



Landscape Assessment of Malaria Surveillance in Nigeria

Final Report 2 August 2018



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Acronyms

| | |
|------------|---|
| ACSM | Advocacy, Communication, and Social Mobilization |
| ACT | Artemisinin Combination Therapy |
| AFENET | African Field Epidemiology Network |
| ANC | Antenatal Care |
| CORPs | Community Oriented Resource Person |
| CHAI | Clinton Health Access Initiative |
| MCLS | Malaria Commodity Logistics Systems |
| CRS | Catholic Relief Services |
| DFID | Department for International Development |
| DHIS2 | District Health Information Software 2 |
| DPRS | Department Planning, Research & Statistics |
| DQA | Data Quality Assurance |
| FMOH | Federal Ministry of Health |
| GFATM | The Global Fund to Fight AIDS, Tuberculosis and Malaria |
| GPS | Global Positioning Satellite |
| HISP | Health Information System Program |
| HMB | Hospitals Management Board |
| HMIS | Health Management Information System |
| HSDF | Health Strategy and Delivery Foundation |
| HR | Human Resources |
| ICT | Information communications technology |
| IDSR | Integrated Disease Surveillance and Response |
| IHDMT/IHDM | Integrated Health Data Management Team |
| IPD | In-Patient Department |
| IT | Information Technology |
| KPI | Key Performance Indicators |
| LGA | Local government authority |
| LLIN | Long Lasting Insecticidal Net |
| LQAS | Lot Quality Assurance Sampling |
| M&E | Monitoring and evaluation |
| MSF | Monthly Summary Form |
| N/A | Not Applicable |
| NAFDAC | National Agency for Food and Drug Administration and Control |
| NCDC | National Center for Disease Control |
| NHMIS | National Health Management Information System |
| NMEP | Nigeria Federal Ministry of Health's National Malaria Elimination Programme |



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| | |
|--------|---|
| NMSP | National Malaria Strategic Plan |
| NPHCDA | National Primary Health Care Development Agency |
| NSOP | National Standard Operating Procedures |
| OPD | Out-Patient Department |
| PHC | Primary Health Centre |
| PMI | President's Malaria Initiative |
| PPMV | Propriety and Patent Medicine Vendors |
| PPS | Probability to Proportionate Size Sampling |
| PSP | Pharmaceutical Service Provider, includes PPMVs and Community Pharmacists |
| RDT | Rapid Diagnostic Test |
| RBM | Roll Back Malaria |
| SDP | Service Delivery Point |
| SMEP | State Malaria Elimination Programme |
| SOP | Standard operating procedure |
| SP-AQ | Sulphadoxine-pyrimethamine and amodiaquine |
| TWG | Technical Working Group |
| UNICEF | United Nations Children's Fund |
| WHO | World Health Organization |



Executive Summary

1.1 Background

Nigeria is the most populous country in Africa, with an estimated population of 182 million (WHO, 2016). Nigeria contributes the highest burden to global malaria morbidity and mortality: it has approximately twenty-nine percent (29%) of global malaria cases, and twenty-six percent (26%) of global malaria deaths (WHO, 2016). Despite this high burden, in 2015, the “National Malaria Control Programme” in Nigeria was rebranded as the “National Malaria Elimination Programme (NMEP).”

WHO surveillance guidelines suggest that as countries move towards malaria elimination, surveillance becomes increasingly important in driving decisions to reduce transmission, improve case management, eventually move to case-based surveillance, and ultimately meet elimination targets.

Nigeria’s surveillance system provides an exceptional opportunity to better understand the heterogeneous malaria situation across the country, yet gaps in the surveillance system’s implementation limit the availability of high-quality data and thus the ability to make progress towards malaria elimination through data-driven decisions.

This assessment aimed to comprehensively describe the surveillance system, provide a deeper understanding of the key bottlenecks in the surveillance system, and offer recommendations to resolve these bottlenecks at all levels of the system. The recommendations from this assessment can be used to strengthen the surveillance system, providing a platform on which to move closer to malaria elimination.

1.2 Methodology

The scope of the assessment was to provide an evidence-based, independent assessment of the malaria surveillance landscape through targeted, quantitative surveys and qualitative interviews of those involved in the surveillance process, a review of key documents describing the system, and an analysis of routine data collected through the system.

Primary data collection involved:

- Interviews with participants of the surveillance system at the LGA (n=19), state (n=6), and national levels (n=14) to understand roles and responsibilities, relationships between surveillance system participants, examples of when surveillance data were used, current challenges, and opportunities for strengthening the system.
- Quantitative checklists at the facility (n=116), LGA (n=7), and state (n=8) levels to capture current data collection, reporting, analysis, and use practices, and record observations of processes.

Secondary data from the facility, LGA, state, and national levels were collected from a desk review and the HMIS system, using data from 2013 to 2017.

Data collection for this surveillance landscape assessment occurred from September to October 2017 in six states (Adamawa, Enugu, Kebbi, Lagos, Plateau, and Rivers—one per geopolitical zone).

Limitations of this assessment included the limited sample size, limited geographic scope, operational and technological field challenges in data collection, and the reliance on the quality of data in DHIS2 for secondary HMIS data analysis.

1.3 Results and interpretation

1.3.1 Overview of Nigeria’s malaria surveillance system

Nigeria’s current malaria surveillance landscape is comprised of multiple data generation pathways, each for different programmatic purposes. Of the five malaria-related passive disease surveillance systems, the most notable are the routine health management information system (HMIS) and the Integrated Disease Surveillance and Response (IDSR) system. Nigeria currently does not have any active disease surveillance systems in place.



Nigeria's current malaria surveillance landscape begins with paper-based data collection at the facility level, which is aggregated monthly by facilities and reported monthly to the LGA. LGAs enter HMIS data electronically into the DHIS2 platform. State and National Malaria Elimination Programs have access to view these data and provide quality audits, but they do not generate primary data. LGA, state, and national program members then can analyse and use these data for programmatic decision-making and quality assurance.

Data from community sources (e.g. Community Oriented Resource Persons (CORPs) and proprietary patent medical vendors (PPMVs)) are often missed through this reporting pathway. As a result, data from these entities are often excluded from the central HMIS repository (DHIS2). Secondary and tertiary health facilities report via a separate, less streamlined procedure, resulting in substantial missing data from these facilities.

1.3.2 Inputs into the malaria surveillance system

Guidelines: There are six guideline documents that describe relevant components of the surveillance process. Guidelines were unavailable at the majority ($\geq 70\%$) of health facilities surveyed, likely due to the fact that only 23% of facility respondents were aware of any guidelines/SOPs that help with malaria surveillance. Compounding this lack of awareness is the notion that there are multiple documents containing surveillance information, rather than a single comprehensive document. This requires users to follow multiple sets of guidelines, potentially creating confusion and declined adherence.

Data collection and aggregation tools: Paper registers—including standardized daily OPD, IPD and ANC registers, a community daily register, and a commodity stock card—are used to collect data at health facilities and in the community. Each month, these daily registers are aggregated to generate summaries, recorded on Monthly Summary Forms (MSFs). Overall, data collection tools were widely available. Only 16% of all facilities surveyed reported having a stockout of a register in 60 days prior to this survey. Reported challenges related to data collection tools included register design-related factors (14%), having too many data elements (13%), and having multiple registers to fill (17%).

Infrastructure for data analysis and HMIS access: For analysis, data are first accessed through the web-based DHIS2 repository. National, state, and LGA personnel reported having access to DHIS2. A key challenge with HMIS access is that the web-based DHIS2 platform requires functional IT equipment and Internet connectivity. This infrastructure remains a challenge for some at the LGA level.

Human resource availability and capacity for surveillance:

- *Facility level.* Of facilities surveyed, 50% reported having a dedicated records officer. 54% of facilities had HMIS training for their staff in the last three years. When asked about challenges in surveillance, approximately one third of facility staff cited inadequate training as a challenge for data collection and data reporting, and 87% reported a high workload, resulting from responsibilities beyond data reporting and with respect to other disease programs.
- *LGA level.* At most surveyed LGAs, there was a lack of skill and capacity for data collation, review and analysis. Almost all LGAs expressed the need for additional human resources, especially data officers with skills and capacity for data management. While all LGAs reported receiving some form of training in malaria surveillance in the past three years, there is a high level of attrition among LGA staff, thus requiring more frequent trainings to be conducted. The LGAs depend entirely on the state for resources and technical support. However, states were generally unable to provide these needs except when supported by the NMEP and partners.
- *State level.* SMEPs have four management and technical staff (Program Manager, Monitoring and Evaluation (M&E) officer, data officer, and Malaria Commodity Logistics System (MCLS) officer). In five of the six states visited (all except Adamawa), these staff are fully and exclusively dedicated to the malaria program. Four states (all except Rivers and Adamawa) reported receiving training on malaria surveillance in last three years.



- *National level.* The National Primary Health Care Development Agency (NPHCDA) plays a very important role in the strengthening the human resource requirement for surveillance as they have access to a pool of HR through its technical leadership of major government intervention programs. The NPHCDA actively collaborates with the NMEP and Roll Back Malaria (RBM) partners as members of the HMIS-technical working group and in the technical capacity building for data producers and users at the state and LGA levels.

Funding for malaria surveillance:

Though it is difficult to identify the precise budget allocation for overall malaria surveillance activities, as per the Nigeria Health Information System Policy (2014), a defined annual budget of 2% of the annual health budget is allocated for HIS at all levels.

Funding remains a serious challenge not only to current surveillance activities and system performance, but also to its maintenance and sustainability long-term. Federally, almost all operational costs of surveillance are partner-funded, while the government only provides funds for HR: partner funding accounts for almost 90% of surveillance costs. At the state level, only Lagos reported having any public funding for surveillance. Funding from partners tends to be inconsistent and inadequate, so sustainability of these funds remains a key concern, especially as they decline.

1.3.3 Sensitivity of the system

The surveillance system exhibited low sensitivity: data from less than half of the country's malaria cases (at most 46%) are captured through the surveillance system and are available for use in decisions and programmatic work. Of particular note is the exclusion of data from community and private sector service delivery points, reducing the overall completeness and reliability of malaria information available for decision making.

1.3.4 Adherence to processes & guidelines

Adherence to processes and guidelines was varied at all levels, with relation to timing and completion of registers, data aggregation, and data quality assurance practices. In some places, procedures were well in line with national guidelines, but other places had deviations for the same processes.

1.3.5 Data analysis, data quality, and use of data for decision making

Analyses of surveillance data are done predominately at the LGA, state, and national levels; it is uncommon at the facility level. There was variation in the frequency and methods that each state and LGA use to conduct analyses. Two states (Lagos and Kebbi) reported doing routine monthly analysis, whereas the remaining four states analysed data less frequently, including states that reported doing no surveillance data analysis. Data analysis and use at the LGA level were rare and inconsistent.

At the state level, data are primarily used for commodity forecasting, resource mobilization, advocacy, and sensitization. At the national level, NMEP analyses data electronically to evaluate data quality and malaria disease trends. Nationally, the Department of Planning, Research and Statistics (DPRS) uses all health surveillance data—beyond malaria—to advise the ministry on health trends, policies, priority setting, resource mobilization, and responses. NMEP uses malaria-specific data from HMIS to provide feedback to states related to surveillance activities, to address data quality audit (DQA) findings, to identify and resolve programming issues, and for policy, decision making, and resource mobilization. Feedback and sharing of results with various stakeholders occur quarterly.

1.3.6 Performance of the system: reporting rates, timeliness, consistency

NHMIS data reporting has improved substantially from 2013 through 2017. Most recently, in 2017, an average of 83% of facilities in DHIS2 reported each month. Timeliness of data reporting also has improved over time, with nearly 73% of expected reports received on time in 2017.



1.4 Stakeholder recommendations

Stakeholders provided a number of recommendations at the national, state, and local government level. Broadly, recommendations related to increasing funding and HR availability and capacity at all levels, as well as increasing harmonization of surveillance tools/processes at all levels, and improving data use at subnational levels.

1.5 Conclusions and discussion

To date, key successes in malaria surveillance include movement towards an integrated national routine health information system, improved reporting rates and timeliness, and NMEP-led capacity building, skill development, and training initiatives to improved capacity of M&E teams at national and state levels.

Key challenges that persist in the malaria surveillance system include: multiple SOPs, program obligations, and parallel reporting systems; lack of dedicated staff for surveillance, and high workload/other competing priorities among facility staff; inadequate quality assurance mechanisms; limited data use at subnational levels; and missing sectors and limited participation from the private sector and community in the HMIS system.

Nine surveillance system attributes evaluated: simplicity, acceptability, flexibility, availability, timeliness, data quality, sustainability, reliability/stability, and availability. Of these, five (56%) were ranked low, three (33%) were ranked medium, and one (11%) was ranked high, with high being the ideal ranking for each attribute.

1.6 Recommendations

Recommendations to address each surveillance gap identified are proposed in this report. For example, it is recommended that the multiple surveillance pathways are integrated and harmonized in their guidelines, data collection and reporting processes, so that the multiple types of data can be accessed, analyzed and used comprehensively. It is also recommended that trainings and capacity building at all levels—both in surveillance processes and case management—and data quality assessment activities are tracked in a national database such as DHIS2. Many other detailed recommendations to fill specific gaps in surveillance guidelines, data collection and reporting processes, quality assurance, surveillance infrastructure, and human resources are also proposed.



2. Background

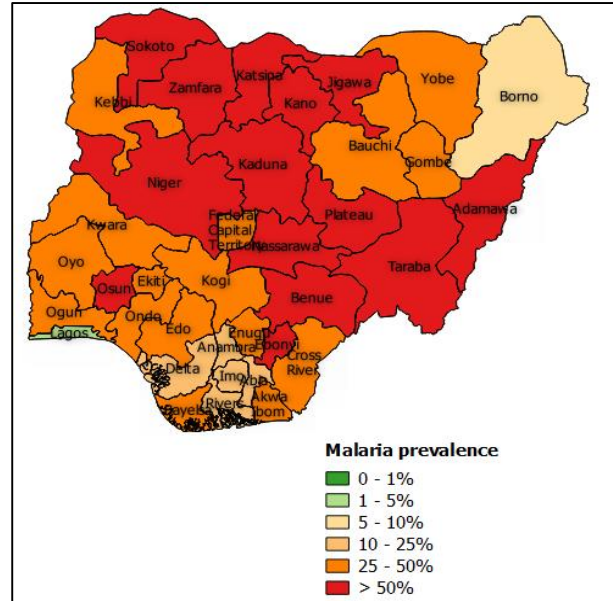
2.1 Malaria Burden in Nigeria

Nigeria is situated in the West African sub-region. Administratively, the country is divided into thirty-six States and one Federal Capital Territory (FCT), Abuja. There are 774 Local Government Areas (LGAs), which is the lowest administrative level. Nigeria is the most populous country in Africa, with an estimated population of 182 million (WHO, 2016). The entire population is at risk for malaria (WHO, 2016).

Diseases such as malaria, diarrheal diseases, acute respiratory infections, vaccine-preventable diseases account for at least 90% of childhood morbidity, mortality and other childhood health problems in Nigeria. Seventy-six percent (76%) and twenty-four percent (24%) of the population are at high and low risk of malaria respectively (WHO, 2016).

- Nigeria has the highest burden to global malaria morbidity: it has approximately twenty-nine percent (29%) of the global malaria cases, and twenty-six percent (26%) of global malaria deaths—no other single country contributes as high a burden (WHO, 2016).
- Annually, Nigeria has an estimated 61 million malaria cases and 110,000 deaths (WHO, 2016).
- Malaria accounts for eleven percent (11%) of the nation’s maternal mortality (NMEP Strategic Plan, 2014-2020).
- Malaria also accounts for approximately sixty percent (60%) of outpatient visits and thirty percent (30%) of hospitalizations among children under 5 years old (NMCP, 2010).

Figure 1: Malaria prevalence in children age of 5 years tested malaria positive, Source: Malaria Indicator Survey, 2015



However, the incidence of malaria is not uniform throughout the country. Transmission is relatively uniform in the southern region but seasonal in the north. This is due to a variety of factors such as the diverse ecology of the country, socio-demographic factors, varying health system infrastructures, and varied programme implementation (NMEP, 2015).

To reduce malaria incidence and transmission, it is imperative that Nigeria improves reporting and surveillance to mitigate the public health challenge. Nigeria’s current surveillance system provides an exceptional opportunity to better understand the malaria situation across the country. A greater understanding of the malaria burden, trends, and intervention coverage will help the NMEP and SMEPs to identify key strategies to accelerate progress towards malaria elimination and make data-driven decisions to most effectively prioritize interventions and allocate resources.

2.2 Surveillance as a core pillar for malaria elimination in Nigeria

In 2015, the “National Malaria Control Programme” in Nigeria was rebranded as the “National Malaria Elimination Programme (NMEP)”. Though Nigeria is making significant progress toward malaria elimination, there remain opportunities to “transform malaria surveillance into a core intervention,” in line with the third pillar of the World Health Organization (WHO)’s Global Technical Strategy for Malaria 2016-2020 (WHO, 2015).

To achieve this third pillar of the WHO's technical strategy, Nigeria has outlined objectives that address surveillance as part of its National Malaria Strategic Plan (NMSP 2014-2020). Specifically, Objective 6 of the NMSP aims to improve surveillance reporting from health facilities, specifying that ">80% of health facilities in all LGAs report routinely on malaria by 2020, progress is measured, and evidence is used for program improvement" (NMEP& RBM, 2014).

Under this Objective 6, the NMEP specified four strategies in particular that are relevant to surveillance (NMEP& RBM, 2014):

Strategy 1: strengthen routine data generation and flow from public/private facilities and community-based health providers for the national HMIS

Strategy 4: strengthen routine monitoring and supervision,

Strategy 5: strengthen data quality assurance at all levels of reporting,

Strategy 7: strengthen malaria surveillance coordination and linkages with National HMIS

To understand the current malaria surveillance practice in Nigeria, the NMEP conducted a preliminary gap analysis of the surveillance system in 2013 and identified some strengths and weaknesses of the surveillance landscape (e.g. limited feedback on data from higher to lower healthcare levels, exclusion of private sector, infrequent data analysis, and challenges in moving from a paper-based to electronic surveillance system) (NMEP& RBM, 2014).

These findings led to the formulation of new National Malaria Strategic Plan 2014-2020, intending to address these identified gaps. Although the surveillance procedure is outlined in the NMEP M&E Plan (NMEP, 2014) and the Technical Guidelines for IDSR in Nigeria (NMCP, 2013), adherence to these procedures varies in practice.

2.3 Objectives of the Surveillance Landscape Assessment

The purpose of this surveillance assessment was to:

Understand the data pathway process (collection, reporting, analysis and use) of the government routine health data in Nigeria, with specific focus on malaria, identifying the associated challenges and/or opportunities

Generate insights that the NMEP can use to identify and prioritize solutions at all levels of the health system, and draw learnings from other disease surveillance programs where applicable

Specific objectives include:

To conduct an in-depth assessment of Nigeria's malaria surveillance system — including data collection, reporting, analysis, and data use at all levels;

To identify bottlenecks, strengths, and weaknesses in the surveillance system at all levels of the health system;

To provide recommendations to improve the surveillance system's infrastructure, implementation, and use to make strategic policy decisions towards malaria elimination; and

To assess the level of discrepancy between the hard copy data at LGA and facility level with the soft copy data in the national DHIS2 database.



3. Methodology

The scope of the assessment was to provide an evidence-based, independent assessment of the malaria surveillance landscape through targeted quantitative surveys, qualitative interviews, desk review of surveillance documents, and secondary HMIS data review. This assessment included both primary and secondary data.

Primary data collection involved interviews with participants of the surveillance system, and checklists to capture current practices and record observations of processes. Data collection for this surveillance landscape assessment occurred in September and October 2017.

Secondary data from the facility, LGA, state, and national levels were collected from a desk review and the HMIS system, using data from 2013 through 2017.

The study methodology included both quantitative and qualitative methods, which are outlined as follows.

3.1 Qualitative Methods

3.1.1 Rationale

The qualitative methods in this assessment aim to provide insight into the acceptance, success, and performance of the current malaria surveillance system, as it is essential to understand the perception of the key stakeholders involved in the malaria surveillance. This assessment employed qualitative key stakeholder interviews with members of each level of the surveillance system (LGAs, states, national government, and external partners). State selection was based on the criteria for the quantitative interviews, described in the quantitative section. States selected for the quantitative interviews doubled for the qualitative data collection as well.

3.1.2 Sample Size

The sample size for this assessment is described below. More information can be found in Annexure Section 8.1.

Table 1: Sample size: In-depth interviews

| Name of the Organization | Geographic Level | If LGA, Name | No. of Interviews |
|---|------------------|-------------------------------|-------------------|
| National Malaria Elimination Program (NMEP) | National | N/A | 3 |
| Federal Ministry of Health (FMoH) | National | N/A | 5 |
| RBM Partners | National | N/A | 3 |
| HISP | National | N/A | 1 |
| National Association of PPMVs | National | N/A | 1 |
| World Health Organization | National | N/A | 1 |
| Adamawa State | State | Yola South LGA, and Girei LGA | 5 |
| Enugu State | State | Udi LGA | 2 |
| Kebbi State | State | Kebbi LGA and Jega LGA | 6 |
| Lagos State | State | Ikeja LGA | 4 |
| Plateau state | State | Jos South LGA and Mangu LGA | 6 |
| Rivers state | State | Obiakpo and Emoha | 2 |
| Total | | | 39 |



3.1.3 Secondary Literature Review

Desk review: The desk review predominantly focuses on describing the current surveillance system, highlighting:

An overview of the existing surveillance system

A description of the malaria burden and care-seeking behaviour

A description of the technical components of the system as specified in guidelines (e.g. IT system, inputs and outputs, data management and reporting methods)

A description of the landscape of implementing partners and members of the healthcare system involved with malaria surveillance

The overall desk review was conducted through an in-depth literature search of technical guidelines, data reports, previous surveillance and ICT assessments, and published research regarding Nigeria's surveillance system, M&E platform, and data at the state and national level. Relevant documents were found by searching for keywords in the literature. Some of the documents reviewed for desk research were:

***Review of National Guidelines for Surveillance from:**
National Malaria Strategic Plan 2014-2020
National Malaria Elimination Program M & E Plan 2014-2020
Technical Guidelines for Integrated Disease Surveillance and Response in Nigeria 2013 Nigeria
Health Information System Policy 2014*

A full list of references is found in Annex 8.9.

