

## Research Article

# Evaluation of the Neglected Tropical Diseases Surveillance System in Kaduna State, Nigeria, 2019

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## Abstract

**Background:** Neglected Tropical Diseases (NTDs) are a group of chronic diseases and conditions that are commonly found among the world's poorest. In Africa, NTDs have been associated with increase in Disability-Adjusted Life Years (DALY). Unlike other diseases like malaria, measles and acute flaccid paralysis, NTDs surveillance system has hardly been evaluated in Nigeria. We described and evaluated the process of operation of the NTDs surveillance system in Kaduna State and assessed its key attributes.

**Method:** We adapted the United States Center for Disease Control and Prevention (CDC), 2001 guideline for surveillance evaluation in describing the attributes of the system. We interviewed key stakeholders operating the NTD surveillance system and analysed an eight-year retrospective NTD surveillance data. We calculated proportions, means, standard deviation and generated maps using Epi Info version 7.2.3 and QGIS 2.18.13.

**Result:** Of the 40 stakeholders interviewed, 34 (85%) were of the opinion that a change in the surveillance process can easily be accommodated in the Integrated Disease Surveillance and Response (IDSR) strategy, 24 (60%) of the stakeholders admit to the system being able to also detect all NTDs in Kaduna State while 35 (88%) expressed difficulties in working within the present system. They attributed these difficulties to work overload, lack of clarity in work and information flow, and poor inter-unit relationship. Lymphatic Filariasis was the most frequent NTD identified by this system. Poor network, inadequate funds and lack of data harmony between the FMOH/WHO and IDSR strategies are some challenges that affect timeliness of reporting. Between 2010 to 2017, the surveillance system through therapeutic Mass Drug Administration (MDA) coverage achieved its required target. However, this target fell short for Schistosomiasis (51%) in 2015 when its treatment commenced.

**Conclusion:** Kaduna State NTDs surveillance system is simple, flexible and acceptable to stakeholders. It is also effectively meeting the required epidemiological coverage.

**Keywords:** Neglected tropical diseases; Surveillance; Evaluation; Kaduna state

## Abbreviations

APOC: African Programme on Onchocerciasis Control; CDC: United States Center for Disease Control; CDTI: Community Directed Treatment with Ivermectin; DALY: Disability Adjusted Life Years; FMOH: Federal Ministry of Health; IDSR: Integrated Disease Surveillance and Response; KII: Key Informants Interview; KSMoH: Kaduna State Ministry of Health; LF: Lymphatic Filariasis; LGA: Local Government Area; LMIC: Low and Middle Income Countries; MDA: Mass Drug Administration; NTD: Neglected Tropical Disease; STH: Soil Transmitted Helminths; USD: United State Dollars; WHO: World Health Organization

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## Introduction

Neglected Tropical Diseases (NTDs) affects over one billion people globally, mostly women and children [1-3]. These 17 infections are common in tropical areas primarily in Low- and Middle-Income Countries (LMICs) of Africa, Asia and Latin America [4,5]. In Africa, NTDs burden equals one-half the disease burden from malaria when measured in Disability-Adjusted Life Years (DALY). Nigeria has the highest number of intestinal helminth infections, schistosomiasis, Lymphatic Filariasis (LF) and onchocerciasis worldwide. It also has an estimated 18 million people at risk for trachoma, with nearly 1.3 million people living with trichiasis, and the third or fourth largest number of new cases of leprosy in Africa [6].

Nigeria has the highest number of people with NTDs infection in Africa [3]. Kaduna State is endemic for all the NTDs except Trachoma [5]. In 1997, Kaduna State government in partnership with the affected LGAs adopted the Community Directed Treatment with Ivermectin (CDTI) as an approach to intervention. In 1998, Onchocerciasis treatment using the CDTI strategy commenced in all the endemic LGAs [5]. In 2008, ten years after the first Mass Drug Administration (MDA) against onchocerciasis, a pre-elimination survey was conducted in two onchocerciasis foci (Birnin Gwari and Kauru/Lere LGAs). The result showed absence of microfilariae in skin snip samples [5].

