



Influence of Organizational Structure and Administrative Processes on the Performance of State-Level Malaria Programs in Nigeria

Ndukwe Kalu Ukoha, Kelechi Ohiri, Charles Chikodili Chima, Yewande Kofoworola Ogundeji, Alero Rone, Chike William Nwangwu, Heather Lanthorn, Kevin Croke & Michael R. Reich

To cite this article: Ndukwe Kalu Ukoha, Kelechi Ohiri, Charles Chikodili Chima, Yewande Kofoworola Ogundeji, Alero Rone, Chike William Nwangwu, Heather Lanthorn, Kevin Croke & Michael R. Reich (2016) Influence of Organizational Structure and Administrative Processes on the Performance of State-Level Malaria Programs in Nigeria, *Health Systems & Reform*, 2:4, 331-356, DOI: [10.1080/23288604.2016.1234865](https://doi.org/10.1080/23288604.2016.1234865)

To link to this article: <http://dx.doi.org/10.1080/23288604.2016.1234865>



Accepted author version posted online: 29 Sep 2016.
Published online: 29 Sep 2016.



Submit your article to this journal [↗](#)



Article views: 681



View related articles [↗](#)



View Crossmark data [↗](#)

Research Article

Influence of Organizational Structure and Administrative Processes on the Performance of State-Level Malaria Programs in Nigeria

Ndukwe Kalu Ukoha^{1,*}, Kelechi Ohiri¹, Charles Chikodili Chima¹,
Yewande Kofoworola Ogundeji¹, Alero Rone¹, Chike William Nwangwu¹,
Heather Lanthorn², Kevin Croke² and Michael R. Reich ²

¹Health Strategy and Delivery Foundation, Abuja, Nigeria

²Harvard T. H Chan School of Public Health, Boston, MA, USA

CONTENTS

Background

Methods

Results

Discussion

Conclusion and Recommendations

References

Appendices A, B, and C

Abstract—Studies have found links between organizational structure and performance of public organizations. Considering the wide variation in uptake of malaria interventions and outcomes across Nigeria, this exploratory study examined how differences in administrative location (a dimension of organizational structure), the effectiveness of administrative processes (earmarking and financial control, and communication), leadership (use of data in decision making, state ownership, political will, and resourcefulness), and external influences (donor influence) might explain variations in performance of state malaria programs in Nigeria. We hypothesized that states with malaria program administrative structures closer to state governors will have greater access to resources, greater political support, and greater administrative flexibility and will therefore perform better. To assess these relationships, we conducted semistructured interviews across three states with different program administrative locations: Akwa-Ibom, Cross River, and Niger. Sixty-five participants were identified through a snowballing approach. Data were analyzed using a thematic framework. State program performance was assessed across three malaria service delivery domains (prevention, diagnosis, and treatment) using indicators from Nigeria Demographic and Health Surveys conducted in 2008 and 2013. Cross River State was best performing based on 2013 prevention data (usage of insecticide-treated bednets), and Niger State ranked highest in diagnosis and treatment and showed the greatest improvement between 2008 and 2013. We found that organizational structure (administrative location) did not appear to be determinative of performance but rather that the effectiveness of administrative processes (earmarking and financial control), strong leadership (assertion of state ownership and resourcefulness of leaders in overcoming bottlenecks), and donor influences differed across the three assessed states and may explain the observed varying outcomes.

Keywords: malaria, malaria control program, Nigeria, organizational structure, program performance

Received 19 July 2016; revised 29 August 2016; accepted 3 September 2016.

*Correspondence to: Ndukwe Kalu Ukoha; Email: ndukwe.ukoha@hdsf.org.ng

Color versions of one or more of the figures in the article can be found online at www.tandfonline.com/khsr.

BACKGROUND

The malaria burden in Nigeria is among the highest in the world. An estimated 97% of the country's population is at risk of malaria.¹ The 2015 Nigeria Malaria Indicator Survey reported an average prevalence of 27% among children under age five,² and with over 300,000 children dying every year from the disease, malaria is the leading cause of child death in the country.³ Nigeria accounted for approximately 25% of the estimated malaria deaths worldwide in 2015.⁴

Despite the high malaria burden, Nigeria has made progress in key areas including increased funding for malaria control, scale-up of malaria interventions, and improvement in outcomes. For example, between 2004 and 2010, approximately 600 million USD in external funding was directed toward the country's malaria efforts.⁵ These funds, as well as growing contributions from the Nigerian government, were used to roll out preventive and curative interventions, which have contributed to reductions in all-cause mortality rates among children under five years by 18% and malaria cases among the same age group by 15% over the past 15 years.⁶ Furthermore, malaria parasite prevalence in under-five children dropped from 42% in 2010 to 27% in 2015.² Despite the overall progress made nationally, there is wide variation in uptake of malaria interventions and malaria outcomes across states in Nigeria.^{1,2,7,8} For instance, the 2015 Malaria Indicator Survey preliminary report has shown that mosquito net usage rates vary widely from 6% in Imo State to 76% in Jigawa State and that malaria prevalence among children under the age of five years range from 5% in Kogi State to 64% in Kebbi State.²

Nigeria is organized politically as a federation, with 36 state governments as the federating units; below the state level there are 774 local government areas (LGAs). Constitutionally, health is placed on the concurrent list of responsibilities (i.e., responsibilities shared between federal and state/LGA levels), with the exception of a few services made exclusive to the federal government.⁹ The country's national response to malaria has evolved from a National Malaria Control Program (NMCP) to the current National Malaria Elimination Program (NMEP), reflecting an important shift in strategic direction.¹⁰ For the malaria program, the national body (NMEP) is responsible for policy making and articulating broader strategies and coordination at the country level, whereas program implementation takes place at the state level.¹¹ State governments in Nigeria have significant autonomy and independence with regard to health program planning and execution.¹² In addition, they have highly varied economic contexts, especially in relation to fiscal space, health infrastructure, and human resource capacities, which

invariably influence resource availability, program planning, and the quality of program of implementation with respect to malaria.¹³ In addition, a recent structural reform has changed the way in which state health systems are organized. This reform involved the 2011 establishment of State Primary Health Care Development Agencies (SPHCDA), which centralizes the governance of primary health care at the state level instead of at the sub-state level (i.e., local government areas or LGAs) as was previously the case.¹¹

One result of the introduction of SPHCDA has been a notable degree of variation in the administrative organization (here referred to as the "model") of state malaria governance architecture. There are three types of organizational structure based on the administrative location of the malaria program, namely: (1) state malaria elimination programs embedded within the department of public health in the state ministry of health (hereafter, "SMOH-embedded" or "Type 1" model); (2) state malaria elimination programs embedded within SPHCDA (hereafter, "SPHCDA-embedded" or "Type 2" model); and (3) state malaria elimination programs parallel to the state ministry of health and SPHCDA, headed by a special adviser (SA) who reports directly to the state governor (hereafter, "Special Adviser," "SA," or "Type 3" model). As Table B1 in Appendix B shows, as of May 2015, 34 states had an SMOH-embedded model. Only Niger State had its malaria program partially embedded in SPHCDA and SMOH, whereas Cross River State alone had a parallel model with an SA on malaria. We note, in addition, that the state model can change to any of the three models at the discretion of the state governor. For instance, the new governor of Cross River State has presently (as of July 2016) changed its malaria program structure to the SPHCDA model.