3.1.4 Primary qualitative data collection

In-depth interviews: In-depth interviews were conducted with the key officials from stakeholder organizations including donors, implementing partners, and members of the healthcare system at each level – national, state, LGA, and facility. The objective of in-depth interviews was to produce:

- A better understanding of the steps of the surveillance system in practice, including concordance and discordance with the guidelines
- An understanding of the simplicity, accessibility, flexibility, availability, sustainability, timeliness, completeness, and data quality of the surveillance system

Direct observation: The surveillance practices were observed to produce:

A direct understanding of the steps in the surveillance process, including successes and challenges that may not be mentioned during interviews (e.g. how the records officers are recording data on facility registers, how frequently data are being recorded and at what point of the patient's visit data are being recorded)

An understanding of the simplicity, accessibility, availability, completeness, and quality of data in the surveillance system (e.g. how simple the facility registers are, how easily the users are able to use DHIS and how frequently).



3.1.5 Qualitative tool design and field data

Standard in-depth interview guides were developed specifically for this assessment to assess 45 qualitative indicators. Interview guides were on paper, with space to take notes between questions on the page. At the national/central level, each interview (of approximately 45 minutes' duration) was conducted by two members of the project team. At the subnational levels, interviews were also conducted (of approximately 30-minute duration). Central level interviews were conducted before subnational interviews so that findings from the central level could be used to inform the guides and methods at the subnational level. Interviewers across the selected states, LGA, and facilities were expected to adhere the guides to keep interviews standard across similar discussions in each locality. Moreover, follow-up questions were encouraged to ensure capturing of relevant information. Answers from interviews were recorded in an audio recorder and the transcribed into electronic format and thereafter synthesized for key findings. Data were synthesized using Atlas Ti.

3.2 Quantitative Methods

3.2.1 Rationale

Quantitative methods were employed in this assessment to explore and quantify various aspects of malaria surveillance system at different levels (facilities, LGAs, state and federal).

3.2.2 Sampling methodology

The sampling methodology aimed to achieve a sample of health facilities that was representative of 1) the six geopolitical zones of the country, 2) the varying malaria prevalence across the country, 3) the difference levels of health facility and 4) perceived functionality of the surveillance system for each of the states, based on partner involvement history and political stability. Probability to Proportionate Size Sampling (PPS) sampling design was adopted for states. Surveys were conducted in six states: Enugu, Adamawa, Plateau, Kebbi, Rivers, Lagos.

Table 2, 3 and 4 below show the states facility type, and number of facilities selected per state respectively for the quantitative data collection:

Table 2: Selected sample State based on PPS method

| Geopolitical Zones | Malaria Prevalence (MIS, 2015) | Sample State |
|--|--------------------------------|-----------------|
| South-East | 21-30% | Enugu |
| South-South and North East | 31-40% | Rivers |
| | | Adamawa |
| South-West, North Central and North-West | 41-50% | Lagos |
| | | Plateau |
| | | Kebbi |
| Total | | 6 States |



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Table 3: Total health facility in selected states

| States | Primary | Secondary | Tertiary | Total |
|---------|---------|-----------|----------|-------|
| Enugu | 808 | 527 | 2 | 1337 |
| Rivers | 417 | 54 | 5 | 476 |
| Adamawa | 1010 | 22 | 2 | 1034 |
| Plateau | 1567 | 16 | 2 | 1585 |
| Kebbi | 1142 | 39 | 2 | 1183 |
| Lagos | 1786 | 460 | 7 | 2253 |

Table 4: Selected sample for each selected state

| States | Primary | Secondary | Tertiary |
|--------------|-----------|-----------|----------|
| Enugu | 8 | 41 | 0 |
| Rivers | 4 | 4 | 1 |
| Adamawa | 10 | 2 | 0 |
| Plateau | 16 | 1 | 0 |
| Kebbi | 11 | 3 | 1 |
| Lagos | 11 | 7 | 1 |
| Total | 60 | 58 | 3 |

Table 5: Calculation of Health Facilities based on multi-state stratified systematic random sampling method

| Health Facility | Intended Sample | Actual Sample |
|-----------------|-----------------|---------------|
| Primary | 60 | 83 |
| Secondary | 58 | 31 |
| Tertiary | 3 | 2 |
| Total | 121 | 116 |

Note: The difference in the intended and actual sample is because of a political instability and long-term strike in health facilities in states like Adamawa.



Landscape Assessment of Malaria Surveillance in Nigeria

Table 6: Number of questionnaires at public health facilities, by state

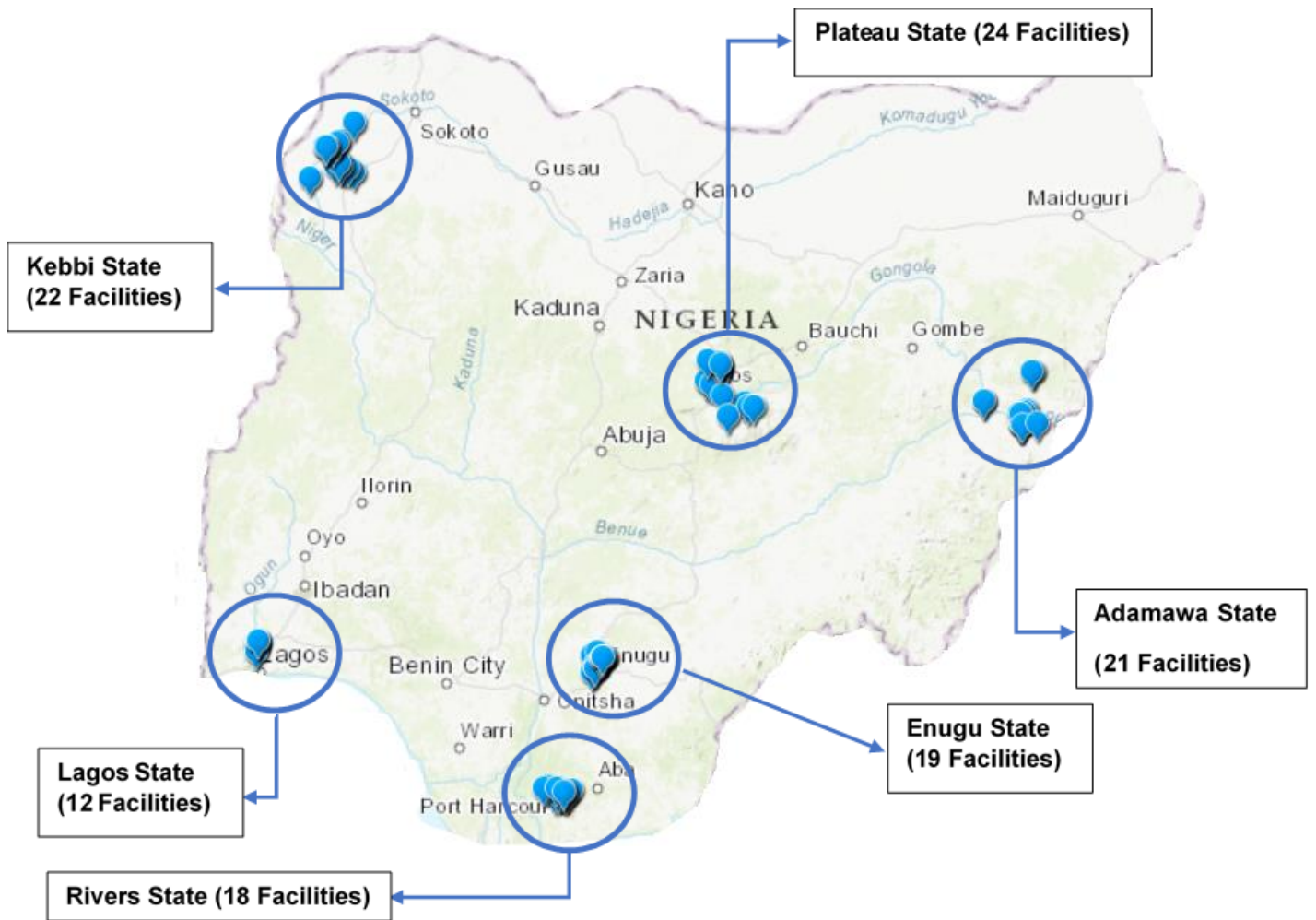
| States | Primary Health Facility | Secondary Health Facility | Tertiary Health Facility |
|---------|-------------------------|---------------------------|--------------------------|
| Enugu | 12 | 4 | 0 |
| Rivers | 13 | 1 | 0 |
| Adamawa | 13 | 3 | 0 |
| Lagos | 11 | 0 | 0 |
| Plateau | 14 | 4 | 1 |
| Kebbi | 13 | 4 | 1 |

Table 7: Number of questionnaires at private health facilities, by state

| States | Primary Health Facility | Secondary Health Facility | Tertiary Health Facility |
|---------|-------------------------|---------------------------|--------------------------|
| Enugu | 1 | 2 | 0 |
| Rivers | 0 | 4 | 0 |
| Adamawa | 0 | 5 | 0 |
| Lagos | 1 | 0 | 0 |
| Plateau | 5 | 0 | 0 |
| Kebbi | 0 | 4 | 0 |



Figure 2: Health facilities visited for Nigeria surveillance landscape assessment (n=116)



Additionally, an interview with the National Associations of PPMVs was also conducted to understand current involvement and capacity to be involved in future surveillance activities.

3.2.3 Tool design, pretest, and data collection

Structured checklists designed specifically for this assessment were used to collect data on 27 selected quantitative indicators in the field. These tools were designed to help descriptively quantify key process indicators, such as acceptability, sensitivity, scalability and performance metrics of the system.

Questionnaires were developed for each type of stakeholder, based on their roles and involvement in malaria surveillance. The drafted questionnaires were subjected to external and internal review and suggestions were incorporated. Pilot testing of the questionnaires was also undertaken, and the questionnaires were adapted based on the results of pilot testing. All study tools used for quantitative primary data collection are attached as Annexure 1.

Data collection occurred from September to October 2017. Checklists were administered during site visits at each level of the health system, through both interviews and direct observation of processes. Data for these checklists were collected on a mobile platform, CommCare.

3.2.4 Primary data analysis

Descriptive analysis of primary data was performed using Microsoft Excel. Analysis of quantitative data described:

- Availability and sustainability of the surveillance system (e.g. through availability of staff dedicated specifically to surveillance work);
- Simplicity of the system (e.g. through assessing participant understanding of the guidelines); and
- Data quality in the system (e.g. correctness of data that is collected and entered at each level).

3.2.5 Secondary data analysis

A review of existing malaria data and M&E reports, different data register forms (facility-level patient register, laboratory registers, etc.), M&E protocols and SOP and health facility level data register observations was done. Facility-level monthly data was exported from the NHMIS from 2017, and annual data was exported from 2013 to 2017. Data were analysed at the facility, LGA, state, and national level, with particular emphasis on the national level, selected states, and selected LGAs.

3.2.6 Quality control/assurance

Primary quantitative data collection was monitored in the field to ensure high-quality standards using three methods:

Accompaniments - Multilevel field management network with Field Team lead, and Team Leader who monitored the quality of the data collection. The same accompanied approx. 5% of the facilities with the Field Investigator conducted the facility survey to monitor quality and provide corrective feedback.

Back-check through phone calls - 10% of the respondents were called back following data collection at the facility level and few critical data points were validated through the phone calls.

Photo and GPS of the Facility – To validate that data collectors visited each facility for data collection, photographs of every facility and each facility's GPS coordinates were recorded.

3.2.7 Limitations of this assessment

First, this descriptive assessment was designed to provide an overview of the status of malaria surveillance in Nigeria. While informative, its results may not be representative of the situation nationally or in states beyond the six that were sampled. Within each state, only a subset of facilities and local governments could be visited due to resource constraints. Additionally, operational challenges limited achieving some of the intended interviews/surveys (e.g. a facility strike in one state impeded some facility surveys). This required secondary sampling. Although sampling and visits were done to achieve as representative of a picture as possible, the results of this assessment may have reduced generalizability nationwide.

Additionally, a goal of this assessment was to compare paper register data from facilities to electronic data entered into DHIS2 to validate accuracy of data entry. Operational and technological difficulties with data collection led to incomplete data. Thus, this analysis could not be done with the scientific standards necessary, resulting in its exclusion from this report.

Finally, the integrity of the secondary DHIS2 data analysis within this assessment inherently depends on the quality of data in DHIS2. A separate analysis of the DHIS2/HMIS system (Facility Level HMIS Analysis, NMEP and WHO, 2018) highlights some organizational and quality-related challenges of the system, thereby affecting the results of the secondary DHIS2 analysis.



4. Results and Interpretation

4.1 Overall Disease Surveillance in Nigeria: An Overview

The NMEP's M&E plan seeks to “establish a sound and continuously updated database that monitors progress towards agreed targets and is used to effectively manage and adjust interventions based on evidence” (NMEP M&E Plan, 2014-2020). Disease surveillance is a key method through which this can occur. To monitor and evaluate each component of Nigeria's malaria program, NMEP relies on multiple surveillance systems.

4.1.1 Disease surveillance systems and their objectives

Nigeria's current malaria surveillance landscape is comprised of multiple data generation pathways, each for different programmatic purposes. Although to date, Nigeria does not have any active disease surveillance systems, there are five systems in place for passive malaria-related disease surveillance:

Routine Health Management Information System (HMIS): monthly aggregated data to track indicators across 40 disease areas and commodity types at all health facilities

Integrated Disease Surveillance and Response (IDSR) System: weekly & monthly aggregated data across notifiable disease areas at all health facilities

Malaria Parasite Sentinel Surveillance (MPSS): weekly/monthly passive surveillance system to track malaria parasite and case data from sentinel sites

Integrated Vector Management (IVM) Surveillance: to track vector control interventions/coverage (e.g. long lasting insecticidal net distribution, indoor residual spraying, and larviciding), vector population fluctuations, and malaria morbidity and mortality.

Pharmaco-vigilance surveillance: The National Agency for Food and Drug Administration and Control (NAFDAC), in collaboration with NMEP, regularly carries out pharmacovigilance activities for antimalarials, which includes cohort event monitoring and active surveillance of ACTs in selected sentinel sites in tertiary institutions across the six geopolitical zones. The pharmacovigilance/ post market surveillance Directorate of NAFDAC is responsible for carrying out this active surveillance on ACTs. NAFDAC also carries out quality monitoring of antimalarial medicines in circulation through post-market surveillance. To date, three rounds of antimalarial medicines quality monitoring (MQM) have been successfully conducted. The latest round of MQM showed that 98.4% of antimalarial samples passed quality tests while 1.6% failed. In addition, NAFDAC, NMEP and Malaria Consortium regularly conduct safety monitoring of sulphadoxine-pyrimethamine and amodiaquine (SP-AQ) used for seasonal malaria chemoprophylaxis (SMC) as well as monitoring of adverse drug reactions due to antimalarials. For example, adverse drug reactions (ADRs) attributable to ACT antimalarial medicines as of 31st March, 2018 constituted 4.3% of Individual Case Safety Reports (ICSR) received by the Nigerian National Pharmacovigilance Centre (NPC), through spontaneous reporting system. NMEP has also collaborated with NAFDAC to build capacity of custom officers in monitoring of quality of antimalarials being imported into the country to detect those of sub-standard quality.

4.1.1.1 Routine Health Management Information System (HMIS)

Nigeria's routine National Health Management Information System (HMIS) is a passive surveillance system through which data are collected on paper registers at facilities, aggregated monthly at the LGA, and entered into the web-based District Health Information System 2 (DHIS2) database. This system is the primary repository for routine disease case data in Nigeria—not specific to malaria, and is expected monthly from all formal public and private health facilities. Community sources are also expected, yet their inclusion is varied. Through its bottom-up structure, data in DHIS2 is organized by facility, and can be viewed or exported electronically at any level of aggregation from the facility to the LGA, state, and national level. The routine HMIS system is the primary focus of this assessment.



Data from this system is used to track progress towards program goals specified in the NMEP M&E Plan (2014-2020), to make decisions regarding the malaria program, and for advocacy (e.g. to promote funding).

Nigeria moved from a fully paper-based surveillance system to an electronic system when it adopted the desktop-based DHIS platform in 2010. They currently operate on the web-based version 2.6 of the platform (NMEP 2014).

DHIS2 is hosted and managed by the Federal Ministry of Health, and HISP provides technical support. All routine HMIS guidelines and tools for data collection and reporting are approved by the health data governing council (HDGC) on the recommendation of the HMIS technical working group (HMIS –TWG).

4.1.1.2 Integrated Disease Surveillance and Response (IDSR)

One of the most important challenges for Nigeria's disease surveillance system was that its data collection and reporting tools across disease programs, regions, and special focus areas were separate. To promote rational use of resources by integrating and streamlining common surveillance activities, Nigeria adopted Integrated Disease Surveillance and Response (IDSR) in parallel to the routine HMIS surveillance system in 1998 to capture weekly data on nationally notifiable diseases, including malaria. The objective of this coordination is to provide accurate, consistent and relevant data and information on a weekly basis to policy-makers and stakeholders at LGA, state, and national levels for effective decision making and epidemic disease detection. Further, IDSR intends to integrate and harmonize various software, data collection forms, standards and case definitions in order to prevent inconsistent information and maximize efforts among all disease prevention and control programmes and stakeholders across the country. IDSR serves as a means of strengthening communicable disease surveillance and response with a view to making it more sensitive at all levels.

All health facilities are expected to submit IDSR data for weekly for 9 epidemic-prone diseases, and monthly for 41 priority diseases, including malaria.

Data from the IDSR system are used for prevention, early detection, and timely response to diseases that causing high morbidity, mortality, and disability in Nigeria (National Policy on IDSR, 2005).

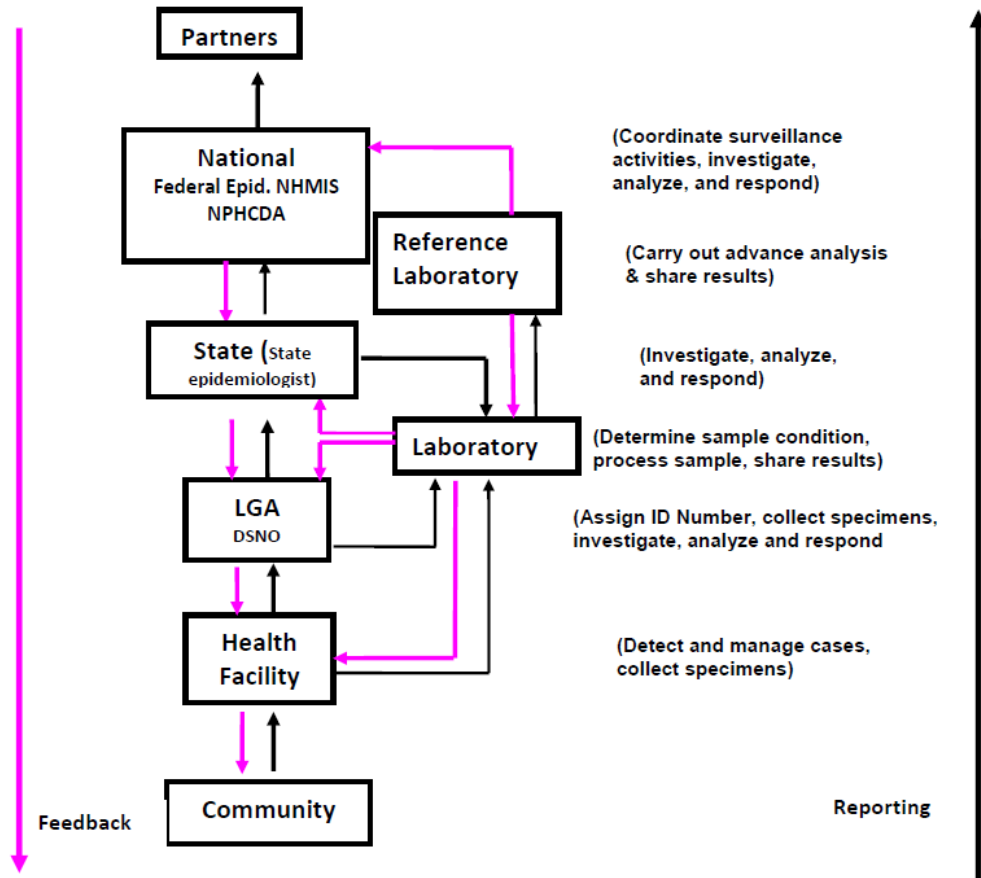
IDSR focal units with specific focal persons at the local, state, and federal government levels are responsible for IDSR activities (Niger Med J. 2015 May-Jun; 56(3): 161–168; National Policy on IDSR, 2005). At the federal level, the FMoH and the IDSR Technical Advisory Committee have the broadest oversight.

The national policy on IDSR within National Health Policy is reviewed every 5 years by the Honorable Minister of Health in consultation with the National Council on Health. The LGA is the primary level of IDSR implementation, and the State MoH and the State Disease Surveillance and Response Committee both provide technical and other support.

IDSR's data flow pathway is detailed below in Figure 3 (copied from National Policy on IDSR, 2005):



Figure 3: Data Collection & Flow Guidelines in IDSR



IDSR provides performance indicators for data collection and reporting which are relevant to this study. A cut off percentage of 80% adherence to process is prescribed to achieve data reporting objectives. See the core indicators from IDSR data and their targets for the facility, LGA, state, and national level in Annexure Section 8.6 (Table 5) (*National Policy on IDSR, 2005*).