In 2013, Schistosomiasis and Soil Transmitted Helminths (STH) disease mapping was conducted and results showed endemicity in 23 and 17 LGAs respectively. In 2015, treatment for Schistosomiasis commenced in 12 of 23 LGAs while treatment for STH also commenced in 11 of 17 LGAs. In the same year, treatment for Lymphatic Filariasis (LF) was scaled up to additional 5 LGAs making it 12 LGAs as at 2015. Lymphatic Filariasis pre-elimination baseline survey was conducted in two sentinel sites (Kwasallo in Soba and Galadimawa in Giwa LGAs) and no larval stage of *W. Bancrofti* were recovered from mosquitoes collected in both communities [5]. Early in 2019, treatment against Trachoma had commenced in Igabi LGA and there were plans towards scaling down Onchocerciasis.

The progress made in the elimination and control of NTDs in Kaduna State could be lost if effective surveillance system is not maintained. We therefore evaluated the NTDs surveillance system in Kaduna State and described the key attributes of the system.

## Materials and Methods

### Study setting, design and population

Kaduna State, located in the North western part of Nigeria has an estimated population of 7.8 million as at 2016 [5]. The NTDs surveillance system in Kaduna is operated by FMOH with support from World Health Organization (WHO) and this is parallel to the IDSR strategy. There are two Onchocerciasis foci located along rivers Mariga and Kungi in Birnin Gwari, Galma and Karami in Kauru and Lere LGAs respectively.

We evaluated the surveillance system through a mixed method approach: Key Informant Interview (KII) on stakeholders, and analysis of state level surveillance data. A standardized semi-structured questionnaire (Additional file 1) was self-administered to forty respondents selected purposively: 23 NTDs focal persons from the 23 LGAs, NTDs state coordination alongside 7 NTDs State staff, State epidemiologist and 8 staff from Sight savers. Information on the demographic characteristics, years of experience and attributes of the surveillance system was collected. The questionnaire interview guide was adapted from the CDC, 2001 updated guidelines for the evaluation of public health surveillance system. The respondents were selected on the basis of their experience and role in providing technical assistance to NTDs surveillance at the LGA and State level. A retrospective review and analysis of 2010-2017 MDA epidemiological/therapeutic coverage data for Lymphatic Filariasis, Onchocerciasis, Soil Transmitted Helminth and Schistosomiasis was conducted.

### Operational definitions

**Population at risk:** This refers to a group of persons exposed to one or more NTDs infection in Kaduna State.

**Eligible/targeted population:** This refers to a specific number of persons that have been enumerated by the community implementers for NTDs drug intervention in Kaduna State.

**MDA epidemiological/therapeutic coverage:**  $(\text{Population treated})/(\text{at risk population}) \times 100$

At least 65% of the entire population at risk must take Ivermectin and Albendazole for an effective MDA epidemiologic/therapeutic coverage.

**Programmatic coverage:**  $(\text{Population treated})/(\text{eligible population}) \times 100$ . Programmatic coverage is often an estimate deduced from the therapeutic coverage. Therefore, a therapeutic

coverage of 65% in a population at risk is considered to be equivalent to the programmatic coverage of 80% of that eligible population.

**Simplicity:** The simplicity of a surveillance system refers to both its structure and ease of operation [6].

**Flexibility:** A flexible public health surveillance system adapts to changing information needs or operating conditions with little or no additional time, personnel, or allocated funds [6].

**Data quality:** This reflects the completeness and validity of the data recorded in the surveillance system [6].

**Acceptability:** This reflects the willingness of persons and organizations to participate in the surveillance system [6].

**Sensitivity:** Refers to the proportion of NTDs detected by the surveillance system and the ability to monitor changes in the number of cases over time [6].

**Timeliness:** This reflects the speed between steps in a public health surveillance system [6].

**Stability:** This refers to the reliability and availability of a public health surveillance system [6].

**Representativeness:** This refers to the ability of the surveillance system to accurately describe the occurrence of disease or health related events over time as well as the distribution of such diseases or health related events in the population by place and person [6].

### Data analysis

Comparison was achieved using the standard CDC guidelines to describe findings from quantitative and qualitative assessments generated from this evaluation. Descriptive statistics was conducted on the quantitative data generated from the survey and those extracted from FMOH/WHO routine feedback using Microsoft Excel 2019, Epi Info version 7.2.3 and QGIS 2.18.13 mapping software. The information was summarized in frequencies, proportions, means, standard deviations and maps. Qualitative assessment was performed by measuring key indicators such as adaptability of the system and funding sources.