The link between organizational structure and performance is a central topic in the academic study of public administration, and a number of studies have shown that there is indeed a link between organizational structure and performance in the public sector.^{14,15} Moreover, the choice between verticalization of public health programs versus integration into line ministry functions is a long-standing debate in public health, most recently in the context of whether HIV/AIDS treatment programs in developing countries should be integrated or constructed in parallel to ministry of health systems.¹⁶⁻²⁰ The debate on the association between structure and performance is an important one, because public sector leaders could potentially seek to improve performance by altering organizational structures or adopting optimal structures.¹⁵ Relatedly, there are many other factors that are hypothesized to affect differential state-level performance (level of economic development,

historical legacies/path dependency, social structure), but these are typically much more difficult to address over the short term. Thus, if organizational structure can be shown to affect malaria program performance, it would offer a powerful lever for reform by policy makers.

Cross-state variations in governance structures and systems can potentially affect access to resources, decision-making processes, and communication and collaboration among stakeholders, with resultant effects on program execution, performance, and outcomes among states. Because state governors in Nigeria wield significant executive power and influence, we hypothesize that states with the malaria program located closer to the governor (the SA or Type 3 model) will have greater access to resources and more political support and therefore better program performance. We also hypothesize that these SA structures will benefit from reduced bureaucratic hurdles and greater administrative flexibility.

However, we recognize that other factors may also be at play, opening up other potential channels through which the administrative model might be linked with program performance, resulting in correlation between model and malaria indicators. In particular, considering that Nigeria is a lower-middle-income country,²¹ the influence of external donor agencies and development partners that supplement public sector funding and the resourcefulness of public sector leaders could have further implications for organizational performance. The different state models might interact with development partners and the different malaria control/elimination stakeholders in differing ways and facilitate differing levels of resourcefulness in the public sector.

Moreover, a number of other factors have been shown to affect implementation capacity for public health programs in developing countries, including the relationship between political competition and public prioritization of health and the role of individual political and bureaucratic leadership.

This article presents findings from an exploratory qualitative study of how differences in organizational structure and administrative processes, leadership, and external influences at the state level might explain variations in malaria program performance in three states in Nigeria: Akwa Ibom, Cross River, and Niger States.

METHODS

Study Design

Semistructured interviews were conducted simultaneously across three states (Akwa Ibom, Cross River, and Niger) between May 2015 and July 2015. Ethical approval for the

study was granted by the National Health Research Ethics Committee of Nigeria and the University of Nigeria Teaching Hospital Research Ethics Committee. Cross River State required additional ethical approval, which was granted by the Cross River State Health Research Ethics Committee.

State Selection

The three states were selected based on three criteria, namely, the state malaria program organizational structure, the feasibility of conducting the study, and the potential for impact of the study. To ensure that each of the three malaria program models in Nigeria were represented in the study, the 36 states were categorized according to structure: Type 1 model, where the state malaria program was embedded in the SMOH; Type 2 model, where the state malaria program was embedded in the SPHCDA; and Type 3 model, where the state malaria program was under the purview of a state official (special adviser) who reports directly to the governor of the state (see Table B1 in Appendix B). The three selected states, namely, Akwa Ibom, Niger, and Cross River, belong to these three models, respectively.

Following this, we assessed the feasibility of conducting the study based on two factors: the security situation of the state at the time and development partner presence in the state to increase the potential for logistic support and access to information.

Finally, we considered the potential for impact of the study, by giving preference to states with high malaria prevalence. Malaria prevalence in all Nigerian states was determined using the results of analysis performed by the Malaria Atlas Project in 2010.²²

This research design allows us to examine the effect of state program organizational structure, holding constant the Nigerian political and administrative context in general terms, the level of malaria prevalence, the security situation, and the level of donor involvement. However, we acknowledge that differences that we observe may be attributed to unobserved regional, political, historical, or idiosyncratic factors that may cause differences in implementation performance in the three states beyond the effect of the malaria program organizational structure identified here. Moreover, we acknowledge potential omitted bias or reverse causality—it is possible that administrative models are constructed by states for reasons that are also correlated with program performance on key malaria indicators. For example, if a given SA model was put in place in states precisely because a state's governor had preexisting political commitment to malaria control or elimination targets, then we would confound the effect of the SA model with the effect of political

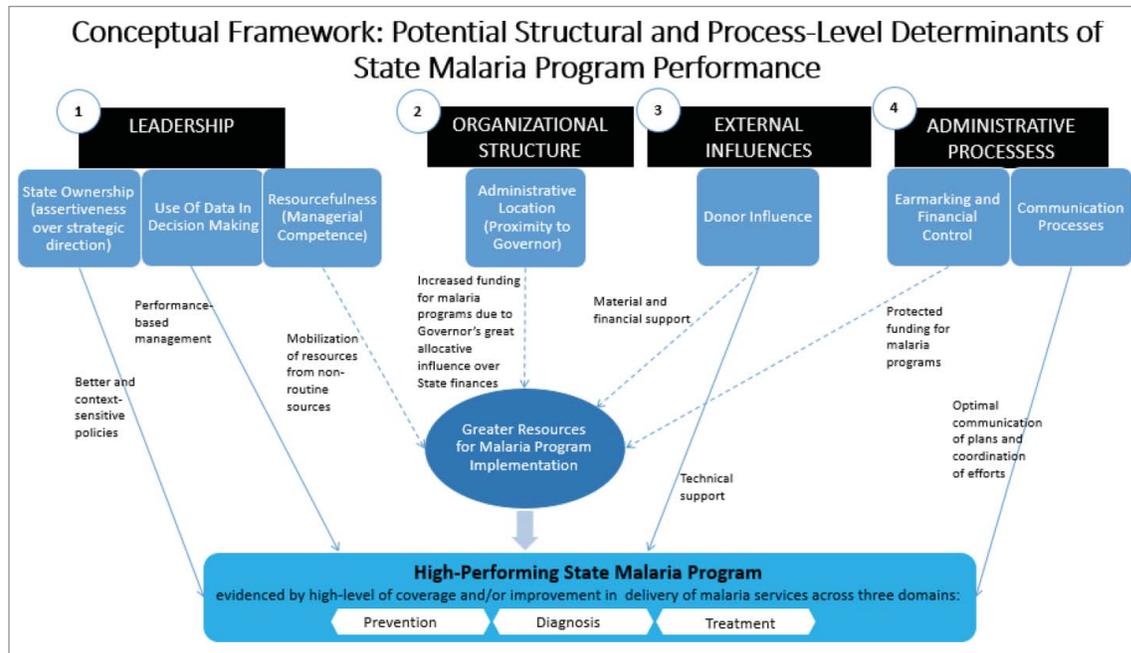


FIGURE 1. Conceptual Framework on the Hypothesized Relationships Between Leadership, Organizational Structure, External Influences, and Administrative Processes and State Malaria Program Performance

leadership. Figure 1 depicts a pathway for the hypothesized processes that may influence program performance of state malaria programs in Nigeria to produce differing malaria outcomes; this figure presents the conceptual framework for this study. The conceptual framework was developed de novo by the authors based on insights from interactions with implementing partners who have experience working on malaria programs in Nigeria and review of literature on malaria program performance.

The hypothesized framework depicted in the conceptual framework sought to explore how leadership (use of data in decision making, state ownership, political will, and resourcefulness), differences in organizational structure (a dimension of administrative location and the proximity of the state malaria program to the governor), external influences (donor influence), and the effectiveness of administrative processes (earmarking and financial control and communication) might explain variations in performance of state malaria programs in Nigeria.

Participants

Participants were selected for interviews in order to obtain representative views from actors in the public and private sectors who are involved in the funding, policy development, and implementation of the state-level malaria program in the three states. The private sector actors were people working with

donor agencies and their implementing partner organizations, which included both local and international nongovernmental organizations; collectively these are referred to as development partners or simply “partners” in this article. The public sector actors were stratified according to their level in the civil service hierarchy and whether they were working at the state level or sub-state level (LGA). Consequently, public sector actors were categorized into four groups as follows:

1. Senior administrators; for example, commissioners and directors in the state ministries.
2. State-level managers; for example, state malaria program managers.
3. LGA-level actors; for example, malaria focal persons.
4. Development partners.