4.1.1.3 Malaria Parasite Sentinel Surveillance (MPSS)

The Malaria Parasite Sentinel Surveillance (MPSS) continuously and systematically collects daily information from sentinel laboratories on individuals presenting with symptoms of malaria, and follows up on all confirmed cases following the administration of antimalarial medicines. This system aims to help NMEP and its partners evaluate progress towards malaria elimination. This system documents laboratory confirmation of suspected malaria cases, and monitoring of parasite clearance during treatment. This allows for detection of possible treatment failures or parasite resistance to antimalarial medicines used in the country, documentation of laboratory-specific findings that are not part of the routine HMIS system (e.g. slide positivity rate, parasite density, parasite species and strains). Ultimately, this provides a more detailed laboratory-based view of malaria trends and the impact of interventions on the malaria burden in sentinel zones.

There is at least one collection centre in every state and the Federal Capital Territory. In these sentinel laboratories, all individuals presenting with malaria symptoms are tested before treatment, and the patient’s blood is observed for the presence of parasites by microscopy on the third day following treatment.

In addition to using the standard routine HMIS reporting form, this system also utilizes a separate MPSS summary form, which is filled in by Medical Laboratory Scientists or any other individual who has conducted the laboratory investigation on the suspected case, and tracks laboratory testing information,



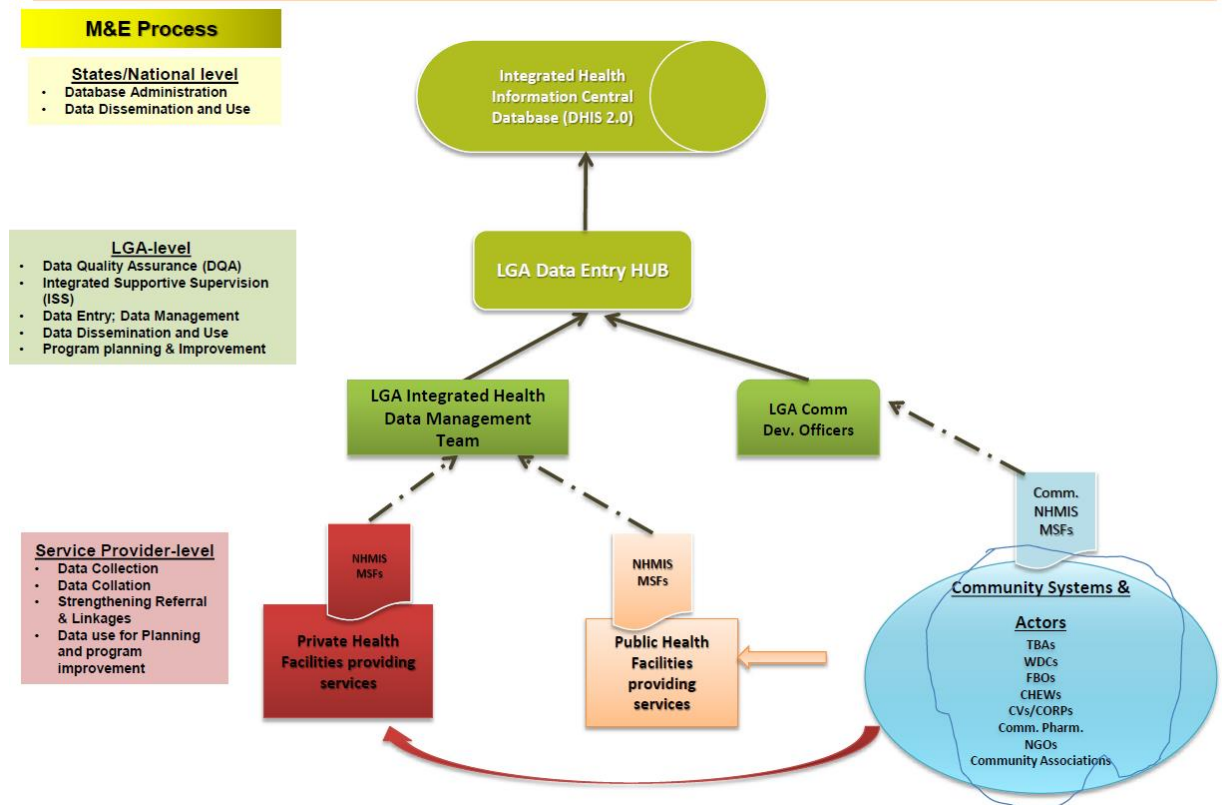
symptoms, and patient details. Like the routine HMIS reporting form, this MPSS summary form is collected by the LGA M&E officer on a monthly basis. The summary form is entered electronically and sent monthly by email to the NMEP (MPSS.NMEP@gmail.com) to ensure timeliness and prompt reports from all sites.

4.1.2 Challenges with overall disease surveillance in Nigeria

Many intervention programs still rely on their own disease surveillance systems. Each program has made efforts through the years to improve its ability to obtain reliable data on time in order to use information for decision-making. Disease control and prevention objectives are successfully met when resources are dedicated to improving the ability of health officials to detect the targeted diseases, obtain laboratory confirmation of the disease, and use thresholds to initiate action at the LGA level.

Further, the inclusion of community-level data (denoted in the blue oval in Figure 4) has been a challenge; it is unclear how much community-level data is incorporated through nearby facilities, and how much is currently missing from the HMIS system.

Figure 4: Data flow and use diagram from Nigeria's Monitoring and Evaluation Plan 2014-2020 (NMEP, 2014)



4.2 Malaria-specific HMIS surveillance in Nigeria: an overview

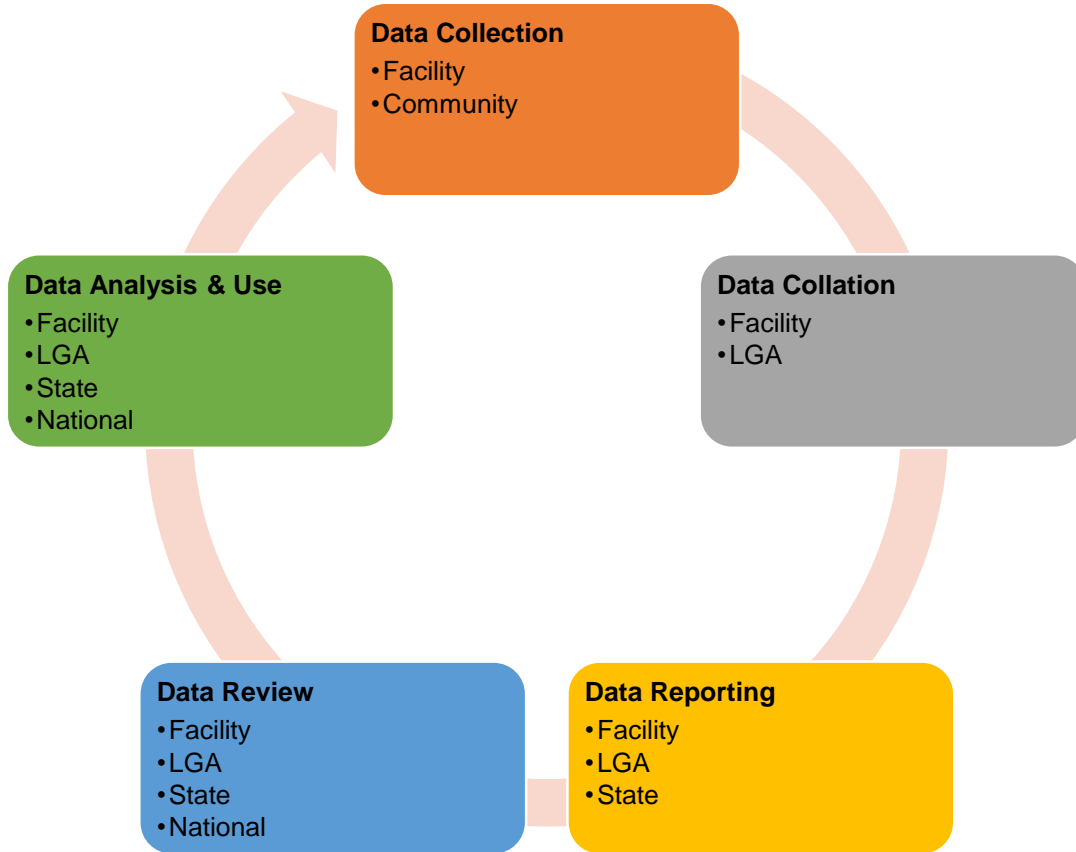
The malaria surveillance system is only one piece of the overall disease surveillance program in Nigeria. This section details the processes and infrastructure specific to malaria surveillance within Nigeria.



4.2.1 Overview of the malaria surveillance system: steps in the process and personnel responsible

Figure 5 provides a broad overview of the steps in the malaria surveillance system

Figure 5: Surveillance process as defined in *National Standing Operating Procedure (NSOP) for the Collection and Management of Integrated Routine Health Data in Nigeria*



4.2.1.1 Facility level

The malaria surveillance process begins at the community and facility level, where data are collected daily through the standard paper “National Health Management Information System (NHMIS) Daily General Attendance Register.” Each facility is expected to record treatment and preventive data for indicators across multiple program/ disease areas, including malaria. First, patient-level data are collected on the paper register daily. This is coordinated by the facility records officer. At the end of the month, the records officer consolidates the month’s daily patient-level data on the “NHMIS Monthly Summary Form for Health Facilities” (MSF). Health facilities are expected to start the collation of their monthly summaries on the last day of the month, and should have their summary ready within the first three (3) days of the following month. A copy of this summary must be submitted to the LGA IHDM team within the first five (5) days of the following month.

Monthly, the facility records officer attends a data validation meeting at the LGA secretariat, during which the MSF is submitted and verified. The MSFs received from facilities are then collated, reviewed,

validated, and finally entered into DHIS2 at the LGA level by the LGA M&E Officer by the 15th day of every month (e.g. January data will be aggregated by 15 February).

For those public and private health facilities within the LGAs that are supported to use mobile phone technology or internet-ready computers to upload their data, data submission will be electronic but all the paper-trail will be kept safe as described above in the paper-based method for follow up during data validation and DQA by the LGA Integrated Health Data Management Team (IHDMT) members.

Once entered into DHIS2, data are available in real-time to all stakeholders with access to the DHIS platform.

4.2.1.2 Community and PPMV level

Malaria case data are also collected at the community level. Community Oriented Resource Persons (CORPs), including Role Model Caregivers and PPMVs, collect treatment and commodity use data on children under 5 years old using the Home Management of Malaria Register, and summarise data monthly on the community HMIS form. In the public sector (e.g. Role Model Caregivers), CORPs submit the data forms monthly to designated health facilities. In the private sector (e.g. PPMVs), data are meant to be collected from the PPMVs.

Since public sector community data are mostly tied to health facilities in that their data are submitted to the health facility from which they receive their malaria commodities, a major challenge is that the community data are often either missed or grouped fully with facility data. Furthermore, private sector community (PPMV) data are usually not collected and/or not included in DHIS2. These gaps in community-level and PPMV data limit an understanding of the full malaria picture nationwide, as these sectors are the source of first care for a substantial share of malaria cases (MIS 2015).

4.2.1.3 LGA level

At the LGA level, there are two key positions that support the malaria surveillance process:

- The Roll Back Malaria (RBM) Focal Person is to ensure that malaria commodities are distributed to the facilities to avoid stockouts. They also provide support to facility records officers at facilities to ensure that malaria data are properly captured in the registers and that data in the registers correlates with that on the MSFs. The facility records officers (or M&E officers in secondary and tertiary HFs) are either trained medical records staff, or nurses, lab technicians or other trained health workers that are responsible for data collection (e.g. extracting patients' records into registers, supporting providers in capturing summary data from service registers, ensuring that changes to records on the registers are properly made, and advocating for correct and consistent use of data collection tools to other focal persons in their facilities)(NSOP). The LGA focal persons are also responsible for ensuring data quality in the following ways:
 - Aggregate data from registers into monthly summary forms;
 - Review accuracy of summary data as compared to registers and patient encounter data;
 - Participation in validation exercises both at monthly M&E meetings using their own data, and during routine DQA visits by subnational and national level officers
- The LGA M&E Officer is responsible for entry of facility data in the MSF into DHIS2. They collect data from all the service delivery points (SDPs)/HFs submitted on the MSF and enter these into the DHIS2 on a monthly basis.

In execution, the responsibilities of the LGA RBM Focal Person and the LGA M&E officer are sometimes muddled, and these roles and processes can differ between LGAs.

Each LGA has a monthly M&E meeting within the first week of each month. The LGA M&E/records officer runs this meeting each month. Attendees of this meeting include facility records officers. The goal of this meeting is to:



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- Hold a data/performance review,
- Build capacity in areas with data quality issues, and
- Collect all MSFs from all the SDPs/health facilities as required.

Additional validation exercises occur during this meeting to ensure that data submitted on MSF is an accurate reflection of services delivered and activities undertaken. The LGA M&E/records officers, on monthly basis, are responsible for liaising with all IHDMT members to ascertain the quality of data approved for entry into DHIS2. Data are used by the LGAs for planning purposes.

If the LGA M&E focal person is unable to hold the meeting or carry out the aforementioned duties, the LGA IHDMT members are responsible for picking up the MSFs from facilities or other service delivery points.

Electronic data entry into DHIS2 generally occurs at the LGA level by the IHDMT. The IHDMT, however, may assign data entry to data entry clerks. In those cases, the IHDMT is responsible for reviewing data for accuracy and usefulness.

4.2.1.4 State level

Although the major responsibility of ensuring data quality lies at the lower levels, an additional data quality check is performed at the state level, as outlined in the NSOP's DQA process. IHDMT members and the various programme managers are responsible for reviewing data for accuracy and usefulness. After deciding on the data quality improvements needed, data are then analysed and used for advocacy. State-level M&E field officers are also meant to visit at least eight LGAs per month for supervision purposes, and those LGAs selected are different each month, thus rotating through LGAs over time.

4.2.1.5 National level

From the highest level, oversight for malaria surveillance comes from the National Malaria Elimination Program (NMEP), which is a division of the Public Health Department of the Federal Ministry of Health. It is statutorily responsible of the department's mandate of policy and guideline formulation, implementation, and evaluation. It is responsible for the surveillance, prevention, control, and elimination of malaria in Nigeria. The NMEP is headed by a National Coordinator and consists of about 120 staff members. It has six operational units headed by a Director or unit head. These units are Program Management; Procurement and Supply Management; Integrated Vector Management; Case Management; Surveillance, Monitoring, and Evaluation; and Advocacy, Communication, and Social Mobilization (ACSM). At the national level, the NMEP is responsible for establishing policies, guidelines, and norms.

A final quality check on the aggregated data is done at the national level by FMOH. At the national level, NMEP's Surveillance and Data Management Unit analyses and produces monthly reports. Feedback on analysed data, data quality, identified gaps, and irregularities are given to states via the Commissioner for Health for onward dissemination to LGAs and health facilities.

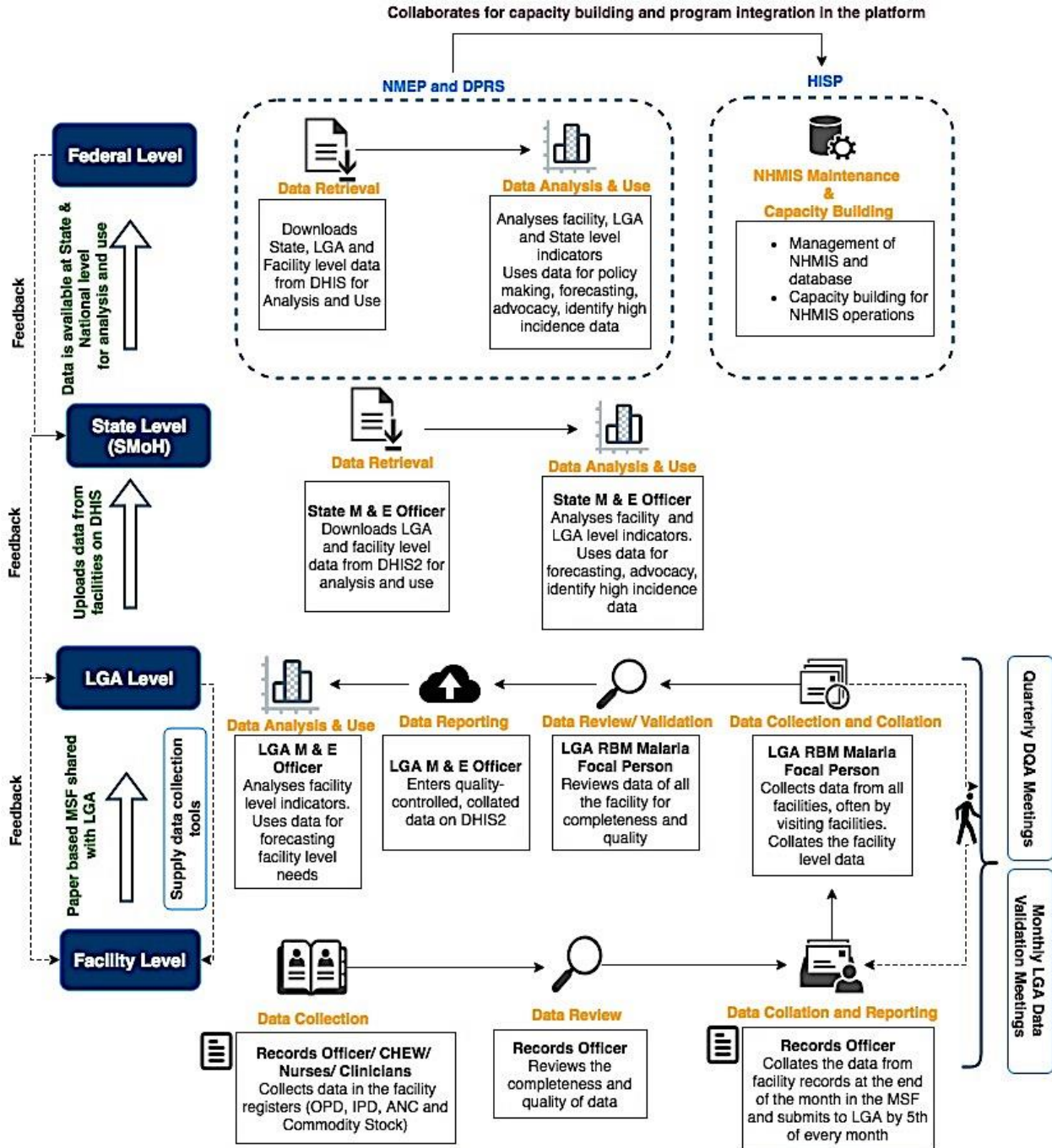
Also at the national level, the Department of Planning, Health Research (DPRS) is responsible for managing the DHIS2 data system. The partner organization Health Information Systems Program (HISP) is engaged by DPRS to technically support in managing, maintaining, and updating the DHIS system.

4.2.2 Malaria surveillance process overview map

The below process overview map is a general representation of the surveillance process, but note that there are minor differences between states.



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4.3 Inputs to the malaria surveillance system

4.3.1 Malaria surveillance guidelines

There are six documents that describe relevant components of the surveillance process, as outlined in Table 8, below. These documents provide guidance to key players at all levels of the healthcare system about the expectations and steps in the surveillance process, including timelines, indicators of interest, case definitions, and more. These guidelines are important to ensure that all relevant parties participate fully and with high quality in necessary surveillance processes.



Overall, guidelines were unavailable at the majority ($\geq 70\%$) of health facilities surveyed. Private primary facilities had especially low availability of guidelines; none of the seven private primary facilities had the Technical Guidelines for IDSR, the National Health Information System Policy, or malaria case management guidelines.

This low availability of guidelines is likely due to low awareness of guidelines: only 23% of facility respondents were aware of any guidelines/SOPs that help with malaria surveillance. This awareness was higher in both public and private primary facilities than it was in public or private secondary facilities.

Table 8: Surveillance guideline comprehensiveness and availability at health facilities

| Guideline | Availability at primary and secondary facilities (n=114) |
|---|---|
| National SOP for the Collection and Management of Integrated Routine Health Data in Nigeria(2014) | 29 (25%) |
| Technical Guidelines for IDSR in Nigeria(2013) | 34 (30%) |
| National Health Information System Policy(2014) | 23 (20%) |
| Malaria Case Management Guidelines (2009) | 20 (18%) |
| National Malaria Elimination Programme Monitoring and Evaluation Plan 2014-2020 (2014) | N/A |

Refer also to Annexure Section 8.3, Results Table 2 for a breakdown of the availability of each guideline by facility type and sector.

Compounding the lack of awareness about and availability of the guidelines is the notion that there are multiple documents containing surveillance information, rather than a single comprehensive document. This requires participants in the system to follow multiple sets of guidelines, and may create confusion and declined adherence.

4.3.2 Malaria surveillance data collection and aggregation tools

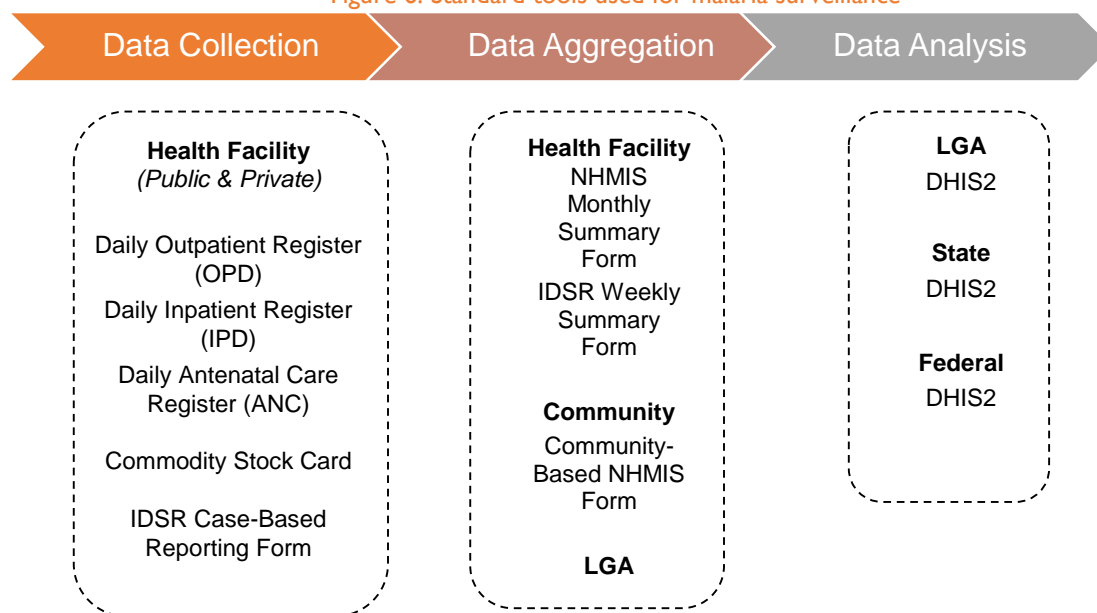
In order to carry out surveillance, tools are required both for data collection and data aggregation/collation.

