

# Evaluation of Malaria Surveillance System in Ebonyi state, Nigeria, 2014

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## Abstract

**Background:** Nigeria accounts for 25% of the malaria disease burden in Sub-Saharan Africa. Responsive surveillance systems are critical for the success of malaria control and elimination. We evaluated the malaria surveillance system to describe the attributes and the process of operation. **Methods:** The evaluation was conducted using the “CDC’s Updated Guidelines for Evaluating Public Health Surveillance System. **Results:** Altogether, 385314 suspected cases were reported, out of which 305879 (79%) were laboratory confirmed. More cases of malaria were noted between April and September. Of the 535 public health facilities, 456 (85%) health facilities had the harmonized Health Management Information System (HMIS) data capturing tools of which 351 (77%) reported monthly aggregated data and 433 (95%) met the monthly deadline. The 149 (22%) private health facilities did not submit malaria surveillance data to HMIS. However, 8/10 (80%) of the stakeholders interviewed reported that the system can accommodate modification and that the forms were easy to complete while 9/10 (90%) of the stakeholders admitted that the system contributed to prevention and control of malaria and have the willingness to use the system. Forty percent of system’s operating resources were provided by donors. **Conclusion:** The surveillance system was found to be simple, useful, flexible and acceptable but not representative.

**Keywords:** Ebonyi state; Evaluation; Malaria; Surveillance

## Introduction

Globally malaria infects between 300-500 million people annually resulting in nearly one million deaths. [1] It is a major public health problem in Africa affecting mostly children under 5 years and pregnant women. Malaria is the 2nd leading cause of death from infectious diseases in Africa, after HIV/AIDS. [2] Almost one out of five deaths of children under 5 in Africa is due to malaria. Nigeria accounts for 25% of the disease burden in Sub-Saharan Africa. [2] Responsive surveillance systems are critical for the success of malaria control and elimination. Public health surveillance is the ongoing, systematic collection, analysis, interpretation and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health. [3] Improved surveillance for malaria cases and deaths helps to determine which areas and/or population groups are most affected and enables effective monitoring of changing disease patterns. Strong malaria surveillance systems also help countries design effective health interventions and evaluate the impact of their malaria control programmes. Malaria surveillance is currently weakest in countries with the highest malaria burden, rendering it difficult to accurately assess disease trends and plan interventions. [3]

Despite the Malaria control measures in Ebonyi state, the number of cases remained high. We evaluated the malaria surveillance system in Ebonyi State to describe the attributes and the process of operation. The data generated can be used for immediate public health action, program planning and evaluation, and formulating research hypotheses.

## Methods

Ebonyi State, occupies a land area of 5,953 square kilometres and situated between longitude 7° 30' E and 8° 30' and between latitude 5° 40' and 6° 54'. The State is bounded in the North by Benue state, in the West, by Enugu state; in the East by Cross River state and in the South by Abia state. The state belongs to the South-East geopolitical zone. Ecologically, Ebonyi state lies in the less wet humid tropics with a marked rainy season from April to October and dry season from October to March. The vegetation is mostly derived savannah with forested stretches in the wetter south. Ebonyi lies entirely in the Cross River plains with frequent floods during the rainy season, resulting from poor drainage systems, stagnant streams and ponds that predispose the state to menace of mosquito infestations and malaria endemicity. About 75% of the state population is engaged in subsistent agrarian economic activities. [1]

The numbers of health facilities in the state are 415 Primary health facilities, 13 Secondary health institutions or General Hospitals, 20 new MDG health Centre and one Tertiary health institution. There are six (6) Faith-Based hospitals currently supported by the State Government and four training health

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institutions in the state. There are 149 private health facilities in the State.

The evaluation was conducted using the “CDC’s Updated Guidelines for Evaluating Public Health Surveillance System.”<sup>[2]</sup> This included engaging the stake holders, describing the malaria surveillance system and gathering evidence regarding the performance of the system. A modified checklist of specific questions for the evaluation of Malaria Surveillance system was developed. The checklist was self-administered to various stakeholders. A follow up key informant interview (KII) was done to elucidate detailed information and clarify answer given in the checklist. A semi-structured questionnaire was administered at the health facility level. We interviewed 20 stakeholders (Malaria focal persons and program manager) to determine the simplicity, flexibility, timeliness and acceptability of the system. We reviewed relevant documents like surveillance forms, malaria summary data from the harmonized Health Management Information System(HMIS) data capturing tools, 2014 Malaria Annual operational plan and log books to determine the Sensitivity, Predictive value positive, funding and Representativeness of the system.