We initially identified 25 key informants based on prior knowledge of key positions in the malaria program and known major partners in the three states; a further 40 participants were identified and interviewed using a snowball approach. Thematic saturation was reached in each state. Analysis commenced after all interview responses were fully transcribed and validated in each state to check for any additional information that might have been left out. No further additions were made to the original transcripts and there were no participant refusals or drop-outs throughout the interviewing and validation process. In total, 65 individuals

Hierarchy/ Position/Rank	States			Total
	Akwa Ibom (SMOH Type)	Cross River (SA Type)	Niger (SPHCDA Type)	
Senior administrators	5	7	7	19
Mid-level managers	5	2	3	10
LGA-level administrators	8	9	8	25
Partners	6	2	3	11
Total	24	20	21	65

TABLE 1. Mapping of Key Informants

were interviewed from the three states (Akwa Ibom, Cross River, and Niger) as illustrated in Table 1.

Data Collection

The interviews aimed to build a rich and detailed picture of how organizational structure, administrative processes, leadership, and external influences shape malaria program outcomes in Nigeria. Appendix A provides more information on the interview guide.

Interviews were conducted using a semistructured format to allow for the exploration of emergent themes. There were a total of eight interviewers, all trained in semistructured interviewing by the Health Policy Research Group of the University of Nigeria over a two-day period in May 2015. The selection criteria for interviewers included (1) familiarity with the malaria program in the respective states and (2) prior experience with qualitative research. All interviewers were practicing public health or medical professionals.

During each interview, an interviewer and a note-taker were present, with the latter also recording nonverbal cues. All interviews were conducted face to face at the participants' work place, audio recorded (with consent), and transcribed verbatim. For a randomly selected subset of interviews, independent auditors were present for a set of quality assurance activities that included monitoring the tactfulness of the interviewer in delivering questions and follow-on probes to illicit the right responses without leading the respondent and the interviewer's ability to exhaust all of the questions in the interview guide.

The interviews lasted an average of 45 minutes. No participants dropped out of the interview.

Data Analysis

We used a thematic framework approach to analyze the data generated from the interviews.²³⁻²⁵ This approach facilitated

data comparison across the framework matrix, which enabled us to explore and compare the variations in views and experiences of the participants across the three states. Data were organized using NVivo 11 for Windows (Pro Edition, QSR International Pty Ltd, Doncaster, Australia).

There were five stages of data analysis:

1. Familiarization with the data
2. Coding
3. Identification of themes
4. Charting
5. Mapping and interpretation

Each transcript was read at least three times (depending on complexity) to become familiar with the data. Coding and identification of themes were conducted simultaneously. This involved refining initial themes and identifying emergent themes (see Table 2) while developing textual codes to accommodate and summarize all the relevant data. Each transcript was coded by two independent researchers. The themes were then reviewed and refined, resulting in a final thematic framework including seven themes that were used for further stages of analysis (see Tables 2 and 3). These final themes were grouped into the four overarching concepts that the study sought to explore (see Table 2).

Charting involved entering summarized data into a framework matrix in order to facilitate the identification of patterns and connections within and between themes.

Mapping and interpretation began with pattern identification. Patterns were identified by making general comparisons between participants' clusters to examine different views and experiences regarding how the explored concepts influence malaria program performance in the three states. We explored similarities and differences in views and/or experiences between participants by states (Akwa Ibom versus Cross River versus Niger) and by actors (senior administrators versus state-level managers versus LGA-level actors versus partners). This enabled identification of factors that could potentially explain the drivers of variations in performance of the three state malaria programs.

Member-Checking

The study findings were shared with the key informants to ensure credibility of the interpretations.²⁶ There were no changes made to the original transcripts following this process. To validate our findings, we reviewed results from this work with stakeholders in each state. The validation

Initial Themes	Final Themes	Overarching Concepts
Structure of the malaria program in the state	Administrative location of the malaria program in the state	Organizational structure
Communication between staff within the state malaria program	Communication processes within the malaria program	Administrative processes
State budget and finances for malaria	Earmarking and financial control	
Decision-making process	Use of data in decision making in the malaria program	Leadership
Incentives to pursue malaria targets		
Factors that influence malaria program implementation		
Mindset of actors within the state malaria program toward data		
Strategic direction of the state malaria program		
Relationship between health and non-health actors in the states	State ownership	
Relationship between state and federal government		
Political attention to malaria	Managerial competence (overcoming resource constraints)	
Options for overcoming roadblocks		
Bottlenecks to achieving targets		
Factors enabling the implementation of the malaria program		
Relationship between state malaria program and development partners	Donor influence	External influence

TABLE 2. List of Initial Themes, Final Themes, and Overarching Concepts

meeting provided additional perspectives on the structural processes for each model in the three states such as on communication, hierarchy, and reporting, as depicted in Figures 2-4.

Measurement of Program Performance

We explored differences in performance across three areas of malaria service delivery: prevention, diagnosis, and treatment. Performance was assessed in two ways: the first

Themes	Definitions
Administrative location of the malaria program in the state	This captures the relevant actors in the malaria program of each state and the organizational structure of the state malaria program
Communication processes within the malaria program	This theme explores the manner—frequency, mode, direction—in which actors within the state malaria program communicate with each other and the level of access of individual actors to high-level decision makers in the state
Earmarking and financial control	This captures the level of influence the malaria program has in terms of budgetary allocation and amount disbursed toward malaria activities and whether funding for malaria is earmarked
Use of data in decision making in the malaria program	This captures the factors that are involved in the process of making program decisions in the state malaria program. It explores the mindset toward data use; the presence of decision-making forums during which data are reviewed; how plans are made and influence of data in making plans; and ways in which data are used within the state malaria program
State ownership	This theme explores the ability of the state malaria program to adapt strategies to its local context and its relationship with the national malaria elimination program
Managerial competence (overcoming resource constraints)	This theme explores how limited resources hinder the performance of the malaria program within the state and whether and how leaders overcome these challenges through their resourcefulness or administrative skill
Donor influence	This captures the relationship between the state malaria program and development partners in the state. Specifically, this theme explores donor dependence; communication, collaboration, and coordination of activities between the state program and development partners; and the ways in which development partners influence malaria program activities