4.3.2.1 Overview of Tools

Paper registers are used to collect data at the facility and in the community. To collect data, staff are expected to fill one line per patient visit on the data collection registers, including standardized daily OPD, IPD and ANC registers, a community daily register, and a commodity stock card. Each month, these daily registers are aggregated to generate summaries, recorded on Monthly Summary Forms (MSFs) and the IDSR reporting forms, as detailed in Figure 6.



Figure 6: Standard tools used for malaria surveillance



4.3.2.3 Availability of data collection and reporting tools

Overall, data collection tools were widely available, predominately at public facilities (Table 9 and Figure 7). Across sectors and levels, the IPD daily register was available at the vast majority (≥99%) of facilities. The OPD Daily Register was available at 84% of facilities, with notably higher availability in public facilities than in private. The NHMIS MSF also was available at 92% of facilities, with similar availability across both sectors and facility types. Although still widely accessible, there was more variation in the availability of the ANC Daily Register and the Facility Record. Both of these forms were less available in the private sector—especially private primary facilities. Although the low sample size of private primary facilities limits the ability to generalize these findings, the low and inconsistent availability of data collection tools in the private sector is notable.

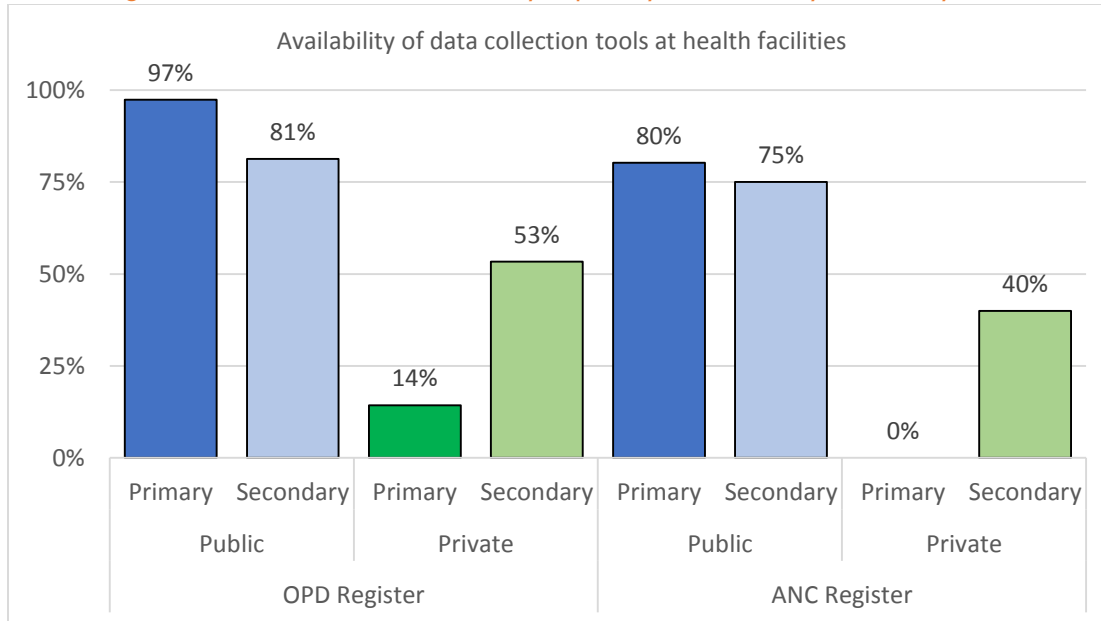
Table 9: Data collection and reporting tool availability at primary and secondary facilities, by sector and level

| Form Name | Public Primary (n=76) | Public Secondary (n=16) | Private Primary (n=7) | Private Secondary (n=15) | Total (n=114) |
|----------------------------------|-----------------------|-------------------------|-----------------------|--------------------------|---------------|
| OPD Daily Register | 74 (97%) | 13 (81%) | 1 (14%) | 8 (53%) | 96 (84%) |
| IPD Daily Register | 75 (99%) | 16 (100%) | 7 (100%) | 15 (100%) | 113 (99%) |
| ANC Daily Register | 61 (80%) | 12 (75%) | 0 (0%) | 6 (40%) | 79 (69%) |
| Facility Record | 63 (83%) | 10 (63%) | 1 (14%) | 6 (40%) | 80 (70%) |
| NHMIS Monthly Summary Form (MSF) | 70 (92%) | 14 (88%) | 6 (86%) | 15 (100%) | 105 (92%) |
| Commodity Stock Card | 62 (82%) | 14 (88%) | 5 (71%) | 11 (73%) | 92 (81%) |



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Figure 7: Data collection tool availability at primary and secondary facilities, by sector and level



Concordant with the high register availability observed, facilities reported low stockout rates of data tools: only 16% of facilities reported having a stockout of a register within 60 days prior to this survey.

Facilities can only adhere to surveillance guidelines if they have the data collection and reporting tools available. Having the tools available, however, does not mean that the facilities necessarily will use them per protocol. For example, although 88% of public secondary health facilities had the NHMIS MSF available, only 69% were able to present a recent completed NHMIS MSF at the time of the visit. Similarly, 100% of private secondary health facilities had the NHMIS MSF available, but only 53% were able to show a recent month's completed form.

4.3.2.4 Challenges with data collection and reporting tools

When asked about challenges related to data collection, approximately one in every seven respondents noted register design-related factors as surveillance challenges. 13% cited that there are too many data elements, and 17% of respondents cited having multiple registers. Beyond the registers in Figure 6 and Table 9, some facilities fill additional registers, resulting in many forms to complete and some duplication of information. For example, in addition to the commodity stock card, many facilities complete the bimonthly commodities request form (RIRV), and some secondary health facilities fill a patient summary register that is separate from the NHMIS MSF.

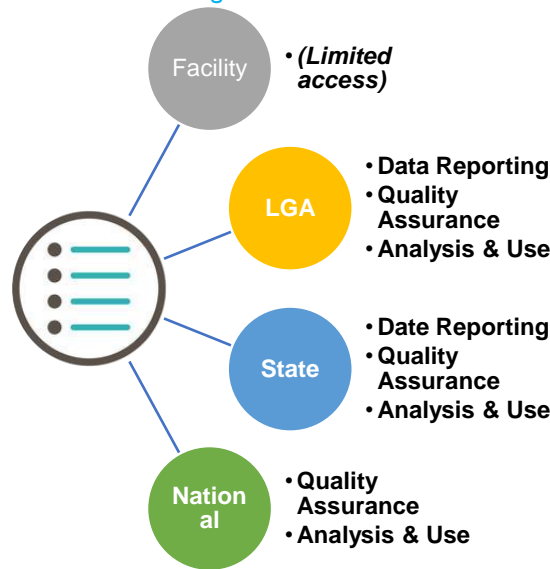
4.3.3 Infrastructure for data analysis and HMIS access

Analyses of surveillance data are done predominately at the LGA, state, and national levels; it is uncommon at the facility level. To analyse data, it is first accessed and exported from through the web-based DHIS2 repository.

National, state, and LGA personnel reported having access to DHIS2. Uptake of DHIS2 is still limited at the facility level. Figure 8 describes the ways that HMIS access is used at each level.



Figure 8: HMIS access each level



A key challenge with HMIS access is that the web-based DHIS2 platform requires functional IT equipment and Internet connectivity. Despite the key role of LGA staff in accessing and entering data into DHIS2, this infrastructure remains a challenge for access for some at the LGA level. Although six of the eight LGAs visited reported that they have government-owned computers for surveillance activities, four reported that the computers have hung (failed to work) more than 30 seconds in the last month, ranging from two to 20 times in the last 30 days. To access the Internet to submit data, one LGA staff reported:



“Even the data that I am sending... I use my salary to send data to the DHIS because I buy data for sending it, I use modem, nobody is giving me anything”. – LGA Level Respondent

Six of eight (75%) LGA-level respondents reported slow loading times for DHIS as a barrier to fully utilizing it. Despite this barrier, seven of the eight LGA representatives reported having logged into DHIS2 within the last month. One LGA member reported never having accessed DHIS2 before.

4.3.4 Human resource availability and capacity for surveillance

Section 4.2.1 described the personnel involved in each component of the surveillance process. This section presents the availability and capacity of the personnel as seen in the entities visited as part of this assessment.

4.3.4.1 HR at Health Facility Level

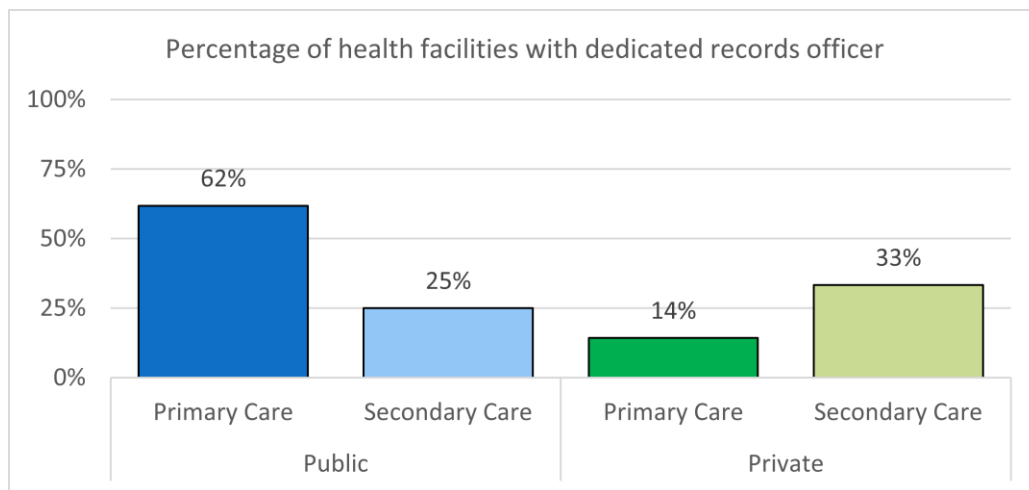
Facilities are expected to have an M&E focal person/records officer to ensure high-quality data collection and monthly summary aggregation in a timely manner. Facilities had varying availability of a dedicated records officer (Figure 9): 50% of facilities reported having a dedicated records officer, but there was overall higher availability in the public sector.

- **Availability of dedicated staff for data/records in public facilities:** 62% of primary public health facilities reported having a records officer dedicated to surveillance. Only 25% of secondary care facilities reported to have a dedicated records officer.

- Availability of dedicated staff for data/records in private facilities:** The scenario varies largely in the private healthcare settings where only 14% of the primary care facilities 33% of the secondary care facilities had a dedicated records officer (which is higher than public secondary care facilities).

Low availability of records officers can limit the amount and quality of data collected and reported, as there are not always other staff that can fill the gap. Any intervention to improve surveillance through the training of records officers would increase the disparity in surveillance capacity between public and private facilities. Further, any changes or increased burden on the surveillance system would be challenging especially for the facilities that lack a records officer.

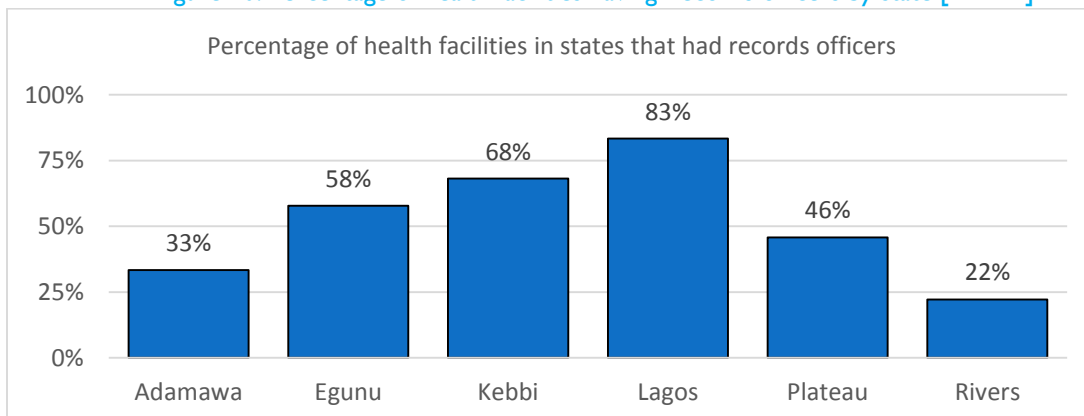
Figure 9: Percentage of health facilities having dedicated records officers [PUBLIC: Primary=76, Secondary=16; PRIVATE: Primary=7, Secondary=15]



Source I: Primary Data

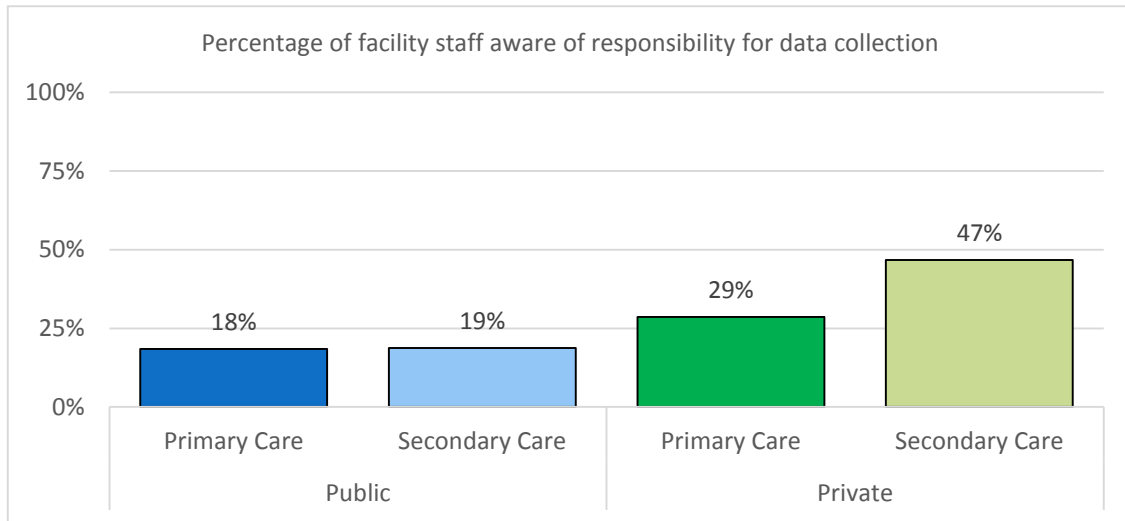
Availability of records officer at facilities, by state: The availability of records officers available varied by state (Figure 10). Lagos state had the highest proportion of facilities with a dedicated records officer—it is the only state in which more than 80% of facilities had a dedicated records officer available. In three states (Adamawa, Plateau, and Rivers), less than half of the facilities had a dedicated records officer, with Rivers state having the lowest number (22%). Although Enugu and Kebbi both had more than 50% of facilities with a dedicated records officer, a large portion of their facilities still lack such an important figure.

Figure 10: Percentage of health facilities having Records officers by state [N=114]



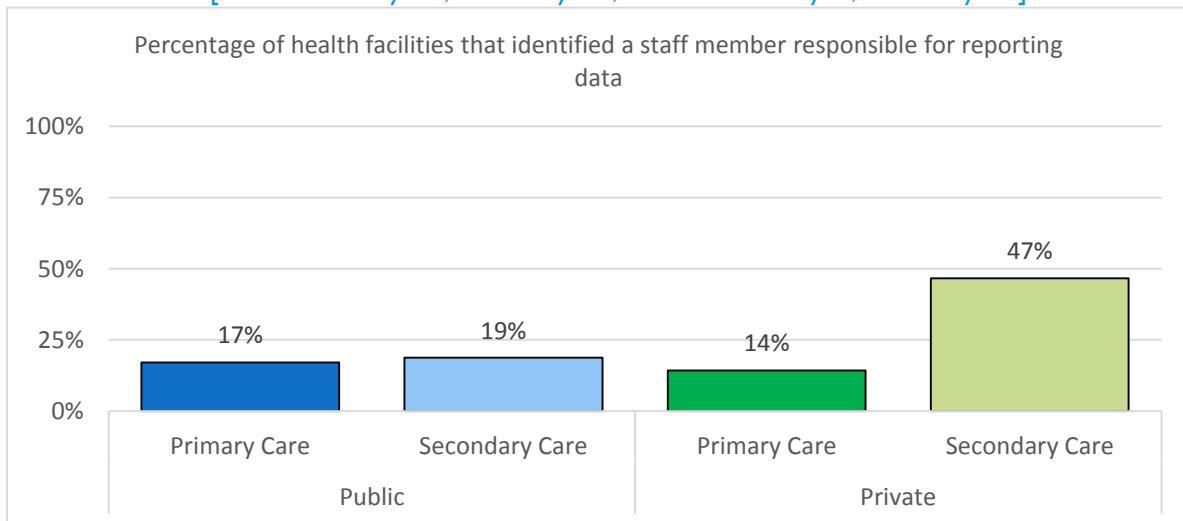
Level of clarity on data collection responsibility: Related to the mixed availability of a dedicated records officer, respondents at the facility level exhibited a general lack of awareness about who was responsible for malaria surveillance data collection at their facility. A majority of the staff at health facilities (both public and private) either were not aware of or did not have clarity on who was responsible for malaria surveillance data collection (Figure 11). Clarity was slightly higher in private health facilities as compared to public health facilities, yet there was confusion at well over half of the facilities.

Figure 11: Percentage of awareness among the staff in health facilities on responsibility of data collection [PUBLIC: Primary=76, Secondary=16; PRIVATE: Primary=7, Secondary=15]



Human resources for data reporting: After malaria surveillance data are collected, they must be reported (e.g. aggregated onto a monthly summary form for entry at the LGA level). Despite the importance of this step in the malaria surveillance process, only 21% of respondents from the facilities visited could identify a staff member that was responsible for reporting data. In other words, a majority of facilities had confusion surrounding who was responsible for data reporting or simply lacked a staff member responsible for reporting data. This is depicted by sector and facility type in Figure 12.

Figure 12: Percentage of health facilities that identified a staff member responsible for data reporting [PUBLIC: Primary=76, Secondary=16; PRIVATE: Primary=7, Secondary=15]



The lack of awareness of who is responsible for both data collection and reporting can be attributed in part to the fact that staff often have responsibilities beyond data reporting and with respect to other programs. When asked about challenges that they face with malaria surveillance, 87% of staff reported having a high workload. Especially in the 50% of facilities without a dedicated records officer, the high workload and split priorities may compound existing confusion on surveillance responsibility.

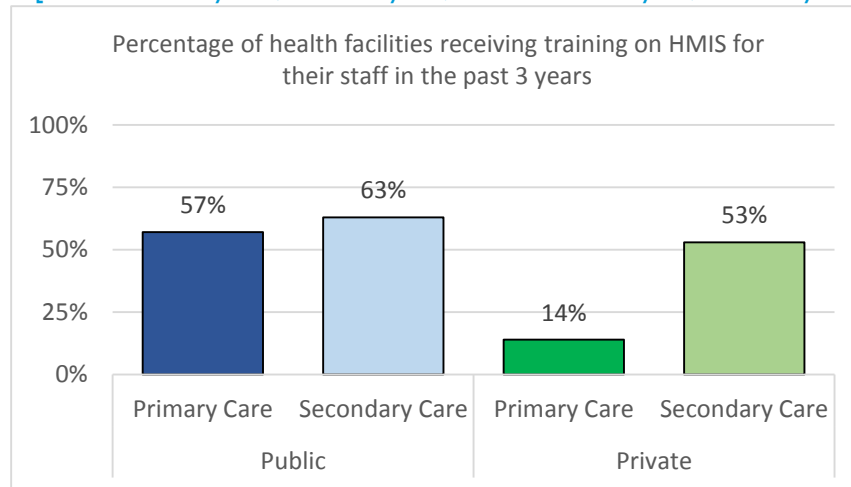
Malaria surveillance training: Having staff available for malaria surveillance is only a piece of the human resource requirements; staff also must have capacity and training to carry out effective malaria surveillance. HMIS trainings for facility staff are predominantly conducted by State Ministry of Health and respective LGA at both the public and private health facilities.

Across sectors and facility types, 54% of facilities had HMIS training for their staff in the last three years. Recent training was lowest in private primary care facilities, in which only 14% of facilities reported HMIS training in the last three years (however, note that there was a low sample for private primary care facilities, n=7). Over half of the facilities in each of the three facility types reported having had HMIS training in the last three years (53% to 63%). See Figure 13 below for reference.

Out of the facilities that received training on malaria surveillance process, the majority of primary health facilities stated that last training they received was within last 3 months to 6 months while most of the secondary health facilities received training within last 3 months.

When asked about challenges in surveillance, approximately one third of facility staff cited inadequate training as a challenge for data collection and data reporting, (30% and 28%, respectively).