## Results

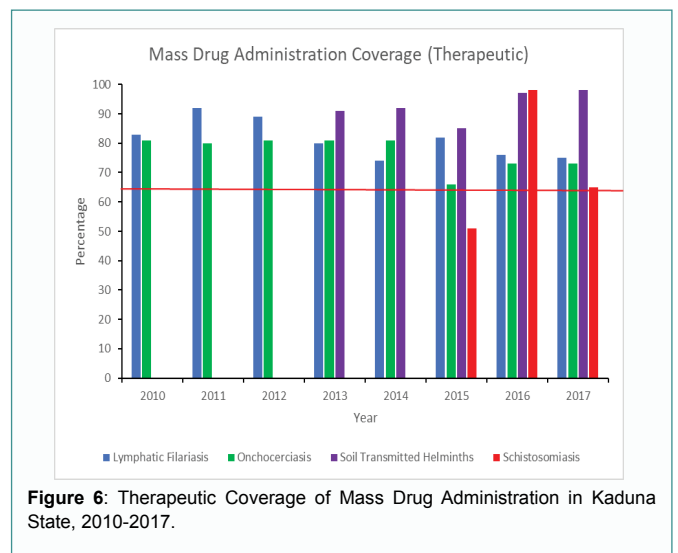
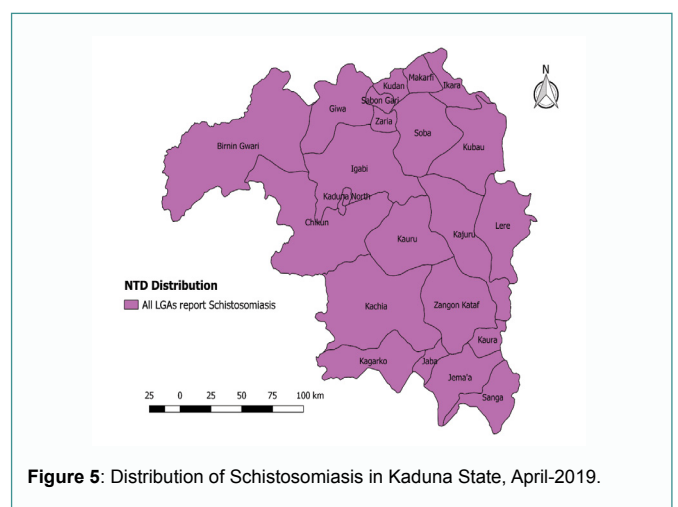
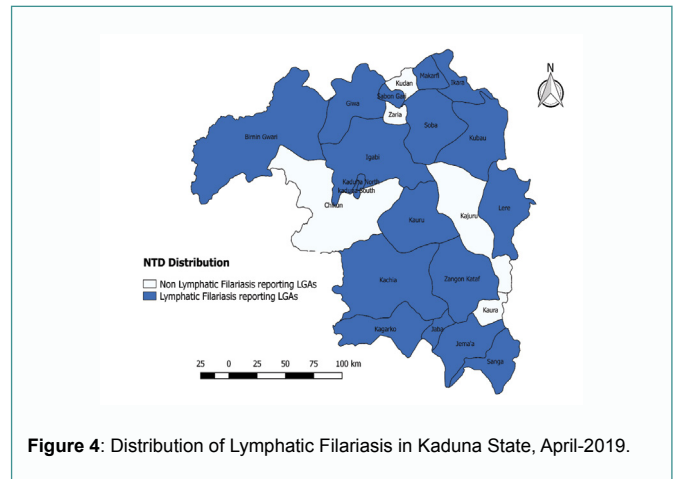
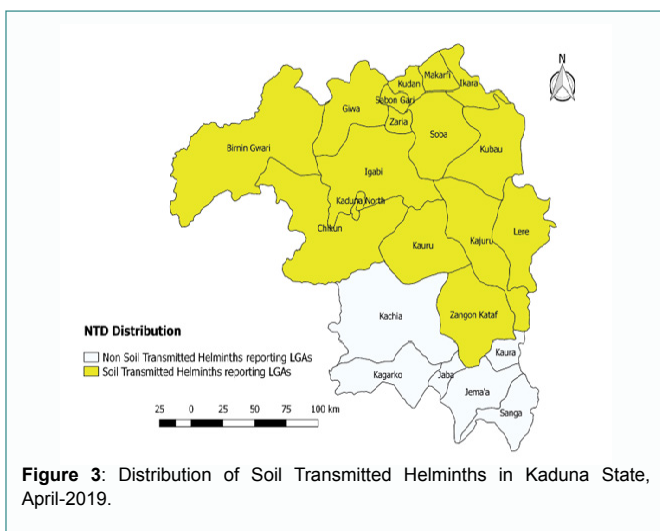
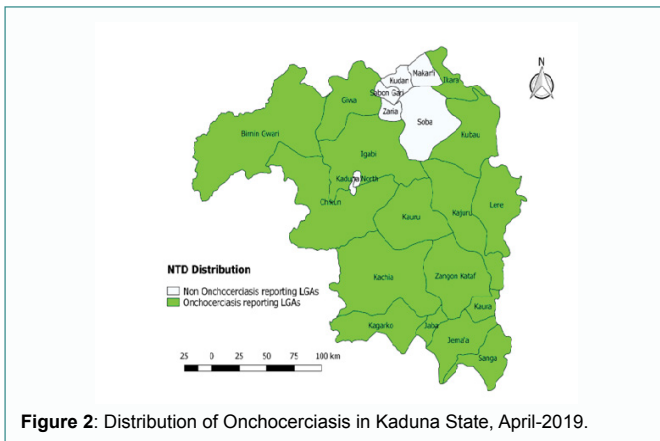
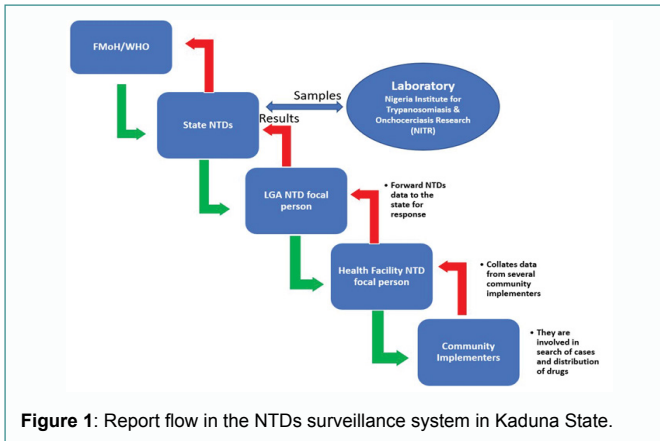
### Demographic characteristics of respondents