TABLE 3. Definition of Final Themes

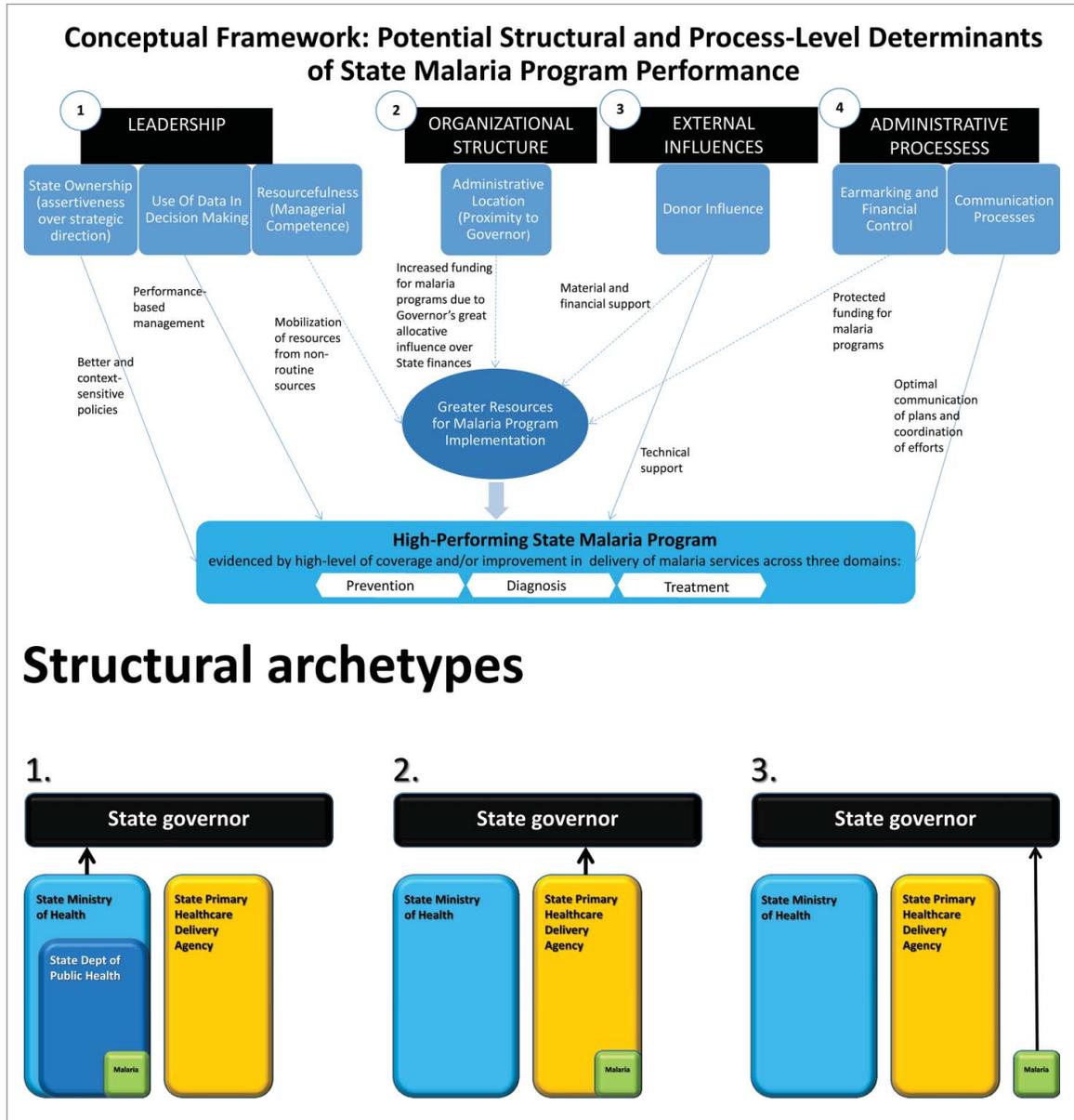


FIGURE 2. Akwa Ibom State Malaria Program Structure—SMOH Location

approach ranked the states based on the most recent data published by the Nigerian Demographic and Health Survey (NDHS) 2013,⁷ and the second ranked the states based on improvements in the reviewed indicators between the two most recent NDHS surveys (2008 and 2013).^{7,8} The best performing state was ranked one and the least performing was ranked three. We relied on the NDHS data because it is the most recent survey that has state-level findings across two time points. We recognize that both methods offer only a rough proxy for malaria program performance; nonetheless, we believe that a ranking exercise to give some sense of both

levels and changes in performance is informative in this context. We used these two approaches to assess performance because though the first approach (ranking based on 2013 figures) might reflect other factors other than administrative location and might be therefore biased toward states with a historically high performance (i.e., states with high level of service coverage in 2008 are more likely to remain high level performers in 2013), the second approach gave room for states to be given credit for recent improvements over the five-year period (2008 to 2013), which could plausibly be linked to changes in NMEP administrative location,

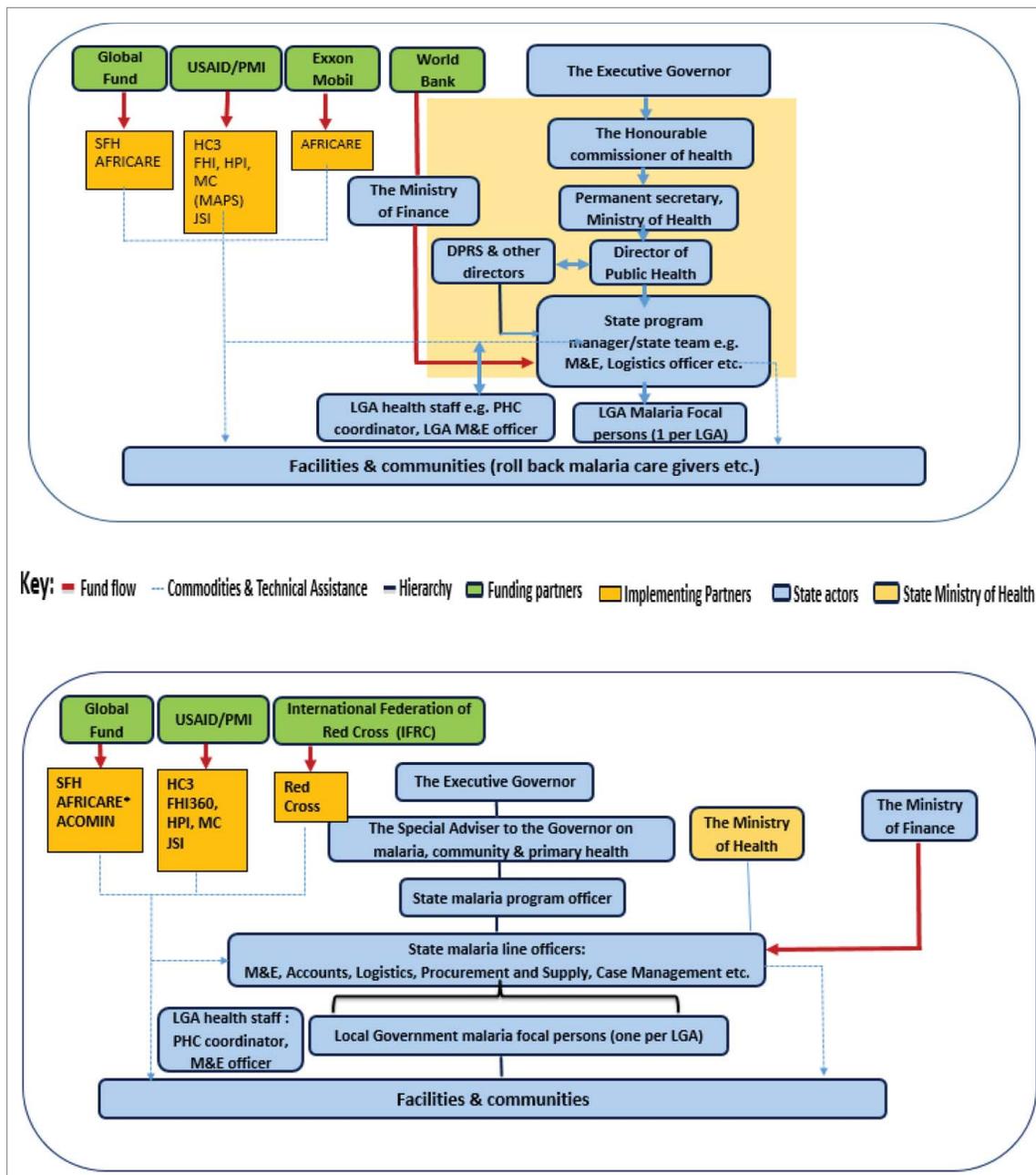


FIGURE 3. Cross River State Malaria Program—SA. Location. *This is a representation of the Cross River state malaria program structure as at June 2015 when this study was conducted. We would like to note that this structure has changed since March 2, 2016. The state malaria program is now embedded in the SPHCDA

irrespective of whether the state started off with a low or high level of service coverage in 2008.