Figure 13: Percentage of health facilities that received training on HMIS for their staff in last 3 years. [PUBLIC: Primary= 76, Secondary=16; PRIVATE: Primary= 7, Secondary=15]



4.3.4.2 HR at the Local Government Area (LGA) Level

At most surveyed LGAs, there was a lack of skill and capacity for data collation, review and analysis, which are crucial activities undertaken at LGA level. Almost all LGAs expressed the need for additional human resources, especially data officers with skills and capacity for data management. The LGAs depend entirely on the state for resources and technical support. However, states were generally unable to provide these needs except when supported by the NMEP and partners. Only a few states have committed resources for malaria programming.

NMEP is responsible to directly train the staff at the facilities. Although the capacity building at LGA level is done with the support from GF, DFID and PMI (master training conducted by NMEP), there is a high level of attrition among LGA staff. As a result, more frequent trainings need to be conducted at LGA level. Special trainings were also conducted for high burden high priority areas in response to GF demands.

In the area of capacity building, all the LGAs under study stated they received some kind of training on malaria surveillance in past 3 years. All the LGA the training received were through NMEP and SMOH except Obiakpo, (Rivers State) which received the training through AFENET. Amongst these LGAs, all received the training within last 3-12 months except Jos South (Plateau State) and Obiakpo, which did not receive any training on surveillance in last 2 years. An inconsistency in the capacity building effort was observed at the LGA level.



“We need more assistance, both at the local government and at the facility; because you see some of that M&E personnel are not permanent staffs of the PHC, so due to insufficient staff the facilities usually hire temporary personnel”.



“The first thing I would recommend is human resource, both on the public side and on the private side. Human resource is one of the major factors. Whoever is available in terms of data in a particular facility should be trained, that is capacity building should be made available to this person in respective facilities, as I said both public and private”. LGA Respondent

4.3.4.3 HR at the State Level

There are an average of four management and technical staff in each SMEP (Program Manager, M&E officer, data officer, and Malaria Commodity Logistics System (MCLS) officer). The state M&E officer shall be responsible for validating the LGA submissions for compliance with reporting rates and quality of data on the National DHIS2 platform. The state IHDMT members and the various program managers at this level are responsible for reviewing data for accuracy and usefulness.

In most states, these staff are fully and exclusively dedicated to the malaria program. However, in Adamawa State, all the officers have other responsibilities they carry out for other programs when the need arises. The respondents in Adamawa state recommends the strengthening of surveillance human resources. Lagos state desires input from partners as they currently have only CRS support, which is limited in scope.

Four states (all except Rivers and Adamawa) reported receiving training on malaria surveillance in the last three years. The surveillance trainings were led by the Department of Planning, Research, and Surveillance (DPRS) in conjunction with NMEP in three of the four states. In Kebbi, the training was conducted by implementing partners (e.g. CHAI) along with some capacity building support from WHO.



“The M&E officer is primarily responsible for malaria M&E but sometimes some programs can come up from other program areas, like myself sometimes I go to supervise other activities, so is not the only malaria that he does, he is a staff of the Ministry of Health, so he can do other activities”. – SMEP Respondent

4.3.4.3 HR at the Federal Level

NPHCDA plays a very important role in the strengthening the human resource requirement for surveillance as they have access to a pool of HR through its technical leadership of major government intervention programs such as the N-Power. The NPHCDA actively collaborates with the NMEP and RBM partners as members of the HMIS-TWG and in the technical capacity building for data producers and users at the state and LGA levels.





“Within the National Program we have resource people and then we have people that are knowledgeable in M&E, sometimes WHO also support us by bringing some resource persons”. – National Level Respondent

4.3.5 Funding for malaria surveillance

Health financing in Nigeria follows the three-tier system of health services: the federal budget covers tertiary healthcare, the state budgets covers secondary care, and the LGA budget covers primary care. The federal level also funds directly some of the disease control programmes, including malaria. The amount of government spending on health and malaria is difficult to ascertain as funding levels vary: actual spending does not always follow the planned budget, and no health accounts have been established to allow a more detailed breakdown of cost.

Though it is difficult to identify the precise budget allocation for overall malaria surveillance activities, as per the Nigeria Health Information System Policy (2014), a defined annual budget of 2% of annual health budget is allocated for HIS at all levels. RBM partners help support the surveillance system through investments in capacity building for data producers and users at state, LGA and facility levels.

Funding support for malaria surveillance activities was discussed with respondents during interviews at various levels during the study, and are summarized in this section.

4.3.5.1 Dependence on donor money for surveillance

4.3.5.1.1 Federal level

Lack of funds remains a major challenge to the ability of the DPRS to provide much-needed capacity building, training, and support to DHIS platform users. This has had obvious implication on data quality and overall system performance. The respondents at DPRS commented that though DPRS annually budgets for HMIS, hardly any funds are released. Even when funds are released, they tend to be grossly insufficient. It was observed that public sector prioritization of the surveillance system is very low, thus the lack of funding. Respondents believed that the system would struggle to improve in performance until public sector funding improves. Respondents at NMEP stated that almost all operational costs are partner-funded (DFID, GF, and PMI), while the government only provides funds for HR. The support of surveillance system by Roll Back Malaria (RBM) partners accounts for almost 90% of costs. Within NMEP, the surveillance budget remains minimal. Funding remains a serious challenge not only to current surveillance activities and system performance, but also to its maintenance and sustainability. Malaria surveillance funding is minimal from the public sector, and although funding can be available from private partners, funds tend to be inconsistent and inadequate. Sustainability of these funds remains a key concern.



“We are unable to provide enough support and training for all users of the DHIS platform due to lack of funds. While there is a budget line item for HMIS which is often approved, there are inadequate or no releases at all of the appropriated funds. As we speak now no funds have been released this year for HMIS and we are in September. However, we are still able to do some training with support from partners”. – National Level Respondent



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4.3.5.1.2 State level

Most of the respondents at SMEPs commented that there is limited or no public sector funding for malaria in their states. Lagos, Rivers, and Kebbi states were supported under the GF New Funding Model grant from 2015-2017, and only Lagos had evidence of public sector funding for malaria. State respondents indicated that almost all activities are funded by partners where present, and by NMEP in others without partner support. There are no clear sustainability plans by states to replace support from partners and NMEP.

Thus, due to limited malaria funding at the state level, there is over-reliance on partner support. Further, only a portion of the funding for malaria activities at state level can be allocated to surveillance activities, thereby creating a variable amount of financial support for surveillance across states.



“Government has a lot of priorities and our budget is supposed to come from the health budget, so what is allocated to health; it is from there we will also get our allocation. Presently we have support but you know support is not usually adequate as usual you know that it is not easy to have an adequate budget because malaria can consume billions of Naira”. – SMEP respondent

4.3.5.1.3 LGA level

At the LGA level, respondents reported that limited funds are released for surveillance. This directly impacts the logistics for surveillance activities:



“Logistics is often a challenge to data reporting as facilities would say that they don’t have money for transportation”. - LGA respondent

4.3.5.2 Diminishing fund allocation for malaria surveillance

To move towards malaria elimination, funding must be allocated to a range of interventions, including many activities beyond surveillance. In a landscape of competing priorities, funding for surveillance has been reduced in some cases. For example, in the last three years (2015-2017), less than 5% of the President’s Malaria Initiative’s total budget is allocated for surveillance. In 2017, the proportion of the malaria surveillance budget decreased by 1.2% (Table 10).

Table 10: President’s Malaria Initiative (2015, 16 and 17) - Nigeria: Planned Budget for Malaria’s Surveillance, Monitoring, and Evaluation

| Proposed Activity | Budget (USD) | | | Health Service Level | Description |
|--|--|---|--|----------------------|--|
| | 2015 | 2016 | 2017 | | |
| Overall PMI Budget | 75,000,000 | 70,000,000 | 75,000,000 | --- | --- |
| Strengthen routine surveillance, Monitoring and Evaluation | 2,404,000 (3.2%) <i>[MEASURE, IHP, CDC IAA, US PMI]</i> | 3,299,025 (4.7%) <i>[RMNCH, CDC IAA]</i> | 2,640,025 (3.5%) <i>[US PMI, CDC IAA]</i> | Nationwide | Strengthen coordination and harmonization of HMIS at the FMoH, NMEP, State, LGA and Facility level |



4.5 Sensitivity of the system: surveillance cascade

This cascade (Figure 14) demonstrates an approximation of how many malaria cases actually make it into the surveillance system and are used in decision-making based on each step in the surveillance process.

Sensitivity, or the proportion of true cases that are detected through the surveillance system, is described here by tracing the flow of cases through the health system and consequently through the surveillance system. Starting with all cases, a proportion will be asymptomatic. However, since the passive surveillance system relies on a patient seeking care, asymptomatic cases are not detected. The proportion of cases that are lost due to being asymptomatic is unknown. Among all symptomatic cases, a portion will not seek care. The most recent Malaria Indicator Survey found that only 66% of children with fever are likely to seek any healthcare (MIS 2015).

Once entering the health system, there are numerous ways in which the case could be undetected. To begin with, starting with diagnostics, if a case does not receive a malaria test either by microscopy or RDT they will not be detected by the surveillance system as a confirmed case. According to data in the NHMIS repository, 86% of suspected cases received a diagnostic test in 2017.

Among this proportion that is tested, only some will have been tested at a facility that participates in the HMIS. Others may receive testing and treatment at informal facilities or dispensaries that do not participate in HMIS, for example. The proportion of facilities that participate in HMIS is not known since a complete list of facilities was not available. For the purposes of this analysis, we opted to overestimate the proportion of cases reported by assuming that all health facilities participate in HMIS.

Next, among the cases tested at facilities participating in HMIS, a proportion will not be reported into HMIS, as despite requirement to report, not every facility successfully reports complete data every month. In 2017, the reporting rate, or percent of expected monthly reports that were received, was approximately 80%.

Combining these proportions, we have 80% reported of 86% tested of 66% that seek care, which yields 45% of all symptomatic cases in total that are reported in HMIS. Lastly, only a portion of reported case data are effectively used, as some facilities, LGAs, and states do not routinely analyze and use all reported data for decision making. However, this proportion is not easily quantifiable.

Due to the lack of data to estimate health facility participation and the amount of data that is actually used in analysis, data representing at most 46% of symptomatic malaria cases are available for use in decision-making. Even with this overestimation, data from less than half of the country's malaria cases are captured through the surveillance system and are available for use in decisions and programmatic work.

Figure 14: Malaria surveillance system sensitivity cascade (HMIS)

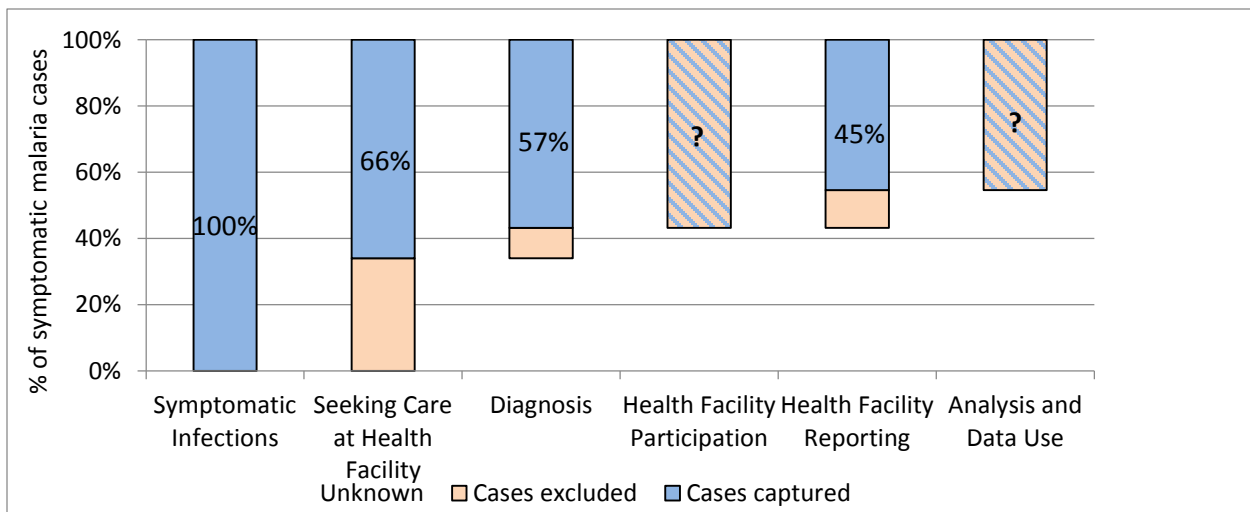


Table 11: Malaria surveillance system sensitivity cascade (HMIS) sources of data

| Category | Percentage | Proportion of Total Symptomatic Cases | Data Source |
|---------------------------------------|-------------------------------|---------------------------------------|---|
| Health Facility Utilization | 66% | 66% | MIS 2015 66% of children under age 5 with fevers seek care |
| Diagnosis | 86% | 57% | DHIS2 routine HMIS data (2017) 86% of suspected malaria cases were tested for malaria by microscopy or RDT <i>Note that is based on facilities that reported in DHIS2, so excludes any facilities that have not reported.</i> |
| Health Facility Participation | <i>Unknown (assumed 100%)</i> | <i>Unknown (57%)</i> | Unknown value, no quantitative data available to estimate <i>Unable to quantify the number of facilities that are missing from DHIS2 or master facilities list. Informal private sector may be excluded from DHIS2.</i> |
| Health Facility Reporting | 80% | 45% | DHIS2 routine HMIS average monthly reporting rate (2017) |
| Analysis, Response, and Dissemination | <i>Unknown (assumed 100%)</i> | <i>Unknown (45%)</i> | Unknown value, no quantitative data available to estimate |

4.6 Adherence to processes & guidelines

4.6.1 Timing and completion of register at health facilities

At the facility level, the FMOH has outlined that data should be collated and reported every month from the facilities to LGAs and then subsequently to the state and national level database. However, the practice of collection, reporting and recording data varied between facilities (Figure 15).

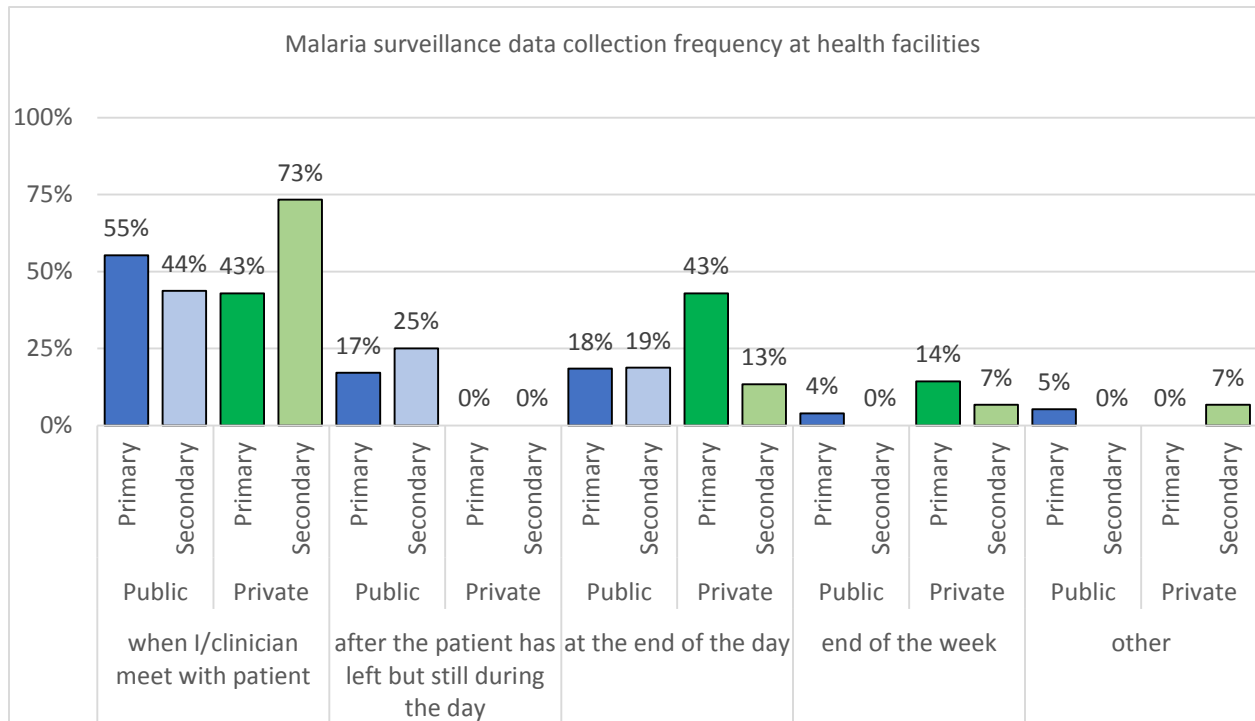
The collection pattern of data **in public health settings** has been categorized into five categories as shown in Figure 15. The majority of facility-level respondents (55% of primary and 44% of secondary facilities) collected data when the clinician sees a patient. A smaller proportion (17% and 18% of public primary and secondary care facilities, respectively) recorded data after the patient left and at the end of the day. In secondary care facilities, 25% collected data after the patient has left and 31% at the end of the day.

In private health settings, 43% of data were collected when the clinician was with the patient, 43% at the end of the day, and 14% at the end of the week in primary care facilities. In secondary care facilities, majority of data collection happened when the clinician was with the patient (73%) and at the end of the day and end of the week contributed to 13% and 7%, respectively.



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Figure 15: Malaria surveillance data collection frequency at health facilities (%)
 [PUBLIC: Primary=76, Secondary=16; PRIVATE: Primary= 7, secondary=15]



Waiting to collect or record patient data until the end of the week—often days after the patient was seen—can introduce recall bias or other data quality challenge, thereby potentially reducing the accuracy of data. In both sectors and levels, most respondents reported collecting data while interacting with the patient. This practice can help ensure that data are accurate.

4.6.2 Adherence to data quality assurance at health facilities

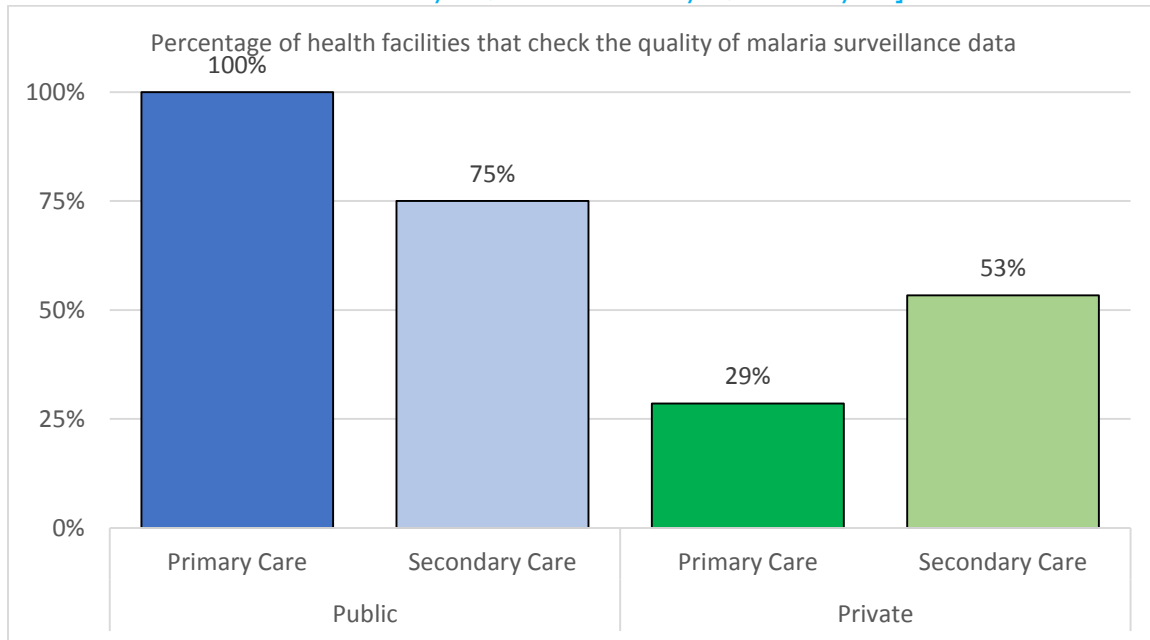
To ensure data quality, facilities are encouraged to check the quality of data in HMIS routinely. While most public facilities reported checking HMIS data quality, only about half of private facilities did so. Among private facilities, 29% of primary care and 53% of secondary care facilities reported checking the quality of HMIS data. Among public facilities, 100% of primary care and 75% of secondary care facilities reporting checking HMIS data quality (Figure 16).

A spot check for consistency between a completed OPD register and the NHMIS MSF record in public facilities showed 87% of facilities had consistent data between the two.



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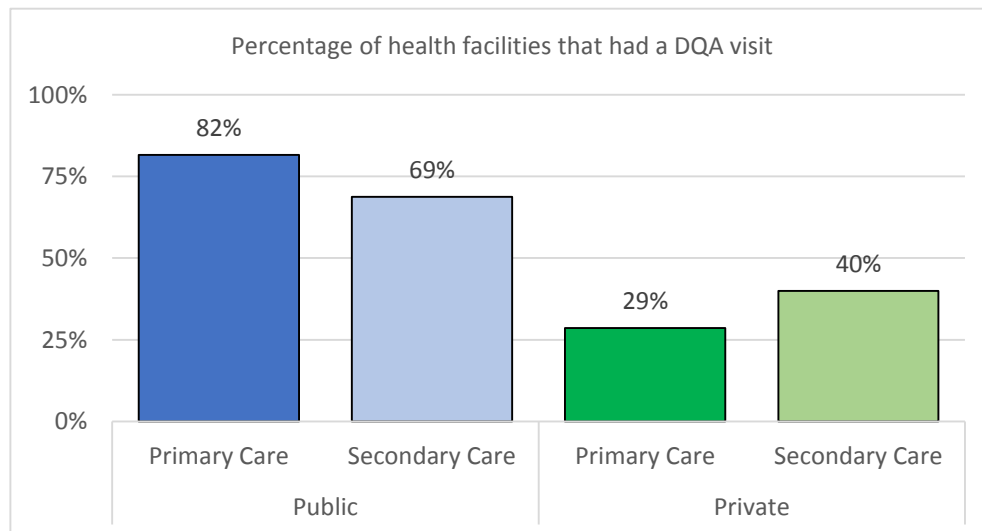
Figure 16: Percentage of health facilities that check the quality of malaria surveillance data [PUBLIC: Primary=76, Secondary=16; PRIVATE: Primary=7, Secondary=15]



To ensure the quality of aggregated data, a data quality assessment visit by M&E officer at the LGA is conducted. The majority of public health facilities (82% of primary and 69% of secondary facilities) reported ever having had a DQA visit.