Forty key stakeholders with a mean age of  $42 \pm 9$  years were interviewed. Thirty-seven (92.5%) among them were less than 51 years, while 26 (65%) were males. The mean work experience was  $11 \pm 8$  years with 36 (90%) of them having  $\geq 3$  years of experience on NTDs surveillance.

### Description of the NTDs Surveillance System in Kaduna State

The NTDs surveillance system in Kaduna State works in parallel with the IDSR strategy. It consists of stakeholders at the community, LGA and state levels who are responsible for data collection and collation, and micro planning of intervention activities. The monitoring and evaluation officer is responsible for data entry into the FMOH/WHO NTDs database while the NTDs program manager and desk officers for each disease offers technical assistance. Since this surveillance is community-based, data flows from community implementers who are involved in case search and drug distribution to the health facility. At the health facility level, the health facility focal person collates data from several community implementers

within the catchment area of that facility. The LGA NTDs focal person collates data from health facilities and forward to the state for action (Figure 1). Four of the NTDs of interest were endemic across Kaduna State as at April, 2019. Onchocerciasis was reported in 16 LGAs (Figure 2), STH in 17 LGAs (Figure 3), LF in 18 LGAs (Figure 4) and Schistosomiasis in all LGAs (Figure 5). From 2010-2012, Mass Drug Administration (MDA) was only provided for LF and Onchocerciasis, STH and Schistosomiasis were added to the list in 2013 and 2015 respectively (Figure 6). The minimum required percentage (65%) for an effective therapeutic MDA coverage was achieved for all the NTDs between 2010 and 2017 but for Schistosomiasis in the first year of introduction (2015) into the MDA scheme (Figure 6).