RESULTS

The results are presented according to the overarching concepts listed in Table 2, first for organizational structure and then for administrative processes.

Organizational Structure

Administrative Location

As noted earlier, we identified three idealized models of the administrative location of malaria programs within state government; these types guided the selection of states in the present sample. In this section, we present (1) slight variations found between the idealized and the actual models

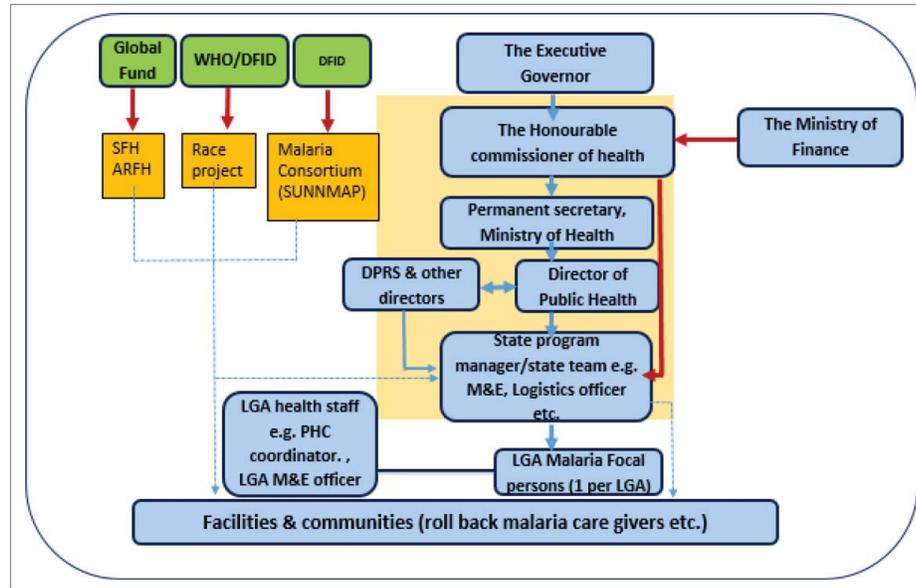


FIGURE 4. Niger State Malaria Program Structure—SPHCDA/SMOH Location

shown in the interview data and (2) how interview respondents described the operation of the different models.

The initial assessment of the three types of administrative location for the state malaria control program suggested that Akwa Ibom was Type 1 or SMOH location, Niger was Type 2 or SPHCDA location, and Cross River State belonged to Type 3 or SA location. However, analysis of the interviews revealed that although the state malaria program in Niger was supposed to be housed in the SPHCDA, it was actually still embedded in the SMOH with minimal reporting overlaps with the SPHCDA as of the time of this study. This is because the state’s SPHCDA was still relatively new and some of its duties and administrative units were still being anchored by the SMOH. In order to distinguish Niger State from Akwa Ibom State, we decided to use the term “SPHCDA/SMOH location” for Niger State in the presentation of the findings and discussion.

Figures 2 to 4 show the organizational structure of the malaria program in the three states. These figures not only depict the administrative location but also highlight differences in funding sources and funding flows of both donor and state’s public resources as of June 2015.

The three figures demonstrate that SA states possess an element of administrative simplification, which is hypothesized as a reason why these states would be likely to perform better: Though there are three levels of hierarchy to go through in the bureaucratic process before the state malaria program manager can place a request to the governor in the SMOH and SPHCDA/SMOH models, in the SA model, the

manager only has the Special Adviser between him or her and the governor. Interviews supported this theory: Most respondents in the state with SA location (Cross River) felt that the excision of the malaria program from the ministry of health and its placement under the Special Adviser for Community Health and Primary Health Care was a good thing because it gave increased visibility to the malaria program and increased access to the state governor:

Has it affected the malaria program? Yes it has affected the malaria program because ... appointing a Special Adviser on Malaria has given high visibility to the malaria program since the Special Adviser reports to the governor and the Executive Council ... decisions on malaria programming are taken at that level without necessarily going through different corners. So that has enabled malaria to have a good amount of hearing at the highest policy [level] in the state. (Senior Administrator, SA location_H1)

However, a senior civil servant in Cross River State (SA location) argued that the isolation of the malaria program causes fragmentation between different health programs. He stated,

If there is a linkage with the ministry of health, resources can be harnessed better and used to achieve a lot more. We can have support for malaria, and we could even combine [with] other programs; e.g., oral rehydration [therapy for] diarrhea, and many others in one program. And if they also report through the ministry, the governor would be better informed of the gaps in health programs,

generality, and be able to assist. So having parallel programs doesn't really help the system. (Senior Administrator, SA location_H6)

One would expect that in the state with SA location, the proximity of the malaria program to the state governor would imply greater political attention to malaria, which would translate into adequate funding available for program implementation. This appears not to be the case, or at least not completely, as reported by many participants in the SA location. An example of this view is shown in this statement:

... when you talk about politics and power; ... the position of an S.A. [Special Adviser] is meant to foster good political will, ... meaning that the governor should have a good listening ear to the program. That was the reason why the malaria program was excised first from the ministry of health, so that it will be given more attention. ... It therefore means that the program would now enjoy better funding ... and more success in implementation, because there is no way you can implement if money is not available ... the malaria program has that [political will], but it has not translated 100% ... because if it did, then we wouldn't be telling you that we don't have funds. (Mid-level Manager, SA location_M1)

Administrative Processes

Communication

Many participants in the SA location state (Cross River) felt that the communication chain to major decision makers within the malaria program was nonbureaucratic and therefore more efficient. In particular, several participants in the SA location state believed that the institutional design of the malaria program, whereby it is detached from the rest of the health sector, contributed to this simplified communication channel:

When you talk to the SA [Special Adviser to the governor on community health, including malaria] then you have talked to the governor. It is easier rather than talking to the program manager who is in the ministry and will report to the director, who will report to the permanent secretary, and then to the commissioner ... so two layers of communication are removed as a result of this structure. (Senior Administrator, SA location_H1)

It is notable, however, that this was not limited to the SA location. In the SMOH state (Akwa-Ibom), simple and non-bureaucratic communications were frequently attributed to good rapport between individuals and the ability of state-level managers to bypass the typical hierarchical reporting chain:

... with this present commissioner ... I'm able to walk into his office at any time. In fact, I'm able to call and tell him this is exactly what we intend to do, and he'd put in his questions, ... we'd just go ahead. (Mid-level Manager, SMOH location_M1)

By contrast, in the SPHCDA/SMOH type state (Niger), very few participants (compared to the two other states) felt that the communication chain to senior administrators was simple (i.e., nonbureaucratic).

Generally, monthly meetings within the respective state malaria program provided avenues for lower level staff to make inputs, and this was consistent in all three states. As noted by an LGA-level administrator:

Every month, all the program managers, the LGA ward focal persons and the facility heads come for a big meeting where we meet with the director and then we rub minds on issues that bother on the program, as well as the program successes achieved within the time frame. (SA location_L3)

Communication is also important for strategic planning. For example, senior leadership must ensure that key stakeholders across all levels understand and align their activities toward the achievement of the statewide goals and objectives for the malaria program. This study found sub-optimal communication of strategic plans in all three states, such that most LGA-level administrators and some mid-level managers did not demonstrate a good understanding of the state malaria targets and goals. For example, some said that the goal of the state malaria program was eradication (rather than elimination), and none of them were able to show documentation of the state strategic plan, suggesting that the simple, nonbureaucratic communication channels, though likely helpful for day-to-day operations, have not necessarily translated to effective communication about high-level strategic goals.