Conversely, less than half of private health facilities reported having had a DQA visit (29% of primary and 40% of secondary facilities), (Figure 17).

Figure 17: Percentage of health facilities reporting ever having a DQA visit [PUBLIC: Primary=76, Secondary=16; PRIVATE: Primary=7, Secondary=15]



Even though a significant effort from the authorities in maintaining the quality of data was observed in public health settings, lack of standard process for rectifying errors found in data remains a challenge. When an error is identified during any data quality check, 64% of facilities respondents stated that they follow up with the data collector to check on the errors in the data. 26% reported that they would correct



the error themselves. The remaining 10% of respondents took different approaches. This variation and lack of standardization in how errors are resolved can perpetuate data quality challenges.

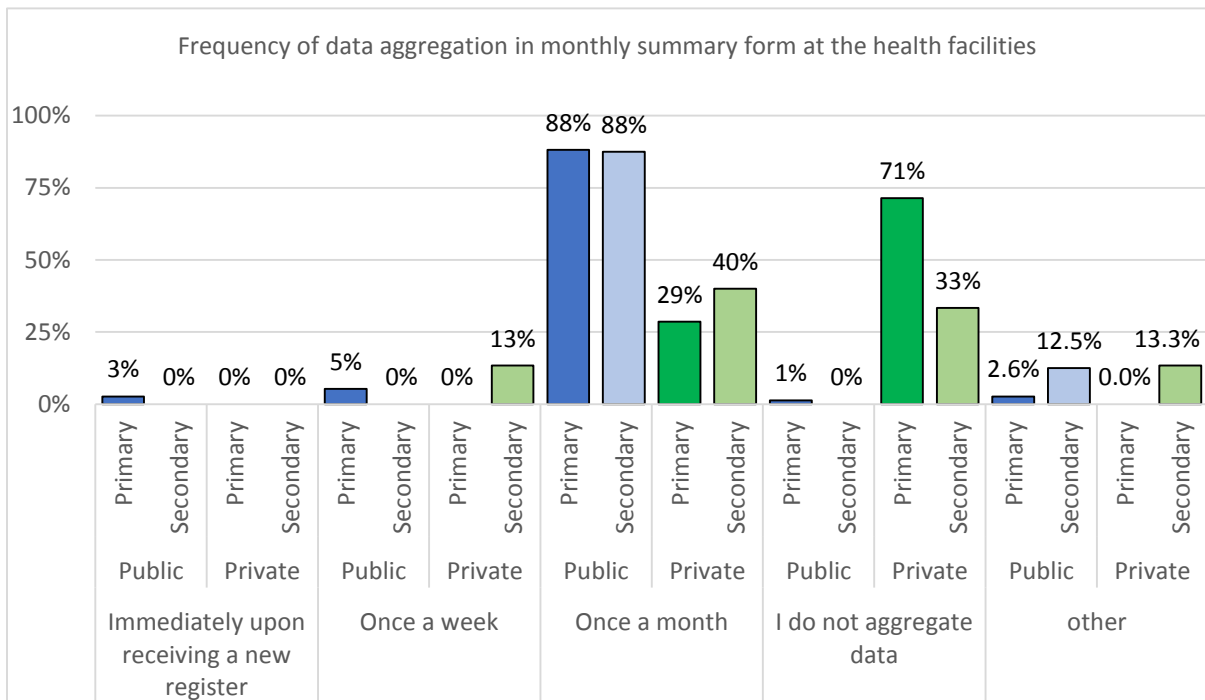
4.6.3 Data aggregation frequency at health facilities

Data aggregation practices at the facility level were mostly in line with the National Standard Operating Processes. At the end of each month, facility-level respondents reported that they aggregate data from different registers (OPD, IPD and ANC) onto monthly summary forms (MSFs), for collection at the LGA.

To transfer data from the daily registers to the MSFs, facility staff choose to aggregate their data at different frequencies or time points. Among public facilities, 88% of both primary and secondary facilities aggregate data in the MSF once a month. However, in private health setting, only 29% of the primary health facilities and 40% of secondary health facilities aggregate data in MSF once a month and many did not report aggregating data at all (Figure18).

The adherence to national standard operating process is inconsistent in private health facilities.

Figure 18: Frequency of data aggregation in monthly summary form at the health facilities (%)
 [Public Primary=76, Public Secondary=16, Private Primary=7, Private Secondary=15]



4.6.5 Data aggregation at the local government areas (LGAs)

Data collected by facilities is collated before uploading it on DHIS2. The MSFs are submitted to the LGA by heads of facilities, or collected from facilities by the LGA records officer. The Nigeria Health Information System Policy allows for both paper-based and electronic data submission. However, in practice, most data aggregation and submission is a manual and paper-based process with the exception of some instances where data are submitted electronically from facilities to LGAs. Some secondary and tertiary facilities are piloting electronic reporting directly into the HMIS. The next revision of the policy and



guidelines may further promote electronic reporting by secondary and tertiary facilities. The perception of the stakeholder on data collation was:



“Facilities bring data to us, sometimes we use to go to them, and sometimes we use to call them through phone calls, to bring data for us so that we send it to the DHIS.” — LGA respondent



“We experience stock-outs very often I can say, especially in the monthly summary form, even now we don't have any in stock, unless if the facilities will print it by themselves” – LGA respondent

4.6.6 Data Quality Assurance at the LGA level

To audit the surveillance data, more than 67% of states have consistently held monthly data quality assurance meetings for their LGAs, though a few states like Rivers and Plateau have been inconsistent due to resource challenges. In these states, data are not transmitted from the LGA to the state level routinely as per protocol; instead, data are shared on an as-needed basis.

All the LGAs considered data quality to be above average but still not at the desired level.



“Data quality needs to improve, despite positive changes in data quality, we are still not there yet, we need to do more to improve data quality and enhance the credibility of the HMIS”- National Level Respondent

Also, the credibility of collated data remains a big challenge at the LGA level. Though all the LGA claimed to have DQA in place, only Ikeja in Lagos and Girei in Adamawa could describe the process correctly as per the NSOPs.



“We do not do DQA, only the state used to do that, I think they do it quarterly.”--LGA Respondent

The LGAs also reported that in absence of a dedicated malaria surveillance officer in LGAs, review and validation of facility data are coordinated by LGA records officer working with RBM officer, which raises questions on the accountability of the data review and quality assurance activity.

4.6.7 Data Quality Assurance at the state level

DQA at the state level mainly occurs through data review and validation meetings. Five of the six states visited (all except Adamawa) had completed DQA reports available. There was confusion at the state level on the difference between data review, data validation, and DQA. Respondents in most states are not very clear in making distinctions between data review/data validation and DQA. Only Kebbi and Lagos states could articulate very well the DQA process as outline in National Health Information SOPs.

4.7 Data analysis, data quality, and use of data for decision making

Analyses of surveillance data are done predominately at the LGA, state, and national levels; they are uncommon at the facility level.

4.7.1 Data analysis at each level

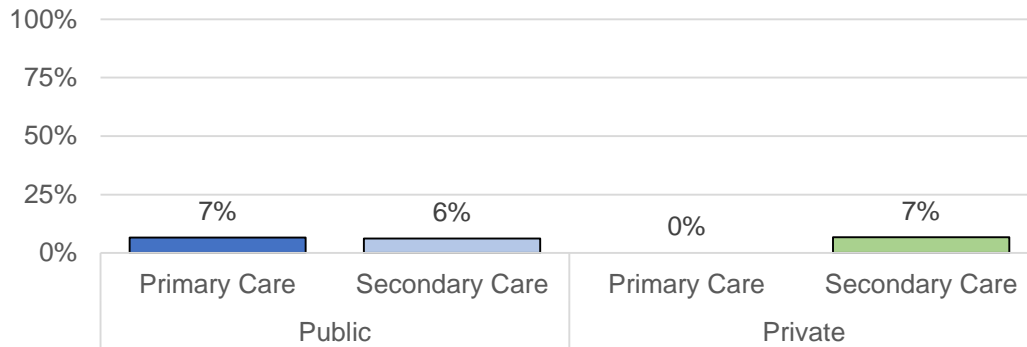
At the facility level, very few facilities reported analyzing malaria surveillance data. Overall, just 7 of 114 primary and secondary facilities (6%) reported analyzing data (Figure 19). The facilities that conducted



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analyses of malaria surveillance data reported that they compare patient malaria indicators at different time points—weekly, monthly, and yearly.

Figure 19: Percent of facilities at which malaria surveillance data is analyzed
[Public Primary=76, Public Secondary=16, Private Primary=7, Private Secondary=15]



At the LGA level, data analysis was reported to be “manual” (non-electronic) except in few where Excel software was used. Few LGAs reported to have the electronic software-based analytic tools available.

At the state level, there was variation in data quality assurance, analysis, and use. Only Lagos and Kebbi states reported data analyses at the state level consistently on monthly basis. They reported that analyses of monthly data are done by state records officers and SMEP M&E Officers, and take approximately one week to carry out using Microsoft Excel. Some states reported using malaria commodity data to track commodity consumption and, when local support is available, to use it for commodity provision. Others, however, stated that no analyses occur:



“We don’t do data analysis at the state level; we don’t do it, no data analysis, therefore no data is used”- SMEP respondent

All states rated data quality above average; on a scale from one to ten, with ten being the highest, states rated their data quality at an average of seven. Only Plateau state rated its data quality at below average, scoring their quality at a four.

At the national level, it is NMEP’s responsibility to review data quality from lower levels during monthly analysis of DHIS2 data, and provide regular feedback to the states on quality issues identified. In parallel, DPRS conducts data quality checks on a real-time basis. NMEP then integrates the feedback for the states and from DPRS’s data quality check to harmonize the HMIS tool.

Stakeholders at the national level noted that there has been a noticeable progressive improvement in quality, but still, the desired quality level is yet to be achieved.

No specific disease data analysis is conducted by the DPRS at the National level. NMEP, on the other hand, analyzes data to evaluate quality and malaria disease trends. The analyses are conducted using electronic software and results are displayed real-time on electronic dashboards.

4.7.2 Data use at the various levels

In order to strengthen routine health data systems, the National Council on Health, Nigeria’s highest health decision-making body, mandated the strengthening of the National Health Management



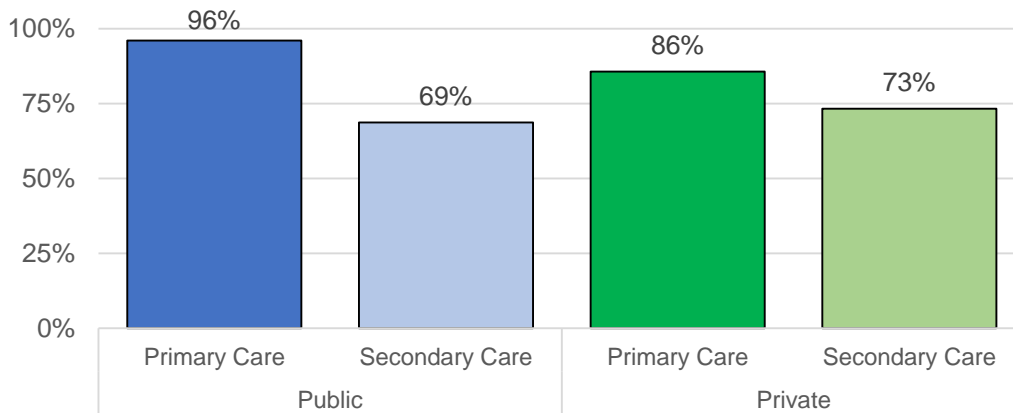
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Information System (NHMIS) through the use of the District Health Information System (DHIS) as the national health database for everyone who generates and/or uses health data. For a policy maker to make use of data, data must be relevant, readily available, comprehensive, timely and current, and of good quality—accurate, credible, and consistent.

4.7.2.1 Facility level

At the facility level, 96% of primary health facilities and 69% of secondary health facilities in the public sector used malaria data while 86% of primary health facilities and 73% of secondary health facilities used malaria data, reportedly for decision making on forecasting the human resource requirement and also to monitor the disease indicators to identify outbreaks of malaria (Figure 20). Though overall data use appears high in primary health facilities, secondary health facilities reported lower data use.

Figure 20: Percentage of health facilities using malaria data for decision making
[PUBLIC Primary=76, Secondary=16; PRIVATE Primary=7, Private Secondary=15]



4.7.2.2 LGA level

At LGA level, the use of surveillance data at the LGA level is rare and inconsistent. When used, it was reported to be for the purposes of advocacy, and sensitization within communities.



“We don’t analyze or use data here.” – LGA Respondent

4.7.2.3 State level

At the state level, the reported data are used for commodity management, advocacy, and resource mobilization targeting government executives and legislatures. All states reported the use of data despite lack of analysis in most. However, Lagos state has evidence of data use for program interventions and decision making. Other states reported data use for commodity forecasts and advocacy and sensitization. As one SMEP explained,



“We use data, of course, we use it to request or to advocate for support for malaria commodities, we use it to look at how the malaria data is being generated and then what is the rate at which malaria is being reported at the health facilities”.

4.7.2.4 Federal level

DPRS uses all health surveillance data to advise the ministry on health trends, policies, priority setting, resource mobilization, and responses. DPRS does not use data specific to disease; rather, it uses data for general health indicators. All ministry’s policy and strategic plans have utilized and been informed by surveillance data generated from the HMIS. More malaria focused entities like NMEP use all malaria-specific data from HMIS to provide feedback to states related to surveillance activities, to address DQA findings, to identify and resolve programming issues, and for policy, decision making, and resource mobilization. Feedback and sharing of results with various stakeholders is meant to occur quarterly.





“We do not use Malaria data specifically but all health data in a holistic manner. Malaria surveillance data use if the preoccupation of the NMEP and Malaria stakeholders at all levels”. – National Level Respondent



“Yes, they discuss, the primary mover of the review meeting is M&E. At least we are malaria interested, so we will look at the malaria aspect of it and then we extract, bring it to the data clerk present it to the M&E expert committee, we have experts in M&E here, they make pictorial graphic representation of everything, people brainstorm on the result, then after brainstorming they come to some conclusion and we now write feedback to the states on the M&E” –National Level Respondent

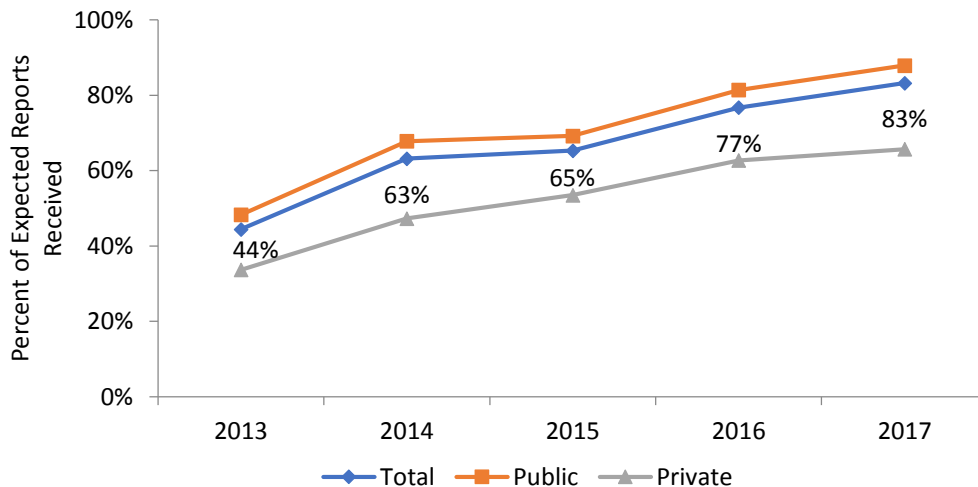
4.8 Performance of the system: reporting rates, timeliness, and consistency

To evaluate the performance of the surveillance system, this section details uptake of the system by examining the frequency and timeliness of reporting. Since this section relies on data in DHIS2, it should be noted that the integrity of this analysis depends on the quality of data in DHIS2. A separate analysis of the DHIS2/HMIS system (Facility Level HMIS Analysis, NMEP and WHO, 2018) highlights some organizational and quality-related challenges of the system, including potential systemic misclassification of facility public or private ownership.

4.8.1 Reporting rates in HMIS

NHMIS data 2013 through 2017 was exported from DHIS2 to evaluate reporting rates. Figure 21 indicates that NHMIS data reporting has improved substantially from 2013 through 2017. Reporting rates peaked most recently, with 83% of expected Monthly Summary Forms received from facilities in 2017. Reporting rates were consistently higher and in the public sector than in the private sector. Though the reporting rates at private facilities have improved over time, the rate still remains low, with one third of Monthly Summary Forms unreported in 2017.

Figure 21: Reporting Rates of NHMIS (2013—2017)



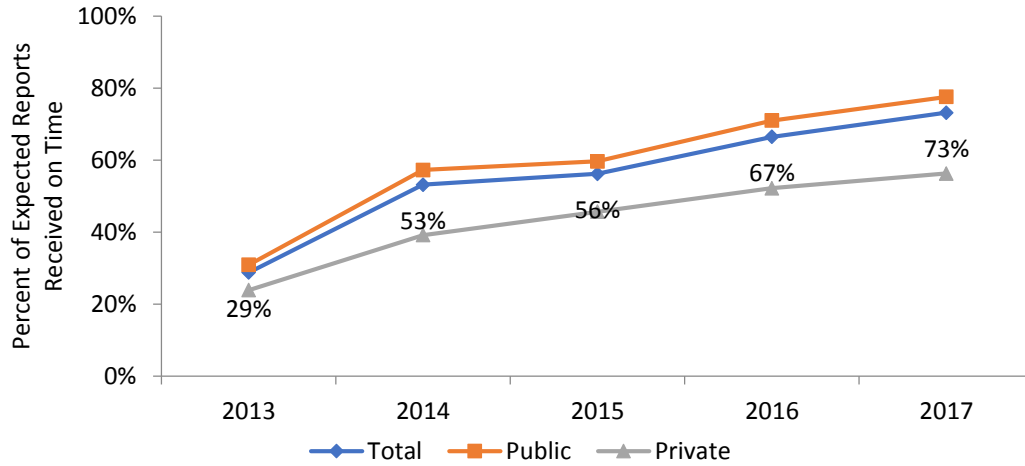
As described in section 4.5, note that these reporting rates are based only on the facilities that exist in DHIS2: facilities (especially private or informal) that are not registered in HMIS are not able to report into the DHIS2 system.



4.8.2 Reporting timeliness in HMIS

The availability of data is an important characteristic of an efficient surveillance system but the availability of data in a timely manner represents the usefulness of the surveillance systems. The trends of timely reporting of data from 2013 to 2017 reveals that the timeliness of data reporting has improved over time. Of the reports expected in DHIS2 each month, nearly three quarters (73%) are received on time, as indicated in Figure 22.