We analyzed malaria surveillance data from the period of December 2013 to November 2014 to determine frequencies and proportions.

## Results

As of 2014, malaria surveillance in Ebonyi state was a vertical system coordinated by the State malaria Elimination Program (SMEP) headquartered in Abakaliki. Passive malaria surveillance is conducted year-round across the state. Health care in the state was provided by the both government and private health facilities. Ebonyi state has 684 health facilities of which 149 are private.

All cases in this system are reported to the State Malaria Elimination Program (SMEP) in Abakaliki through the Malaria focal persons. Febrile patients reporting to any health center were screened for malaria, and diagnosis were made by Rapid diagnostic tests (RDTs) or Giemsa-stained blood slide examination for the presence of parasites.

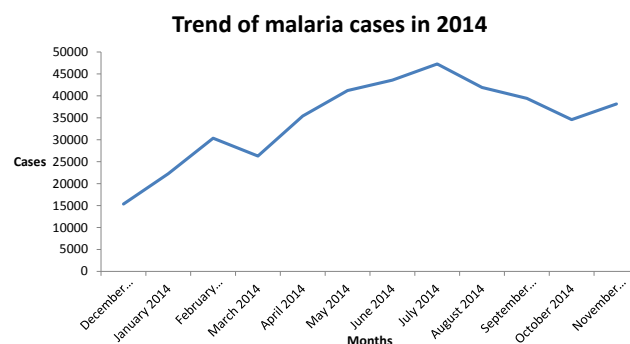
Malaria specific data collected through the National Health Management Information System (NHMIS) were analyzed by the SMEP and used to inform the planning of activities at the local level, including heightened efforts of community outreach, environmental management, and vector studies.

Overall, 385314 suspected cases were reported, out of which 305879 (79%) were laboratory confirmed (300803 were Uncomplicated and 5730 were severe) and 7272 were malaria in pregnancy. Over the period no deaths were reported, 301779 cases tested positive and 4100 were microscopy-confirmed cases [Table 1].

The trend of malaria cases during the study period was shown in Figure 1. Malaria cases were more during April to September with a pick in July. Decline in the cases were seen in March and October.

**Table 1: Selected malaria indicators as recorded in NHMIS from Public health facilities in Ebonyi state, December 2014.**

Diagnosis	Malaria cases (Total fever cases=385314)	Percentages
Fever cases tested by RDT	370184	96.1
RDT tested positive	301779	78.3
Microscopy tested positive	4100	1.1
Uncomplicated	300803	98.1
Severe	5,730	1.5
Malaria in pregnancy	7272	18.9
Clinical Malaria	38155	9.9



**Figure 1:** Reveals the number of malaria cases in Public health facilities in Ebonyi state during December 2013-November 2014.

### Representativeness

Of the 535 public health facilities, 456 (85%) health facilities had the harmonized Health Management Information System (HMIS) data capturing tools of which 351 (77%) reported monthly aggregated data. The 149 (22%) private health facilities did not submit malaria surveillance data to HMIS.

### Acceptability

Difficulties were encountered initially but with training of the malaria focal persons and sensitization visits to the health facilities, there was full participation of all stakeholders. Nine (90%) of the stakeholders interviewed reported that they were willing to continue to use the system.

### Flexibility

Eight (80%) of the stakeholders interviewed reported that the system can accommodate modification.

### Timeliness

All health facility records and surveillance report forms were completed on paper and delivered to the SMEP every month. All data were received by the Information Unit of the SMEP. Four hundred and thirty three health facilities (95%) met the monthly deadline.

### Simplicity

Surveillance forms were easy to fill and the case definitions were well understood by the stakeholders. Eight (80%) of the stakeholders interviewed reported that the forms are easy to complete. Diagnosis was strictly by RDT or Microscopy by trained personnel.

## Usefulness

The system generated data that identified high priority areas and the trend of malaria cases. The information was used by the state ministry of health during the allocation of malaria commodities to the LGAs. Nine (90%) of the stakeholders admitted that the system contributed to prevention and control of malaria in the state.

## Data quality

Forms were filled by trained malaria focal persons and data collected were analyzed by trained Monitoring and Evaluation officers. The data review meeting at the State Level and data quality validation meeting at the LGA level held monthly. Data quality assurance exercise was conducted quarterly.