Earmarking and Financial Control

Another potential benefit of the separate malaria-specific administrative structure afforded by the SA model could be the existence of a corresponding malaria-specific budget. In this section we examine participants' views on and experiences with budget development and the state malaria program's leverage on budget disbursement across the various administrative settings.

Whereas the SA location state (Cross River) had a budget line item with specific earmarked funds for malaria in the general state ministry of health allocation, this was not the

case in either of the other states. In the SPHCDA/SMOH location (Niger State), for example, the malaria budget was lumped under the “public health” budget of the state ministry of health. To provide exemplary quotes from each state:

The department has its own budget. There is a [specific] budget for malaria interventions. (Senior Administrator, SA Location_H7)

Malaria is part of the entire program of the ministry. So depending on the envelope the ministry is given, the ministry will prioritize her programs and will allocate accordingly. (Senior Administrator, SMOH location_H1)

The state coordinator with her team draws up the budget and gives it to us in the public health department, where we compile it. Because there are other programs in public health we compile it together, on departmental budget with all the various programs. Then we review and submit to the planning research and statistics department. (Senior Administrator, SPHCDA/SMOH location_H6)

The implication of the earmarking of funds for malaria in the SA location state (Cross River) is that once the budget is approved, the malaria program knows exactly the amount that was approved for its activities for the year and can plan more efficiently. The specificity of the approved budget also gives some degree of leverage to implementers, because they can make demands for budget release based on the sum approved for the program. On the contrary, in states where state funds intended for malaria program activities are lumped with other public health disease areas, the malaria program managers cannot lay claim to a specified amount of the health sector budget and therefore rely on negotiation, because the commissioner for health has the discretion to decide which program to prioritize within the funding envelope approved for the ministry that year.

It should also be noted that, between 2007 and March 2015, state-driven malaria program activities in the SMOH location state (Akwa-Ibom) were funded through the World Bank Malaria Control Booster Project, a multi-million-dollar credit facility, to the federal government and select state governments in Nigeria. During the period of this project, the state malaria elimination program essentially relied on this credit facility for funding, because it practically stopped receiving funding from the state government. Hence, the malaria program budget for the state for the duration of the World Bank credit facility was independently budgeted for, rather than lumped with the budget of other health programs. The state program was reported to have been well funded when the World Bank’s credit was in place, but funding challenges have returned since the end of the project. This state program also

experienced funding disruptions in 2012 due to accountability deficits that caused the World Bank to temporarily suspend the credit to the state.²⁷ Following resolution of these issues, the credit line was reinstated in 2013.

Under the World Bank support, we were able to draw operational funds . . . then under the present scenario . . . because operational funds are tied into the public health program allocation, we now have to apply to the ministry for these funds, and this may cause unnecessary delays . . . [compared to] when we were under the World Bank support. (Mid-level Manager, SMOH location_M1)

Several participants across the three states, mostly senior administrators or mid-level managers, reported that they were involved in the budget formulation process. Yet even though staff within the malaria programs of all three states were involved in drafting the budgetary request for malaria, they had weak leverage over the amount of funds eventually disbursed to the program after the budget is approved. This was the case even in the SA location. These findings suggest that even when administrative location results in more control over budget *allocation*, it did not deliver sufficient control over budget *disbursement*.

The budget is not even released. So even if they have a budget line of 20 million Naira for instance, it may not be released before the end of the fiscal year. . . . (Mid-level Manager, SMOH location_M2)

Leadership

Use of Data in Decision Making

A number of participants across the three states felt that data were a major influence on decision making in their state malaria programs. There were no clear differences in how data were used across the three states, suggesting that administrative location did not affect the usage of data. Respondents reported using data for target setting, supply chain management, monitoring progress, and assessing performance. Data also appeared to be viewed as a useful monitoring and evaluation tool and a few also reported using data as an advocacy tool.

State Ownership

One important motivation for creating a parallel structure that reports to the state governor (SA location) is that such a structure could create greater ownership of the malaria program by key state political and bureaucratic leaders. This could be manifest in a greater state role in setting the strategic direction for malaria programs, rather than only being

swayed by national or development partner directions. However, across the three states, most participants reported that the national strategic plan for malaria was the primary influence on the strategic direction of the state-level malaria program. They have not developed their own malaria program strategic plans at the state level but have rather adopted the national strategic plan, out of which they develop annual operational plans.

Since it is a national plan to pursue malaria elimination, we key into this plan. When we are setting our annual targets, we look at what each partner is bringing. We do a review of the previous year to see what we have achieved. Whatever is left that we feel that partners would not do, we budget for it. (Senior Administrator, SA location_H5)

Well, I will say that in the state, as much as possible, we align ourselves with the national policies. (Senior Administrator, SMOH location_H4)

Nonetheless, in keeping with the hypothesized benefit of the SA model, the state with SA location (Cross River) demonstrated an ability to question national policies and adjust them to their own situation when they deemed it necessary, as reflected in this statement by a senior administrator:

... where what is coming from the national doesn't favor us, we make adjustments; adjustments are made to fit the state situation. ... (SA location_H3)

This viewpoint was further corroborated by another senior administrator in the state:

When the national program sends guidelines and policies, we adjust it to suit the state targets. I will give you an example: during the net distribution campaigns to [achieve] universal coverage, the national directive was to distribute two nets per household. As we had previously conducted a net distribution campaign to children under the age of five and pregnant women, two years earlier, we evaluated our net [coverage] ... and discovered that net ownership in communities were close to 50%. ... So, during our net campaigns, we distributed a minimum of two and maximum of four per household. ... So, we adapted the national policy to our local context. (Senior Administrator, SA location_H5)

Managerial Competence (Overcoming Resource Constraints)

The most commonly reported constraint to malaria program performance among participants across the three states was the lack of operational funds, which hindered activities such as distribution of commodities to health facilities and supportive supervision. This was especially stressed by LGA

administrators who often carry out these activities. Availability of funds dictated whether these critical activities in the malaria program could be carried out or not. Other constraints expressed by some participants, especially in the SMOH location, included staff shortages, whereas participants mostly in the SPHCDA/SMOH location state reported stock-outs of malaria commodities.

Yes, there have been some constraints both in the issue of finances and in human resources. Finance, in the sense that sometimes, you really need to go out [for a field visit] but cannot go because the mobility is not there for you to go. Sometimes, you need finances to recharge your phone because if you are to go to a health facility, you need to know if facility staff are there to attend to you. (LGA Administrator, SA location_L3)

Participants in the SPHCDA/SMOH location state (Niger) reported experiences where actors at different levels had demonstrated resourcefulness in overcoming challenges in the malaria program. This was usually in the form of advocacy to external parties to make up for insufficient operational funds:

During the net campaign it was difficult for us to move the LLINs [long-lasting insecticide-treated nets] across the river bank in Shiroro local government, as they are bulky. What was earmarked for the movement of nets there was not enough, so we met with the community leader to explain that the LLINs are free for the community. He [the community leader] paid for an engine boat to move the nets to the other side of the river bank. (LGA Administrator, SPHCDA/SMOH location_L8)

Thus, though a potential benefit of the SA model could be that greater political will and attention to malaria would translate into greater resources for malaria control, this was not found in our interviews.

External Influence

Donor Influence

Many participants in the three states stated that partner activities are well coordinated and that partners work together with the state to achieve common objectives. This collaborative environment appears to be fostered by the existence in all three states of a quarterly partners' forum that serves as a coordinating platform and the involvement of partners in the development of the state's annual operational plan. The quotes below reflect the views expressed in each of the three states.