Figure 22: Timeliness of data reporting NHMIS (2013—2017)



5. Stakeholders' Recommendations

Stakeholders at all levels suggested ways to strengthen the surveillance system as are summarized below:

National level stakeholders

- *Need for the strengthening of the leadership and coordination role of NMEP*
- *Need for more public-sector funding and investment especially in states without active donor support*
- *Emphasis on harmonization and streamlining of data collection tools and processes especially at the facility levels*
- *Need for expansion of data capture scope to include private sector facilities and community-based facilities such as Community Pharmacies and PPMVs*
- *Strengthen the surveillance system HR with more dedicated staff especially at the community and facility levels*

State level stakeholders

- *Need for active involvement for data use and analysis at facility and LGA level which can be possible if adequate system is provided rather than making it manual*
- *Need for more support for advocacy for increased public sector funding*
- *Need for increased HR availability and capacity building*

LGA level stakeholders

- *Need for increased HR availability*
 - *Need for more capacity building*
 - *Need for reduction in tools stock-outs*
-



6. Conclusions & Discussion

6.1 Key findings across malaria surveillance landscape

Key findings across all levels are summarized in Table 12:

Table 12: Key findings of malaria surveillance indicators across all levels; Source: Primary Data

● Available ● Not Available ● Partially Available

| Indicators | Facility Level | LGA Level | State Level | Federal Level |
|---|-------------------|--------------|--------------|---------------|
| Available documentation | | | | |
| Malaria surveillance SOPs | ● | ● | ● | ● |
| Well-defined indicators | ● | ● | ● | ● |
| Tools availability & use | | | | |
| Data entered into electronic system | ● | ● | ● | ● |
| Adequate IT infrastructure | ● | ● | ● | ● |
| Data Collection | Facility Register | ● | ● | ● |
| Data Reporting | MSF | DHIS | DHIS | DHIS |
| Data Analysis | ● | Manual | MS Excel | MS Excel |
| Human resources | | | | |
| Roles and responsibilities clearly defined | ● | ● | ● | ● |
| Dedicated Malaria Surveillance staff available | ● | ● | ● | ● |
| Surveillance monitoring & evaluation training plan in place | ● | ● | ● | ● |
| Frequency of training on HMIS | 3-6 Months | Last 3 years | Last 3 years | ● |
| Malaria Surveillance Process in place | | | | |
| Data Collection | ● | N/A | N/A | N/A |
| Data Reporting | ● | ● | ● | N/A |
| Data Analysis | ● | ● | ● | ● |
| Data Use | ● | ● | ● | ● |
| Data Quality Assurance | | | | |
| Assessment frequency | Quarterly | Quarterly | N/A | N/A |
| Mechanism to monitor timeliness of reporting | ● | ● | ● | ● |
| Mechanism to monitor completeness and mistakes | ● | ● | ● | ● |
| Major Constraints | | | | |
| Adequate training on surveillance | ● | ● | ● | ● |
| Proper staffing for surveillance | ● | ● | ● | ● |
| Adequate funding for surveillance | ● | ● | ● | ● |



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Key findings are summarized by state in Table 13:

Table 13: State-wise key findings of malaria surveillance attributes; Source: Primary Data

● Available/Good ● Not Available/Needs Improvement ● Partially Available/Average

| Indicators | Adamawa | Enugu | Kebbi | Plateau | Lagos | Rivers |
|--|---------------------|---------------------|---------------------|-------------------|--------------------|-------------------|
| Available documentation | | | | | | |
| Malaria surveillance SOPs (HF) | ● | ● | ● | ● | ● | ● |
| Well-defined indicators | ● | ● | ● | ● | ● | ● |
| Tools availability & use | | | | | | |
| Access to DHIS among records officers (LGA) | ● | ● | ● | ● | ● | ● |
| Adequate IT infrastructure | ● | ● | ● | ● | ● | ● |
| Data Collection | ● | ● | ● | ● | ● | ● |
| Data Reporting | ● | ● | ● | ● | ● | ● |
| Human resources | | | | | | |
| Roles and responsibilities clearly defined (HF) | ● | ● | ● | ● | ● | ● |
| Dedicated Malaria Surveillance staff available (HF) | ● | ● | ● | ● | ● | ● |
| Surveillance, Monitoring & Evaluation training plan in place | ● | ● | ● | ● | ● | ● |
| Frequency of training | Within last 2 years | Within last 2 years | Within last 2 years | More than 2 years | Within last 1 year | More than 2 years |
| Malaria Surveillance Process in place | | | | | | |
| Data Collection | ● | ● | ● | ● | ● | ● |
| Data Reporting | ● | ● | ● | ● | ● | ● |
| Data Analysis | ● | ● | ● | ● | ● | ● |
| Data Use | ● | ● | ● | ● | ● | ● |
| Data Quality Assurance | | | | | | |
| Mechanism to monitor timeliness of reporting | ● | ● | ● | ● | ● | ● |
| Mechanism to monitor completeness and mistakes | ● | ● | ● | ● | ● | ● |
| Major Constraints | | | | | | |
| Adequate training | ● | ● | ● | ● | ● | ● |
| Proper staffing | ● | ● | ● | ● | ● | ● |
| Adequate funding | ● | ● | ● | ● | ● | ● |

6.1.1 Initiatives and successes at national level

There have been substantial successes as part of malaria surveillance program over last few years, with strong leadership and commitment shown by NMEP, and strong support by WHO, donors, and implementing partners. Of note, some key initiatives include:



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- Movement towards an integrated national routine health information system
 - Vertical reporting being rationalized
 - Movement towards tools and reporting harmonization
- Improving reporting rates and timeliness
- NMEP-led capacity building, skill development, and training initiatives to improved capacity of M&E teams at national and state levels
- Improving infrastructure at federal and state level such as computers, required software and internet connections
- Engagement of new donors and implementation partners to support surveillance and M&E
- Increasing capacity for sub-national levels to analyze data

6.1.2 Overall understanding of system objectives inadequate at facility level

High-level stakeholders in the surveillance system demonstrated a clear understanding of the goals and objectives of the surveillance system. This understanding did not percolate down fully to staff at the facility level. Although there was variation, facility personnel overall demonstrated a vague understanding of the surveillance system's importance, what guidelines/SOPs to follow, and the roles that each facility staff member holds with relation to surveillance.

6.1.3 Key challenges across levels

6.1.3.1 Multiple SOPs, program obligations, and parallel reporting systems

Multiple process documents (guidelines, SOPs, national policies, etc.) provide a wealth of information about surveillance—both broadly across disease areas and specifically for malaria. However, having key pieces of information split into multiple documents instead of being consolidated into one place seems to have created confusion and irregularities among facilities in the processes they followed and the subsequent quality of data produced. Although the *National Standard Operating Procedure for the Collection and Management of Integrated Routine Health Data in Nigeria* provides the most comprehensive information for facilities, there are opportunities for consolidation of key information for facilities to ensure clarity of roles/responsibilities and standardized practices.

Further, disease surveillance in Nigeria spans across dozens of disease areas, and is not focused specifically on malaria. Integrating malaria surveillance process with other diseases on registers and reporting forms helps to streamline surveillance by reducing the number of parallel reporting systems, yet this results in a large number of indicators that must be tracked and reported over time. This requires time, attention to detail, and adherence to many case definitions, which can differ for the same disease area across multiple reporting systems.

6.1.3.2 Lack of dedicated staff for surveillance

Another critical area of improvement is the distribution of human resources for HMIS. Data shows that there was a shortage of HMIS personnel at many facilities and often HMIS personnel were engaged in multiple programs. Even at facilities with dedicated records officer, some staff were not aware of their availability and responsibilities. In health facilities, which are often busy and understaffed, surveillance often is not a top priority, especially if there are not dedicated staff for surveillance. This could lead to lack of clarity about data collection and reporting at the facility level, as staff were often unclear on what happens with the collected data.

Another issue with HMIS personnel was their overall capacity to engage with the system and it was reflected by lack of training on HMIS/DHIS platforms. FMOH/DHIS could schedule training checks at the facility level and assess training needs of facility and LGA level personnel.

6.1.3.3 Inadequate quality assurance mechanisms

Although data quality assurance procedures are outlined in guidelines, many of these processes occur irregularly or do not occur at all, mainly due to funding or human resource shortages.



6.1.3.4 Limited data use at subnational levels

Data utilization at the state levels tend to be limited to commodity forecasting and advocacy—not for program interventions. Data are seldom used at the LGA level. There are opportunities for increased data use at subnational levels to improve resource allocation, selection and targeting of interventions, and other programmatic decisions.

6.1.3.5 Missing sectors and limited participation from the private sector and community

First, of data that are currently included in the HMIS system, process adherence among private facilities falls short in comparison with that of public facilities. This could be due to a lack of perceived benefits of compliance by the private sector and/or inadequate engagement with the private sector by the public health stakeholders. Also, limited access to data reporting tools at the patient interface level, limited availability of surveillance guidelines, and few pathways to report data from the private sector all lead to low receipt and quality of data in this sector.

Furthermore, reporting processes for secondary and tertiary facilities are complex, resulting in lower reporting rates compared to primary facilities. While the National Health Information System Policy requires secondary and tertiary facilities to provide monthly summary data to the LGA in which they are located, the catchment areas of these facilities often extend beyond LGA boundaries. In addition, the policy also states that secondary and tertiary facilities are expected to submit their data electronically directly into DHIS2. These duplicative requirements may create confusion as to the correct procedures resulting in lower reporting rates among secondary and tertiary facilities.

Beyond the facilities that exist in DHIS2, much of the private sector—including the substantial informal private sector (e.g. PPMVs)—are currently excluded from the HMIS system. Without the ability to have high-quality data collected from this sector and to have that data flow into the national HMIS system (DHIS2) with the rest of the malaria data, decision-makers will continue to be equipped with an incomplete picture of the malaria situation as they plan and carry out programs. This limits the ability to target interventions most efficiently to move towards malaria elimination.

The incorporation of community data into the HMIS system is similarly challenging and creates a substantial gap. While some facility data enters DHIS2 through the facilities from which community health workers receive commodities, it is likely that much data from the community is excluded entirely.

6.1.4 Key challenges at each level

Although overall challenges span across multiple levels of the healthcare and surveillance systems, there are some challenges that are specific to each level of the system.

6.1.4.1 Challenges at the facility level

Surveillance HR capacity and training: There was a lack of clarity about who was responsible for each surveillance activity at many facilities. High workloads and competing priorities (in seeing patients, administrative work, and parallel reporting systems) can limit staff availability to conduct necessary surveillance activities. Further, only about half of the facilities reported having staff trainings on HMIS in the last three years. This may have contributed to the low awareness and understanding about the malaria surveillance process (e.g. in which less than 50% of staff were aware of the standard malaria case definition and guidelines).

Data collection and reporting: The high number of indicators adds enormous burden on the data collection staff, hence reducing the simplicity of the current system. Findings indicate that manual paper based data collection on tools like daily OPD, ANC and IPD register is cumbersome. Some facilities fill additional registers beyond NHMIS MSF inputs, thereby creating parallel reporting systems and often duplication of work. Health facility staff exhibited low motivation for multi-point data collection and reporting process.

Data quality: The quality of data collected and reported by health facilities was found to be reduced due to a majority of facilities' staff being burdened with high workload and lacking adequate training for data collection. Due to this low-quality data, the analysis of data at the facility doesn't help in the process of forecasting and decision making.



6.1.4.2 Challenges at the LGA level

Surveillance HR capacity and training: LGA level HR in surveillance was found to be weak with inadequate resource capacity for malaria programming in general and for surveillance in particular. The absence of dedicated surveillance personnel at LGAs supports this finding. Inadequate support and supervision of processes and HR are common in all LGAs. Almost all LGAs expressed the need for additional HR, especially data officers with skills and capacity for data management. Finally, the confusion of roles between the RBM Focal Person and the M&E Officer at the LGA level creates variability in how data reporting, validation, and use are done at this level, and creates space for missed steps and miscommunications.

Data reporting: Though there have been only a few reported incidences of tool and register stock-outs in some states, especially those without partner’s support, register stockouts indicate inconsistency in data reported across facilities in different states. Stockouts occur mainly because of shortage of funds, which restrict mobilization of data reporting tools.

Data quality: The main challenges related to data quality included incompleteness of data, use of wrong case definitions, and inappropriate reporting (under and over-reporting) of cases.

6.1.4.3 Challenges at the state level

Surveillance HR capacity and training: Identified areas of disparities include; HR availability, HR capacity, data collection efficiency, data analysis capacity and data utilization. Most states lack adequate HR for surveillance and available HR have inadequate skills and capacity. Data collection is often incomplete, and data are not analyzed.

Data use: Data utilization is limited to commodity forecasting and advocacy/sensitization. There is limited use of data for program interventions.

Data quality: Some states have no process in place for DQA as outlined in the “national standard operating procedures for surveillance in Nigeria”.

Surveillance cost: There is limited public sector funding of malaria in the states. There are no clear sustainability plans by states to replace support from partners and NMEP.

6.1.4.4 Challenges at the national level

Use of surveillance data limited by data quality: Surveillance data quality remains below expectations. Even though guidelines are in place for quality improvement, they are not sufficiently implemented or complied with. This low quality and completeness of data contributes to an inability to analyze and use data for decision making at higher levels.

Surveillance cost: Lack of funds remains a major challenge to the ability of the DPRS to provide much-needed capacity building, training, and support to DHIS platform users. This has had obvious implication on data quality and overall system performance.

6.2 Attributes of the surveillance system

Attributes of the surveillance system were rated following the U.S. CDC’s Guidelines for Evaluating Surveillance Systems (CDC, 1988). Attribute definitions are provided in the Annexure section 8.8 of this report.



Sliding scale indicating quality of the system is, with rightmost (green) being higher quality and red being lower quality

Simplicity: Rating – Low

The current system **is complex**, as there are many data elements and registers, and the process of data collection, collation and submission is cumbersome at the facility and LGA levels. Manual paper-based process drives data collection into different registers and then collated into MSF. These MSF then manually needs to be transported to LGAs. At the LGA level, the collation of MSF from facilities is also manual. Further, having multiple different



sources for guidelines/SOPs results in confusion or lack of awareness: at the facility level, only 44% of the facilities are aware of standard case definition for malaria diagnosis and only 41% of the facilities are aware of standard case guideline for malaria.



Acceptability: Rating – Low

Relatively high reporting rates from health facilities (83%) indicate acceptance of the surveillance process. However, facilities reported challenges with the cumbersome data collection and reporting process, lowering their acceptance of the system. The majority of facilities also do not analyze or use data for decision-making. Some LGAs indicated low acceptance of/ adherence to the system by having irregular rather than monthly data quality meetings.



Flexibility: Rating – Low

The surveillance system for malaria has very low flexibility. The resources allocated for malaria surveillance are very limited and any change in the current system will be difficult to implement at lower levels, as staff involved in surveillance activities already report high workload. 50% of facilities had a dedicated records officer, and fewer had a dedicated staff member for malaria surveillance. Low funding and reliance on donor funding, which can be unpredictable, are challenges that limit flexibility of the system.



Availability: Rating – Medium

The availability of the tools, resources, and skilled personnel for malaria surveillance was moderate. There was high availability of data collection tools (>80%) and low stockout rates of tools at health facilities (16%). Facilities' availability of dedicated staff to support malaria surveillance was low, while there was moderate availability of facility records officers (50%). Most facilities had not had recent HMIS trainings for staff.

Access to IT infrastructure for surveillance remains a challenge at the LGA level especially, where although computers and logins for DHIS2 were generally available, internet access was less common and computers sometimes failed. Limited access to DHIS2 at this level creates a bottleneck in the surveillance process, reducing the availability of data to higher levels and at potentially delaying timelines.



Timeliness: Rating – High



The timeliness of the current malaria surveillance data reporting is in line with the prescribed national standard operating procedures. Approximately three quarters of facilities report surveillance data by the expected deadline each month. Limited technological or HR infrastructure at higher levels can delay data analysis and use, but most data are entered in DHIS2 on time.



Data quality: Rating – Medium

The quality of information collected for malaria surveillance is low. More than 60% of the facilities conduct a quality check for data collected, but these quality assurance activities often occur less frequently than expected per guidelines, especially at the LGA level. The quality of collated data at LGA was rated an average of 7 out of 10. However, data quality challenges persist at all levels, and data completeness is often low.



Sustainability: Rating – Low

Sustainability of the system is defined as the system's ability to withstand human resource or financial gaps. The current malaria surveillance system is very human resource-intensive, especially at the facility level. The majority of data collection and reporting activities in health facilities are manual, and many staff members at facilities are not trained on HMIS. Facilities often lack dedicated surveillance personnel. Low funding for surveillance and reliance on donors limits sustainability as well.



Reliability/stability: Rating – Low

The current malaria surveillance system has a low reliability. Data collection and reporting tools were unavailable in much of the private sector, and the quality of data collection can vary across sectors. The use of a partially paper-based and partially electronic pathway introduces challenges with reliability (e.g. register stockouts, poor internet connection, etc.); any infrastructure challenges can cause the system to break down or experience bottlenecks.



Representativeness: Rating – Low

At most, data from 45% of symptomatic malaria cases are captured through the HMIS system and are available for use in decision-making. Data from the private sector and the community are inconsistently captured, and parts of these sectors are excluded from the HMIS pathway. As such, 45% is likely an overestimate, yielding low availability of the system.

7. Recommendations

| Primary Entity Responsible | Gap Category | Gap Description | Impact Level | Recommendation | # |
|----------------------------|----------------------------------|--|----------------------------|--|---|
| DPRS | Surveillance guidelines and SOPs | Numerous detailed guidelines/ SOPs; key surveillance processes and terms defined across multiple documents | All levels | Create a single document for consolidated surveillance guidelines, for ease of use | 1 |
| | | | All levels | Revise guidelines for malaria surveillance to provide better clarity on roles, process, tools for all levels not only in terms of data collection, reporting but also monitoring, quality assurance, analysis etc. | 2 |
| | | | All levels | Create simple, easy-to-follow job aids for surveillance staff at each level (especially facility) | 3 |
| | | | All levels | Integrate or harmonise elements of parallel reporting systems as much as possible for consistency (e.g. aligning case definitions, forms, guidelines, SOPs, job aids, etc.) | 4 |
| | Data collection | Long data collection forms: too many elements can reduce quality | Facility | Simplify form to capture only the key information needed from all disease areas (maintaining the full integration that exists for malaria) | 5 |
| | Data reporting | Duplicative reporting through IDSR and HMIS | Health Facilities and LGAs | Explore ways to streamline reporting between IDSR and HMIS pathways (e.g. standardizing case definitions) to reduce duplicative work and increase consistency between platforms | 6 |
| | | Case management and other malaria indicators are obtained through multiple platforms | All levels | Not all the relevant indicators are collected through HMIS registers (e.g. IRS data). Explore integrating all necessary routine malaria data elements into a single revised HMIS system | 7 |



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| Primary Entity Responsible | Gap Category | Gap Description | Impact Level | Recommendation | # |
|----------------------------|---|--|--|--|----|
| DPRS (continued) | Data Reporting (continued) | Secondary and tertiary facilities have a unique reporting pathway and low reporting rates | Health Facilities (secondary and tertiary) | To increase consistency, inclusion, and data completeness: tailor reporting forms to secondary and tertiary facilities, and implement pathway through which secondary and tertiary facilities report directly into DHIS2 | 8 |
| | | Community-level data are inconsistently captured | All levels | Revise the reporting pathway for community entities to ensure that this sector's data are reported and clearly attributed to community (i.e. not grouped with nearby health facilities) | 9 |
| | | HMIS and other parallel data sit in separate repositories that do not integrate | National | Integrate IDSR data into DHIS2: activate the link that already exists for this pathway | 10 |
| | Data quality & data quality assurance (DQA) | Paper-based data collection can introduce manual aggregation errors | Health Facilities and LGAs | Implement an additional data quality checks for facility-level data before data are reported to the LGA (i.e. better coverage of facility-level data quality checks, potentially by wards) | 11 |
| | | Poorly defined data quality assurance processes & feedback mechanisms, and lack of standardization in how DQA activities are carried out | All levels; National-level M&E Expert Group | Develop and implement an up-to-date data quality assurance guidelines and feedback mechanism for government staff and partners to use consistently across all levels <i>In progress by M&E Expert group</i> | 12 |
| | | Records of DQAs are paper-based, and DQA activities are not tracked centrally | DPRS | Track DQA activities in DHIS2 (e.g. integrate DQA dates and feedback forms into DHIS2) | 13 |



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| Primary Entity Responsible | Gap Category | Gap Description | Impact Level | Recommendation | # |
|----------------------------|------------------------------|--|------------------------------------|--|----|
| DPRS (continued) | | Feedback to facilities is inconsistent and infrequent | Health facilities, LGA | Improve feedback mechanisms for providing feedback to facilities on their data quality as well as other aspects of malaria such as case management and commodity management | 14 |
| | Surveillance infrastructure | Master Facilities List is outdated and excludes some malaria service providers | Health Facilities, State, DPRS | Ensure that the Master Facilities List is updated routinely, and includes formal private sector, retail private sector, and community entities—all with unique IDs and accurate sector classification | 15 |
| | Surveillance human resources | Inadequate training conducted for malaria surveillance | Health facilities, LGAs and States | Implement system to track trainings (surveillance, case management, etc.) routinely; develop a standard training calendar and track training activities in DHIS2, so training needs are centrally recorded | 16 |
| | | Inadequate human resources for malaria surveillance | All levels | Develop and implement a human resource plan to improve staffing and adherence to guidelines for malaria surveillance. | 17 |
| | | LGA-level malaria surveillance staff roles are often confused | LGA | Further delineate roles of the LGA RBM Focal Person and LGA M&E Officer, including clarity about how these roles support each other/work together | 18 |
| | Private sector engagement | Retail private sector excluded from DHIS2 | All levels | Prioritize reporting in and integrate data from the retail private sector (e.g. PPMVs) into DHIS2 | 19 |
| | | Low reporting by private sector | All levels | Orient formal private sector on data collection and entry | 20 |



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| Primary Entity Responsible | Gap Category | Gap Description | Impact Level | Recommendation | # |
|----------------------------|---|---|-----------------|---|----|
| NMEP | Data reporting | HMIS and other parallel data sit in separate repositories that do not integrate | National, State | Explore ways to integrate HMIS data with other data from other parallel sources (e.g. MPSS, vector sentinel, and pharmaco-vigilance) in a central platform like DHIS2 | 21 |
| | Preparing data systems for malaria elimination (<i>long-term</i>) | Preparing for shifts in malaria surveillance as move closer towards elimination | National | Begin <i>long-term</i> planning for elimination-focused data systems, including but not limited to individual-based real-time reporting, electronic reporting systems, more frequent and improved data analysis and review mechanisms, etc. | 22 |
| | | Aggregate data collection limits data quality and granularity | National | Consider case-based surveillance, especially in low-endemic areas | 23 |
| | | Malaria surveillance is passive | National | Consider adding active surveillance to the malaria surveillance pathway in areas with low malaria burden | 24 |
| States | Data quality & data quality assurance (DQA) | DQA activities occur inconsistently | All levels | Improve consistency of DQA activities from state to LGAs, and from LGAs to facilities, including advocacy for consistent funding | 25 |
| | Data quality & data quality assurance (DQA) (continued) | At subnational levels, findings from DQA visits are not centrally summarized | State | States to begin preparing DQA reports that synthesize DQA visit findings, including recommendations, validations, and scores—as is done at national level | 26 |
| | | Data use at state level is limited | State | Stimulate data use for other programmatic decisions (e.g. vector control, improving case management, trainings, etc.), beyond commodity forecasting and advocacy purposes | 27 |
| | Surveillance infrastructure | Master Facilities List is outdated and excludes some malaria service providers | State, DPRS | Strengthen link between state and DPRS to ensure facility status updates are communicated regularly | 28 |



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| Primary Entity Responsible | Gap Category | Gap Description | Impact Level | Recommendation | # |
|----------------------------|---|---|----------------------------|--|----|
| States (continued) | | Unavailability of internet and frequent crashing of computers | State, LGAs | Develop and implement state-led quarterly infrastructure assessment/audit, of which findings will be communicated each time to DPRS | 29 |
| | Surveillance human resources | Limited tracking and forecasting of HR needs for malaria surveillance | State, LGAs | Develop improved methods for states and LGAs to assess, report, and advocate for their HR needs on a regular, routine basis | 30 |
| LGAs | Data Reporting | Data reports sent late (not timely) | Health Facilities and LGAs | Ensure states are held accountable for funding monthly LGA-level data validation meetings, to ensure that these meetings occur every month | 31 |
| | Data quality & data quality assurance (DQA) | Data are seldom analyzed or used at the LGA level | LGA | Build data analysis and use into LGA-level staff responsibilities, so LGAs can begin using data for their own program management (e.g. training and commodity management needs) | 32 |
| | Private sector engagement | Low reporting by private sector | All levels | Identify designated staff at LGA or ward level to manage private sector reporting, including ensuring registers are available and collecting completed private sector registers each month | 33 |
| Facilities | Data quality & data quality assurance (DQA) | Paper-based data collection can introduce manual aggregation errors | Health Facilities and LGAs | Develop and operationalize electronic data collection system from health facilities | 34 |