**Kaduna State NTDs surveillance system attributes**

**Simplicity:** Community summary forms are easy to fill, however, thirty-five (88%) stakeholders expressed difficulties in working within the system. They attributed these difficulties to work overload, lack of clarity in work and information flow, and poor inter-unit relationship.

**Flexibility:** All other NTDs in Kaduna State are part of the

priority diseases that are captured in the IDSR. Thirty-four (85%) of the stakeholders believe that the NTD case report and investigation forms can accommodate new variables.

**Data quality:** With the exception of lymphatic filariasis, most data on other NTDs are either scarcely or not available. The data is electronically stored and sometimes partially complete and accurate. However, there is staff dedicated to checking and correcting the completeness and validity of the data collected.

**Acceptability:** Stakeholders interviewed showed enthusiasm in ownership and participation in the NTD surveillance system. They opined that with timely release of funds and NTDs drugs and with adequate security, program challenges will be reduced.

**Sensitivity:** Lymphatic filariasis is the disease mostly reported by this system. Twenty-four (60%) stakeholders admit to the system detecting all NTDs in Kaduna State while 26 (65%) believe the system also detects new NTDs.

**Timeliness:** Twenty-eight (70%) stakeholders think that there are challenges in sending data on timely basis which range between 3 days to 16 weeks; such challenges include poor network, lack of proper logistics and non-inclusion of NTDs database in IDSR strategy. However, eighteen (45%) stakeholders interviewed say it takes the third week of every month to complete monthly report within the new month. Laboratory samples collected and sent to the laboratory takes 24 hr-4 weeks result turnaround time.

**Stability:** The surveillance system for NTDs is stable since there is dedicated staff to record, store, transfer and analyze data. Funds are made available to run the system by the KSMoH, WHO and other partners who have continued to demonstrate their support for the sustenance of the strategy. However, there is good feedback communication from the national and state levels.

**Representativeness:** The system is representative because it captures data on all age groups, gender, public and private health facilities and from the different endemic geographical locations in the state. However, traditional/herbal healing houses are not adequately covered.

## Discussion

The NTDs surveillance system in Kaduna State operates parallel to the IDSR strategy. Nevertheless, it was found to have met certain attributes of a good surveillance system [9]. As at the period of evaluation, the system was meeting its set goal of controlling soil transmitted helminths and schistosomiasis.

The system was simple, flexible and acceptable to stakeholders. However, its stability was affected by the untimely release of funds and poor reporting rate by the LGA focal persons. Three out of the four NTDs under focus in Kaduna state are among the priority diseases listed in the IDSR strategy. LF is mostly reported by the system possibly because its clinical manifestation of swellings as a result of damage to the lymph system in the legs, arms and genitalia [10], makes it easier to be recognized and reported, in addition, its vector might have been difficult to control leading to increased cases [11].

Timely release of funds and drugs amidst provision of security are key to disease elimination and control in Kaduna State. The recent security challenges in certain LGAs disrupted surveillance activities. It is estimated that, to interrupt transmission of LF, MDA compliance must exceed 65% [12]. The system has been very effective in the

treatment of the focused NTDs; between 2010-2017, the system met its epidemiologic coverage for all NTDs except for Schistosomiasis which had coverage of 51% in 2015. As a result of the high therapeutic coverage and other interventions, Onchocerciasis' transmission has been interrupted in Kaduna State and its treatment scaled down as at August, 2019 [13].

We recognize limitations of our evaluation. We could not find similar evaluations (NTDs surveillance system) carried out in Nigeria; these would have been helpful for comparison. Despite this limitation, we observed a functional donor driving NTD surveillance system in Kaduna State. Though its sustainability is a cause for concern and plans should be put in place to encourage more government participation and ownership of the system. Integrating the system into the already existing IDSR approach could help strengthen the system further.

## Conclusion

The NTD surveillance system in Kaduna State is simple, flexible, and acceptable and its MDA coverage was above the set target. We recommend that Kaduna State Ministry of Health should take full ownership of this surveillance system.

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## Authors' Contributions

SPS conceived and designed the evaluation, performed the evaluation and initial draft: SPS, CA, TD, CDU and AD contributed to data analysis and result interpretation: SPS, CA, TD, CDU and AD made substantial contribution to the review of the draft manuscript for intellectual content. All authors read and approved the final manuscript.

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