[The] state has a unified A.O.P (annual operational plan); hence, all the partners are carried along... Partners identify which areas of support they provide, based on the work plan, so we review the gaps and agree on how to draw support to close these gaps. (State-level Manager, SMOH location_M1)

In the partners' forum, we share our plans and achievements, so partners can have visibility of the program's outlook... and align their plan and resources accordingly. (Senior Administrator, SA location_H5)

Whatever they (partners) [do], we are involved. They don't do it alone. We are involved in both planning and implementation. We meet, whenever we finalize plans, and call them (partners) to a meeting where we review these plans and challenges together. (State-level Manager, SPHCDA/SMOH location_M1)

However, a few participants in the SA location felt that the coordination between partners and the government was not always sufficient and that the state played a major role in enforcing coordination:

They [partners] presently write and inform us of their plans and also share their intended activities with us. ... I insisted on this, because initially, we were not always carried along on some partner activities. And I insisted on our having a prior knowledge of these activities. An example of this happened some time back; when some partners recruited field staff without informing us. ... The LGA Chairmen intervened and insisted that a letter must come from the State Roll Back Malaria program. ... Like I said, the political will has been there, the position of the malaria control program is right up there, and when we have activities at the LGA level, we communicate by writing the LGA Chairmen. (Senior Administrator, SA location_H5)

Finally, though the presence of partners in the malaria program was evident across the three states, some participants in the SPHCDA/SMOH location, particularly, felt that the state was highly dependent on development partners. In fact, partners were acknowledged to be a key influence on strategic decision making within the malaria program. This greater ability of the SA state (Cross River) to enforce coordination on the donors contrasted with the SPHCDA/SMOH state's (Niger) greater donor dependence, which again may reflect the greater political support for malaria programs in the SA state.

Most of the sources of funds for execution of malaria activities comes from partners. So, unfortunately for us some partners decide on their choice of activities ... and we just key in. (Senior Administrator, SPHCDA/SMOH location_H8)

To my knowledge, the state malaria elimination program is largely donor driven in terms of funding. ... I am sure each partnership has its mandate from their organization, including goals and priority areas. So, the only thing we do is make sure our goals and priorities align with that of the state operational plan. (Partner, SPHCDA/SMOH location_P2)

Program Performance

Analyses showed that based on the most recent survey data (NDHS 2013),⁸ the SA location (Cross River) was the best performing state, in terms of having highest levels of coverage of key malaria prevention interventions, whereas the SPHCDA/SMOH (Niger) performed best with respect to diagnosis/treatment. The SMOH state (Akwa-Ibom) was the least performing across both categories (Tables 4 and 5). However, the SPHCDA/SMOH location state was fastest in improving across all assessed indicators between the 2008 and 2013 NDHS surveys in both preventive and diagnostic and treatment indicators; once again the SMOH location state recorded the weakest performance. The SPHCDA/SMOH location state had lower coverage of interventions in 2008 than the other two states for nearly all of the indicators (data not shown), so it had more room for improvement. Nonetheless, over the period 2008 to 2013, the SPHCDA/SMOH location state (Niger) showed remarkable improvements across all indicators (Table 5); however, the SA location (Cross River) still surpassed its coverage levels in the prevention indicators (Table 4), with insecticide-treated net (ITN) usage by children under five over two times higher in Cross River than in Niger (46.9% to 18.4%). These results suggest that at least with respect to these summary indicators, there is not a clear relationship between administrative location and program performance (also see Appendix C, Table C1).

DISCUSSION

This study explored how differences in administrative location, administrative processes, leadership, and external influence (Figure 1) might explain variation in state-level malaria program performance across three states in Nigeria. The results show that the following factors differed across the states: earmarking of funds, asserting state ownership, donor influence, and the resourcefulness of leaders in overcoming bottlenecks. Though this kind of study design cannot hold many background conditions constant, we hypothesize that these differences may explain a component of the observed variations in malaria program performance.

We hypothesized that the state with the malaria program located closer to the state governor (SA model) would have

Prevention	SMOH Location	SA Location	SPHCDA/ SMOH Location
	(% Coverage)		
Ownership of ITN (percentage of household with at least one ITN)	43.6	57.9	49.4
Ranking	3	1	2
Use by children (among children under age five in households with at least one ITN, the percentage who slept under an ITN the night before the survey)	31	46.9	18.4
Ranking	2	1	3
Use by pregnant women (among pregnant women age 15–49 in households with at least one ITN, the percentage who slept under an ITN the night before the survey)	32.2	54.3	29.7
Ranking	2	1	3
IPTp (percentage of women age 15–49 with a live birth in the two years preceding the survey who, during the pregnancy preceding the last birth, received at least two doses of SP/Fansidar)	7.3	18.2	34.5
Ranking	3	2	1
Diagnosis			
Malaria testing (percentage of children under age five with a fever in the two weeks preceding the survey, who had blood taken from a finger or heel for testing)— rapid diagnostic testing	8.9	11.7	35.3
Ranking	3	2	1
Treatment			
ACT use (percentage of children under age five with a fever in the two weeks preceding the survey who took any ACT the same or next day following the onset of fever)	1.9	0.7	14
Ranking	2	3	1
Overall rank ^a	3	1	2

TABLE 4. Coverage Indicators for Malaria Interventions Across the Three States with Ranking Based on Most Recent Data (2013 NDHS). *Note.* IPTp = Intermittent Preventive Treatment in pregnancy, ACT = Artemisinin-based Combination Therapy. ^aOverall rank is the ranking based on the summation of all ranks: 1 = best performer, 3 = lowest performer. Source: Adapted from Nigeria Demographic and Health Survey 2013⁸

greater access to resources, would have more administrative flexibility, and would have more high-level political support and would therefore demonstrate better program performance. Although this state (Cross River) performed relatively well in coverage of prevention interventions, the SMOH and SMOH/SPHCDA states showed better changes over time. Consistent with this, respondents suggested that the close proximity of the state malaria program to the governor did not yield the expected increase in access to resources. However, interviewees did highlight the presence of other benefits of the SA model, such as clear earmarking of funds for malaria program and strong state ownership, including the ability to give direction and guidance to donors.

Adequate and steady flow of funds is essential to the successful execution of health programs.²⁸ The level of control that the managers of a state malaria program have over the volume and timing of program funds can impact their ability to plan and execute effectively. We found that the state programs are funded from two main sources: official budget

allocations from the state government and funding from development partners such as the Global Fund, World Bank, and the USAID/US President's Malaria Initiative among others. With regard to budgetary allocations, a major distinction was whether malaria is specifically budgeted for (such as in Cross River) or whether its funding is part of a lump sum given to the SMOH for public health programs. Having a specific provision for the malaria program can shield the funds from competition with other disease programs and subjective interests in the ministry of health, which can influence the amount of funding that the program receives. It is beyond the scope of this article to evaluate whether such earmarking is beneficial for public health in aggregate, but it is clearly beneficial to malaria programs.