8. Annexure

8.1 Sample Size

| State | State | | LGA | | Primary HF | | Secondary HF | | Tertiary HF | Total facility |
|---------|-------|------|-------|------|------------|--------|--------------|--------|-------------|----------------|
| | Quant | Qual | Quant | Qual | Private | Public | Private | Public | | |
| Adamawa | 1 | 1 | 2 | 4 | 0 | 13 | 5 | 3 | 0 | 21 |
| Enugu | 2 | 1 | 1 | 1 | 1 | 12 | 2 | 4 | 0 | 19 |
| Kebbi | 1 | 1 | 1 | 5 | 0 | 13 | 4 | 4 | 1 | 22 |
| Lagos | 1 | 1 | 1 | 3 | 1 | 11 | 0 | 0 | 0 | 12 |
| Plateau | 2 | 1 | 1 | 5 | 4 | 14 | 0 | 4 | 1 | 24 |
| Rivers | 1 | 1 | 1 | 1 | 0 | 13 | 4 | 1 | 1 | 18 |
| Total | 8 | 6 | 7 | 19 | 6 | 76 | 15 | 16 | 2 | 116 |

8.2 Results Table 1: Malaria Surveillance Infrastructure and Activity Summary

| Category | Indicator | Facility | LGA | State | National |
|------------------------|------------------------------------|--|--|-------------------------------------|---------------------------------|
| Infrastructure | | | | | |
| Human Resources | Availability | Dedicated records officer- 50% | Dedicated Records officer- 88% | Surveillance and Data Officer- 100% | National Coordinator NMEP- 100% |
| | Training on HMIS in last 3 years | 54% | 100% | 78% | N/A [Not Relevant] |
| Tools | Data Collection Tools Availability | <ul style="list-style-type: none"> OPD Daily Register- 84% IPD Daily Register- 99% ANC Register- 69% Facility Records- 70% Commodity Stock Card- 81% <i>[In line with prescribed process]</i> | N/A [Not Relevant] | N/A [Not Relevant] | N/A [Not Relevant] |
| | Data Reporting Tools Availability | NHMIS Monthly Form- 92% <i>[In line with prescribed process]</i> | LGA staff with login/access to DHIS- 88% | Have login/access to DHIS – 56% | N/A [Not Relevant] |



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| Category | Indicator | Facility | LGA | State | National |
|------------------------|----------------------------------|---|---|---|--|
| | Data Analysis Tool Availability | Paper & Calculator | Excel | Excel | Data Analysis Software |
| | Data Capturing Medium | <ul style="list-style-type: none"> Excel- 1% Paper- 99% | Computer available- 88% | Computer available- 89% | N/A [Not Relevant] |
| Activity | | | | | |
| Data Collection | Who collects data | Records Officer, Nurses, Clinicians & CHEW <i>[Not in line with prescribed process]</i> | M & E Officer | State M & E Officer | N/A [Not Relevant] |
| | When is data collected | When Patient is with the Clinician | Once a Month | Once 6 Months | N/A [Not Relevant] |
| | What data are collected | Patient Demographic & Clinical Data Commodity Stock Data | Patient data from facilities Register stock outs in facilities | Patient Data from facilities and LGAs Register Stock outs at LGAs & Facilities | N/A [Not Relevant] |
| Data Reporting | Who reports data | Records officer & CHEW <i>[Not in line with prescribed process]</i> | M & E Officer | State Data Officer | N/A [Not Relevant] |
| | When is data reported/ frequency | Once a Month <i>[In line with prescribed process]</i> | Need Basis <i>[Not in line with prescribed process]</i> | Once in 6 months <i>[Not in line with prescribed process]</i> | N/A [Not Relevant] |
| | What data are reported | Data in the facility registers | Data from facility NHMIS monthly forms | Data from malaria data LGAs | N/A [Not Relevant] |
| | How are data reported | Data from facility register is collated in the paper based NHMIS monthly summary form and shared with LGA's M&E officer <i>[In line with prescribed process]</i> | Data from NHMIS form is being collated in an excel and uploaded in DHIS <i>[In line with prescribed process]</i> | Data from LGA is uploaded in DHIS <i>[In line with prescribed process]</i> | N/A [Not Relevant] |
| DQA | Does DQA takes place | Facilities- 44% <i>[Not in line with prescribed process]</i> | In all LGAs except Ikeja and Girei <i>[Not in line with prescribed process]</i> | No DQA defined for States | Yes, DPRS conducts DQAs in facilities and LGAs |



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| Category | Indicator | Facility | LGA | State | National |
|----------------------|-------------------------------------|---|--|---|---|
| | When was the last time DQA was done | 3 Months- 6 months (60%) | Last month (88%) | N/A <i>[Not Relevant]</i> | N/A <i>[Not Relevant]</i> |
| Data Quality | Aspect of data quality assessed | Completeness of patient information | Completeness of the facility data; over and under reporting and case definition | Completeness of the LGA data | Completeness of LGA and State data |
| | Frequency of data quality check | Once a month | Once a month | Once in 6 months <i>[Not in line with prescribed process]</i> | Once a month |
| | Data quality rating | Good – Less than 10 incomplete records | Above average- Incomplete facility monthly summary forms | Average in all states except Plateau where is very low | N/A <i>[Not Relevant]</i> |
| Data Analysis | Who analyzes data | Records officer & CHEW <i>[Not in line with prescribed process]</i> | LGA M&E Officer | State M&E Officer | NMEP |
| | What data are analyzed | <ul style="list-style-type: none"> Calculating indicators Comparing weekly and monthly data | <ul style="list-style-type: none"> Facility indicators Comparing facility wise data | LGA Indicators | Malaria indicators for LGA and state |
| Data Use | Who uses data | Not Used <i>[Not in line with prescribed process]</i> | LGA M&E Officer | State M&E Officer | NMEP |
| | When is data used | Never <i>[Not in line with prescribed process]</i> | Inconsistent frequency | Frequently | Frequently |
| | What data are used for | N/A <i>[Not Relevant]</i> | Advocacy and sensitizations in the communities Forecasting commodities Identify areas with high incidences | Decision making for program interventions Advocacy and sensitizations in the communities Forecasting commodities Identify areas with high incidences | Policy making Identify and resolve program issues Resource mobilization Provide feedback to states |



8.3 Results Table 2: Facility-Level Surveillance Characteristics

Source: facility-level questionnaires in 6 states in Nigeria, 2017

| | | Public Primary (n=76) | Public Secondary (n=16) | Private Primary (n=7) | Private Secondary (n=15) | Total (n=114) |
|--|---|-----------------------------|-------------------------------|-----------------------------|--------------------------------|------------------|
| Human Resources | Health Facilities with a Dedicated Records Officer | 47 (62%) | 4 (25%) | 1 (14%) | 5 (33%) | 57 (50%) |
| | Known Person Responsible for Data Collection | 14 (18%) | 3 (19%) | 2 (29%) | 7 (47%) | 26 (23%) |
| | Known Person Responsible for Data Reporting | 13 (17%) | 3 (19%) | 1 (14%) | 7 (47%) | 24 (21%) |
| | Known Person Responsible for Ensuring Register Availability | 70 (92%) | 10 (63%) | 2 (29%) | 12 (80%) | 94 (82%) |
| | Known Person Responsible for Data Analysis | 5 (7%) | 1 (6%) | 0 (0%) | 1 (7%) | 7 (6%) |
| | Someone at Facility Regularly Attends Monthly LGA Review Meetings or Otherwise Uses the Facilities Malaria Data | 73 (96%) | 11 (69%) | 6 (86%) | 11 (73%) | 101 (89%) |
| Guidelines/SOPs Available at Facilities | National SOP for the Collection and Management of Integrated Routine Health Data in Nigeria | 21 (28%) | 4 (25%) | 1 (14%) | 3 (20%) | 29 (25%) |
| | Technical Guideline for IDSR in Nigeria | 21 (28%) | 7 (44%) | 0 (0%) | 6 (40%) | 34 (30%) |
| | SOP for Malaria Data Management/DQA | 26 (34%) | 2 (13%) | 1 (14%) | 0 (0%) | 29 (25%) |
| | National Health Information System Policy | 16 (21%) | 6 (38%) | 0 (0%) | 1 (7%) | 23 (20%) |
| | Malaria Case Management Guidelines | 16 (21%) | 3 (19%) | 0 (0%) | 1 (7%) | 20 (18%) |
| | Respondent Aware of Guidelines/SOPs that Help with Malaria HMIS | 22 (29%) | 1 (6%) | 2 (29%) | 1 (7%) | 26 (23%) |
| Tool Availability | OPD Daily Register | 74 (97%) | 13 (81%) | 1 (14%) | 8 (53%) | 96 (84%) |
| | IPD Daily Register | 75 (99%) | 16 (100%) | 7 (100%) | 15 (100%) | 113 (99%) |
| | ANC Daily Register | 61 (80%) | 12 (75%) | 0 (0%) | 6 (40%) | 79 (69%) |
| | Facility Record | 63 (83%) | 10 (63%) | 1 (14%) | 6 (40%) | 80 (70%) |
| | NHMIS Monthly Summary Form | 70 (92%) | 14 (88%) | 6 (86%) | 15 (100%) | 105 (92%) |
| | Commodity Stock Card | 62 (82%) | 14 (88%) | 5 (71%) | 11 (73%) | 92 (81%) |
| | Stockout of a Register in the Past 60 Days | 12 (16%) | 1 (6%) | 1 (14%) | 4 (27%) | 18 (16%) |
| Quality Assurance | Respondent Received Training on HMIS in the past 3 Years | 43 (57%) | 10 (63%) | 1 (14%) | 8 (53%) | 62 (54%) |
| | Data Quality Audit has Ever Been Done at Facility | 62 (82%) | 11 (68%) | 2 (29%) | 6 (40%) | 81 (71%) |
| | Respondent Checks Data Quality During Data Reporting | 65 (86%) | 14 (88%) | 5 (71%) | 10 (67%) | 94 (82%) |
| | Respondent Regularly Checks the Quality of Facility's Malaria Data in HMIS | 76 (100%) | 12 (75%) | 2 (29%) | 8 (53%) | 98 (86%) |



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| | | | | | | |
|---------------|--|----------|----------|---------|----------|----------|
| Timing | Data recorded when: When with the patient | 42 (55%) | 7 (44%) | 3 (43%) | 11 (73%) | 63 (55%) |
| | Data recorded when: After the patient has left but during the day | 13 (17%) | 4 (25%) | 0 (0%) | 0 (0%) | 17 (15%) |
| | Data recorded when: End of day | 14 (18%) | 5 (31%) | 3 (43%) | 2 (13%) | 24 (21%) |
| | Data recorded when: End of week | 3 (4%) | 0 (0%) | 1 (14%) | 1 (7%) | 5 (4%) |
| | Data recorded when: Other | 4 (5%) | 0 (0%) | 0 (0%) | 1 (7%) | 5 (4%) |
| | Respondents Frequency of Data Aggregation: Immediately Upon Receiving a New Register | 2 (3%) | 0 (0%) | 0 (0%) | 0 (0%) | 2 (2%) |
| | Respondents Frequency of Data Aggregation: Once a Week | 4 (5%) | 0 (0%) | 0 (0%) | 2 (13%) | 6 (5%) |
| | Respondents Frequency of Data Aggregation: Once a Month | 67 (88%) | 14 (88%) | 2 (29%) | 6 (40%) | 89 (78%) |
| | Respondents Frequency of Data Aggregation: Never | 1 (1%) | 0 (0%) | 5 (71%) | 5 (33%) | 11 (10%) |
| | Respondents Frequency of Data Aggregation: Other | 2 (3%) | 2 (13%) | 0 (0%) | 2 (13%) | 6 (5%) |



8.4 Results Table 3: Perceived Surveillance Challenges at Facility Level

Source: facility-level questionnaires in 6 states in Nigeria, 2017

| | | Public Primary (n=76) | Public Secondary (n=16) | Private Primary (n=7) | Private Secondary (n=15) | Total (n=114) |
|----------------------------------|---|-----------------------------|-------------------------------|-----------------------------|--------------------------------|------------------|
| Data Collection | High workload | 69 (91%) | 14 (88%) | 6 (86%) | 10 (67%) | 99 (87%) |
| | Inadequate Training | 28 (37%) | 2 (13%) | 2 (29%) | 2 (13%) | 34 (30%) |
| | Multiple Registers | 14 (18%) | 1 (6%) | 2 (29%) | 2 (13%) | 19 (17%) |
| | Too many data elements | 12 (16%) | 1 (6%) | 0 (0%) | 2 (13%) | 15 (13%) |
| | Register Stockouts | 5 (7%) | 1 (6%) | 0 (0%) | 3 (23%) | 9 (8%) |
| | Data Missing from Clinician | 4 (5%) | 2 (13%) | 0 (0%) | 1 (7%) | 7 (6%) |
| | Other | 1 (1%) | 2 (13%) | 1 (14%) | 4 (27%) | 8 (7%) |
| Reporting | High Workload | 47 (62%) | 10 (63%) | 0 (0%) | 6 (40%) | 63 (55%) |
| | Inadequate Training | 26 (34%) | 4 (25%) | 1 (14%) | 1 (7%) | 32 (28%) |
| | Stockouts of Registers | 20 (26%) | 3 (19%) | 0 (0%) | 2 (13%) | 25 (22%) |
| | Late collection or unavailability of filled registers | 16 (21%) | 4 (25%) | 0 (0%) | 2 (13%) | 22 (19%) |
| | Inappropriate Timing | 19 (25%) | 1 (6%) | 1 (14%) | 0 (0%) | 21 (18%) |
| | Poor / Unavailable Guidelines | 13 (17%) | 3 (19%) | 1 (14%) | 2 (13%) | 19 (17%) |
| | Unclear Roles | 1 (1%) | 1 (6%) | 0 (0%) | 0 (0%) | 2 (2%) |
| | Other | 20 (26%) | 3 (19%) | 1 (14%) | 1 (7%) | 25 (22%) |
| Data Analysis | High Workload | 27 (36%) | 5 (31%) | 0 (0%) | 3 (23%) | 35 (31%) |
| | Inadequate Training | 14 (18%) | 1 (6%) | 1 (14%) | 0 (0%) | 16 (14%) |
| | Lack of SOPs for Data Analysis | 13 (17%) | 0 (0%) | 0 (0%) | 0 (0%) | 13 (11%) |
| | Poor Data Quality | 7 (9%) | 2 (13%) | 1 (14%) | 0 (0%) | 10 (9%) |
| | Other | 6 (8%) | 1 (6%) | 0 (0%) | 0 (0%) | 7 (6%) |
| Reviewing/ Using Data | Meetings take too long to complete | 28 (37%) | 6 (38%) | 2 (29%) | 2 (13%) | 38 (33%) |
| | Meetings Inconsistent or Cancelled | 14 (18%) | 5 (31%) | 0 (0%) | 1 (6%) | 20 (18%) |
| | Data Quality is Poor | 5 (7%) | 3 (19%) | 0 (0%) | 0 (0%) | 8 (7%) |
| | Other | 22 (29%) | 3 (19%) | 0 (0%) | 6 (40%) | 31 (27%) |



8.5 Results Table 4: National Stakeholder Responsibilities in Surveillance

| Activities | NMEP | HISP | DPRS | NPHCDA | Partners (DFID, GFATM and PMI) |
|---|--|--------------------------|--|--|--------------------------------|
| Human resource training | Trains facility and LGA staff | Trains on HMIS operation | Capacity building at all levels | x | x |
| Data collection | Supply Registers to facilities | x | Finalizes indicators to be collected Reviews the tools every 3 years | x | x |
| Data reporting | Supply Monthly Summary Forms to LGAs & facilities | x | x | x | x |
| Data quality | Conducts data quality check for states | x | x | x | x |
| Data analysis | Analyses malaria surveillance data available on DHIS2 | x | No specific disease data analysis | Analyses the malaria surveillance data whenever required | x |
| Data use/feedback | Provides feedback to states and LGA on data quality and uses data for better planning of malaria elimination program | x | x | Uses surveillance data for human resource planning | x |
| DHIS2 management | x | Maintains DHIS2 | x | Oversee the operations of DHIS | x |
| Register development/management | x | x | Creates and revises registers, with input from stakeholders | x | x |
| Support formulation guidelines/policies | x | x | Involved in formulating policies and guidelines for malaria surveillance | x | x |
| Funding for surveillance | For human resources only | x | Annual budget for HMIS maintenance | x | 90% of the operational cost |



8.6 Table 5: Core indicators from IDSR for the health facility, LGA, state, and national level

Source: National Policy on IDSR, 2005

| Indicator | Purpose | Numerator | Denominator | Source of information | Target |
|-----------------------|---|---|--|--|--------|
| Facility Level | | | | | |
| Timeliness | Measures the practice of health facilities in submitting timely surveillance reports to the LGA level | Number of complete surveillance reports submitted on time to the district | Number of expected surveillance reports from the health facility | Monitoring chart for timely submission of report | 80% |
| LGA Level | | | | | |
| Timeliness | Measures the timeliness of submission of surveillance reports | Number of health facilities that submitted surveillance reports on time to the district | Number of health facilities in the district | Monitoring chart for timely submission of report ⁷ | 80% |
| Case Reporting Rate | Measures reporting of surveillance data with detailed information to use for further analysis | Number of diseases targeted for elimination, eradication, and any diseases selected for case-based surveillance reported with case-based forms or line list | Total number of cases of diseases selected for case-based surveillance that occurred in the district | Routine summary reports and case-based or line listing reports for diseases targeted for elimination and eradication and for any diseases selected for case-based surveillance | 80% |
| State Level | | | | | |
| Timeliness | Measures the practice of timely submission of surveillance data | Number of districts that submitted IDSR reports on time to the province | Total number of districts that report to the province | Monitoring chart Routine summary reports | 80% |



| Indicator | Purpose | Numerator | Denominator | Source of information | Target |
|-----------------------|--|---|--|--|--------|
| Case reporting rates | Measures reporting of surveillance data with detailed information to use for further analysis | Number of diseases targeted for elimination, eradication, and any diseases selected for case-based surveillance reported with case-based forms or line list | Number of districts that submitted case-based surveillance Reports on time to the province | Routine summary reports and case-based or line listing reports | 80% |
| National Level | | | | | |
| Report submission | Measures the practice of timely submission of surveillance data | Number of provinces that submitted IDSR reports on time to the national level | Total number of provinces that report to the national level | Summary reporting forms | 80% |
| Timeliness | Measures practice of timely submission of surveillance data from health facilities to district | Number of health facilities submitting reports on time to the districts | Number of districts | Summary reporting forms | 80% |

8.7 Ethical review

This assessment was a part of a programmatic review for NMEP. It is a process evaluation intended to help with strategic planning for future malaria control and elimination endeavors. As such, no IRB approval was needed. All data were de-identified.

8.7.1 Consent

All participants in the assessment were briefed on objective of the project, and their voluntary consent was sought. Consent was verbal for all participants, as detailed in the table below:

| Verbal Consent | Written Consent | No Consent Needed |
|---|-----------------|---|
| Stakeholder interviews at central level | N/A | Desk review |
| Stakeholder interviews at state level | | HMIS system (DHIS2) secondary data analysis |
| Stakeholder interviews at LGA level | | |
| Process observation at LGA level | | |
| Data review/spot-checking at LGA level | | |
| Stakeholder interviews at facility level | | |
| Process observation at facility level | | |
| Data review/spot-checking at facility level | | |



8.7.2 Risks and benefits to the participants

This assessment involved no more than minimal risk to participants. The primary burden for participants in this study was a delay in their daily activities of 45 minutes to 1 hour required to participate in interviews and respond to questionnaires. Potential participants were always given the option of not participating or discontinuing their participation at any point in the process. Emphasis was given to the voluntary nature of participation during the assessment. The participants were asked where they wish to conduct the interview/questionnaire, which helped to ensure that they were comfortable and that their privacy was maintained. All data collection activities were kept as brief as possible. Additionally, participants hesitant to speak about any activities considering the interview as an audit were assured that this exercise was not meant to evaluate individual performance, but instead the system as a whole and that all data were anonymized.

Participation in this assessment expected to provide valuable information about the strengths, bottlenecks, and gaps in the current malaria surveillance system. Knowing this information can help to create recommendations to improve the system, thereby improving NMEP's understanding of the malaria situation in Nigeria. This greater understanding of the situation can be used to target resources and next steps in malaria elimination more effectively, thereby indirectly helping participants' malaria risk and outcomes.

8.8 Surveillance system attribute definitions

| Attribute | Definition (<i>adapted from CDC, 1988</i>) |
|---------------------------------|--|
| Simple | The clear structure and ease of operation of the system |
| Sustainable | A qualitative measure of the system's ability to withstand human resource or financial gaps |
| Representative/sensitive | How much coverage the system has of all malaria cases; a measure of the system's ability to accurately describe a health event based on population characteristics; ability to identify sub-groups who are systematically excluded from the reporting system |
| Available | The ability of the system to be operational when it is needed |
| Flexible | A qualitative measurement of the system's ability to adapt to changing information needs or operating conditions with little additional time, personnel, or allocated funds |
| Stable/reliable | The ability to collect, manage, and provide data properly without failure of the public health surveillance system |
| Acceptable | Willingness of persons to participate in a surveillance system |
| Relevant | The data elements in the system are relevant to programmatic objectives/needs |
| Timely | The speed between steps in a public health surveillance system, including a quantitative measurement of the proportion of facilities that report on time & description of time between diagnosis and response |
| Data quality | The completeness and validity of health records, including a quantitative measurement of missing data |



8.9 References

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