## Stability

The malaria control activities were funded by the Ebonyi state Government, the Local Government Areas, and Donors-the WHO, the Global Fund and MAPS [Figure 2].

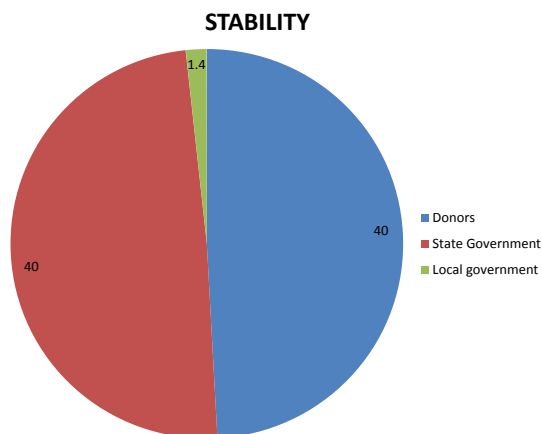


Figure 2: Shows stability of the system.

Forty percent of system's operating resources were provided by donors, 40% by the state government and 20% by the local government.

## Discussion

The malaria surveillance system in Ebonyi 2014 was evaluated using CDC guidelines for the evaluation of public health surveillance systems for its attributes and system of operations. This surveillance system captures data related to malaria morbidity, mortality, diagnosis, and treatment.

One primary purpose of this surveillance system was to detect malaria outbreaks through regular analysis and reporting of data to inform appropriate public health responses. By April 2014, the surveillance system identified a rise in malaria cases which lasted till September and peaked in July. More cases of malaria were noted between April and September, this is the period of rainy seasons with its attendant flooding, and stagnant streams and ponds. This predisposes the state to menace of mosquito infestations and malaria endemicity. Standard responses to these epidemics were to notify local health authorities and malaria control partners, and to ensure that health centres and health posts were adequately supplied for testing and treatment; local partners and authorities also increased targeted interventions in

the areas. There were sharp declines in the months of March and October due to massive campaign and distribution of LLIN in the state.

At the health post level, malaria RDTs are utilized exclusively, and it currently appears that more than half of all malaria cases in Ebonyi state are diagnosed based upon RDT results. Ebonyi state has high malaria transmission levels. When there is high malaria transmission, false negativity due to low sensitivity of both RDTs and microscopy at low parasite densities may prove problematic.<sup>[4-6]</sup> Conversely, false positives may lead to overuse of anti-malarial drugs and a failure to properly delineate areas of the country absent of malaria risk. Malaria prevention and control programmes must ensure quality of laboratory confirmation especially in high transmission areas.

The malaria surveillance systems in Ebonyi state lack the ability to produce generalisable data as the private health facilities do not submit data to the HMIS. The system as it currently stands is quite simple. There are no intervening entities between the point of diagnosis and the center of data receipt and analysis. Case definitions were well understood by participants, with willingness to continue to sustain the system. Standardized data collection tools (stationery, paper and electronic based forms) were in place, and data communication was clear with feedback to surveillance units at all levels. The malaria surveillance system in Ebonyi state was rated by stakeholders as simple.

Although the paper-based data reporting process at health facilities has been fairly successful in delivering quality data to stakeholders on a monthly basis, the reliance on this slowed the process and was resource-intensive. Four hundred and thirty three health facilities (95%) met the monthly deadline. The integration of electronic based data reporting process and weekly SMS reporting will greatly improve the timeliness of the surveillance system.

The surveillance system has helped in the generation of data on malaria in the state, the peak periods and the communities with more cases in a year. The malaria surveillance system in Ebonyi state was rated by stakeholders as simple, flexible, acceptable and useful. The system was timely however it was not representative as private health facilities did not submit data. There were few cases of severe malaria. No malaria death was recorded. There were sharp declines in the months of March and October due to massive campaign and distribution of LLIN in the state.

We found the surveillance to be useful with good data quality. This was not surprising as the malaria focal persons and monitoring and evaluation officers were trained. We found the system to be simple, and stable. The funding of the system operation was based on the contribution from the State government, LGAs and donors.

## Conclusion

Overall, from our assessment, the malaria surveillance system appeared strong and produced data that was useful and of good quality. The performance of the system has been critical to the major reductions of malaria morbidity and mortality in Ebonyi

state. However, elimination will require the system to function at an even higher level.

### Conflict of Interest

All authors disclose that there was no conflict of interest.

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