partners such as WHO and NCDC. As regards training of personnel, this study revealed that there is no specific training for yellow fever surveillance, however, there is an annual training provided to the healthcare workers and community informant which focuses on detection and reporting of priority diseases. In the same regard, the study of Isere, Fatiregun, and Ajayi (2015) emphasize that the IDSR guideline should be provided to all health facilities and training should be provided to enhance efficient implementation. In respect to financial resources, the results showed that there is no specific budget for yellow fever surveillance, however, yellow fever surveillance benefit from other resources available for other activities such as Acute Flaccid Paralysis (AFP) and Measles.

Challenges bedeviling the surveillance of yellow fever in Oyo State lack of sufficient subject matter experts such as entomologist to conduct entomology survey. Further, financing was also identified as another challenge hindering the efficiency of yellow fever surveillance in Oyo State. The study conducted by Oleribe et al. (2019) establish the fact that inadequate human resource contributes significantly to the current state of the health sector in Africa. Likewise, the also highlighted lack of sufficient funds as a challenge. Other problems raised included suboptimal vaccination coverage. Bassey et al. (2022) recommended that routine immunization exercise be strengthened to enhance population immunity.

In conclusion, yellow fever surveillance is an ongoing process that requires the engagement of healthcare workers at the health facility level and community informants at the community level. It is therefore recommended that the government and relevant stakeholders should endeavor to have a dedicated budget to adequately fund yellow fever surveillance activities in the state.

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