The greatest challenge that the states face when it comes to funding from the government is weak leverage over disbursements. Across all administrative locations, the respondents unanimously acknowledged that they are less worried about the amount of funds approved for them annually and

Prevention	SMOH Location	SA Location	SPHCDA/ SMOH Location
	(Change in % Coverage between 2008 and 2013)		
Ownership of ITN (percentage of household with at least one ITN)	29.9	42.2	44.2
Ranking	3	2	1
Use by children (among children under age five in households with at least one ITN, the percentage who slept under an ITN the night before the survey)	(21.4)	(24.2)	1.2
Ranking	2	3	1
Use by pregnant women (among pregnant women age 15–49 in households with at least one ITN, the percentage who slept under an ITN the night before the survey)	(3.1)	(1.3)	4.3
Ranking	3	2	1
IPTp (percentage of women age 15–49 with a live birth in the two years preceding the survey who, during the pregnancy preceding the last birth, received at least two doses of SP/Fansidar)	(11.6)	4.1	22.3
Ranking	3	2	1
Diagnosis ^a			
Malaria testing (percentage of children under age five with a fever in the two weeks preceding the survey, who had blood taken from a finger or heel for testing) ^a			
Ranking			
Treatment			
ACT use (percentage of children under age five with a fever in the two weeks preceding the survey who took any ACT the same or next day following the onset of fever)	0.7	(4)	12
Ranking	2	3	1
Overall rank ^b	3	2	1

TABLE 5. Coverage Indicators for Malaria Interventions across the Three States with Ranking Based on Change in Coverage over Time (Between 2008 and 2013). ^aRapid diagnostic testing data were not available in the NDHS 2008 because rapid diagnostic testing was not part of the case management protocol in 2008. ^bOverall rank is the ranking based on the summation of all ranks: 1 = best performer, 3 = lowest performer. Source: Adapted from Nigeria Demographic and Health Survey 2008 and 2013.^{7,8}

more concerned about the failure to disburse the amount budgeted. Several studies have shown that health care tends to be given lower priority by politicians, who tend to favor civil infrastructure projects,²⁹ which provide more political visibility and are believed to be more appreciated by the electorate. Lack of prioritization of the health sector is an important phenomenon that should be explored in future research work. It is therefore not surprising that, across the board, all of the states relied on donor funding to implement malaria interventions.³⁰ Because the malaria program in Niger State (SPHCDA/SMOH model) was much more partner driven, it appeared that the lack of a specific budget for malaria seemed to have a smaller impact on performance.

Although the three states relied on the national malaria elimination program for guidance on strategic direction, Cross River State (SA model) showed the greatest ability to adapt the national directives to its own situation. This may reflect the greater state ownership enabled by the SA administrative location.

Many participants across the three states stated that partner activities were well coordinated and that partners work together with the state to achieve common objectives in the state malaria program. Though all three states reported partner/donor involvement in the development of their annual operational plans, Niger State (SPHCDA/SMOH model) in particular appeared to be quite dependent on donors. This may have accounted for the perceived high partner influence on the strategies and activities of the malaria program in the state. Thus, higher improvement rate in malaria program performance in Niger state may be partly explained by the effectiveness of partner-driven activities, which is in line with the findings of Mutero and colleagues³¹ on the influence and effectiveness of donor-run programs. Though the findings suggest a relatively healthy relationship between donors and government counterparts in the three states, donor dependence raises concerns about the sustainability of programs. Evidence has shown that programs are susceptible to collapse following the exit of development partners or donors.³²

Although we are not aware of other studies that have explicitly explored the influence of donor dependence in malaria control or elimination programs, with the majority of low- and middle-income countries facing declines in donor funding,³² it is crucial for states in Nigeria to start working toward sustaining their programs by mobilizing alternate domestic funding mechanisms.

Our findings show that other factors such as resource constraints influenced the performance of the states' malaria programs. Bottlenecks such as lack of operational funds, due to limited fiscal space, hindered planned activities. This is consistent with the findings of Ghosh and colleagues,³³ who found that financial difficulties and meager budget allocation for health (and subsequently malaria) in two Indian states contributed to poor malaria outcomes. These findings suggest that the challenges currently facing and influencing malaria control in these three states are in many ways similar to those facing health systems as a whole. Furthermore, it appeared that the ability of state malaria actors to overcome limitations influenced performance. For example, in Niger State (SPHCDA/SMOH model), there were instances of the strategic use of data to advocate for funds outside their respective state governments to ameliorate the lack of operational funds and the limited fiscal space. This may have also contributed to improvements observed in the malaria program in Niger State. It is likely that managers and/or administrators in Niger State were able to recognize and maximize opportunities to advocate for additional funds, thereby highlighting the importance of effective management in malaria program. This is in line with the study by Gosling and colleagues,³⁴ showing that effective program management is key to malaria elimination programs. This finding also shows that administrative capacity and political skill were not limited to the SA state in the three cases examined in this study.

Finally, communication is a major component of program management and was explored in this study. An important motivation for the SA model is to streamline bureaucratic processes and enable direct communication between malaria program managers and the state governor. However, most LGA and mid-level administrators in the three states reported a simple chain of communication across levels and frequent stakeholder malaria meetings. This suggests that an important hypothesized benefit of the SA model (clear, direct communications to senior political leaders) may not have been necessary in this context. We also note, however, that most of the LGA-level administrators did not demonstrate a basic understanding of the malaria targets set by the state and their role in achieving these targets. State malaria programs may need to develop deliberate plans to ensure that staff across various levels know and understand the strategic direction of the state program.

CONCLUSION AND RECOMMENDATIONS

This study found that effectiveness of administrative processes, resourcefulness of leaders, and external influence may be more important than organizational structure (administrative location) in influencing the performance of state-level public sector malaria programs in Nigeria. At the least, public sector models were not determinative of malaria program performance in this sample of three states. Though the Cross River State (SA location) malaria program had the highest coverage of several key prevention indicators in 2013, Niger State (transitioning from the SMOH to SPHCDA model) showed the most improvement in the recent past across indicators spanning the entire spectrum of malaria interventions from prevention to diagnosis and treatment. The ability of the leadership to demonstrate ownership by adapting strategies to local context (in the case of Cross River/SA model); earmarking of funds for malaria in the health budget (in the case of Cross River/SA model); the resourcefulness of program managers in finding creative ways to overcome roadblocks such as through advocacy (in the case of Niger/SMOH/SPHCDA model); and influence of donor agencies and their development partners in driving activities (in the case of Niger/SMOH/SPHCDA model) are likely to have contributed to the variations in performance observed in this study. These characteristics of high-performing state malaria programs could be further assessed in follow-up studies to validate and identify standards for less-performing states to emulate.

Across all three states, it was observed that funding for malaria programs from state budget allocations was poor, mainly due to the low rate of disbursement of approved budgets. The programs are thus dependent on donors for support. This finding suggests that state governments in Nigeria need to plan for more sustainable sources of funding for the long run. This fundamental issue appeared to cross-cut all three organizational models. This highlights a weakness in decentralized health systems, which push administrative functions critical to program implementation down to levels where basic administrative capacity is often weak.

This study suggests that state governments in Nigeria that seek to improve the performance of their malaria programs should focus on strengthening the leadership and administrative processes of the program and on key administrative functions such as budget disbursement. Though the creation of novel organizational structures to harness political will and bypass core administrative weaknesses can deliver benefits, it is far from a panacea. The study's findings also suggest that donor funding can help states scale up effective interventions in the short run, but plans should be made to see that

states commit and follow through with the release of their own dedicated funds for malaria control in order to ensure sustainability of malaria services in the long run.

Strengths and Limitations

This study is one of relatively few to explore the relation of organizational structural factors and implementation processes to public sector performance in the Nigerian context, using malaria control programs as a focus. A key strength is its potential for immediate utility, contributing to our understanding of how the malaria elimination programs actually function in the three study states (Akwa Ibom, Cross River, and Niger). The major limitation is the restriction of the study sites to three out of 36 states in Nigeria. Information from more states might have provided further insights into both internal structural and administrative process factors as well as external factors that influence malaria program performance in Nigeria. These constraints limit the generalization of the study's findings. We addressed these constraints somewhat through our careful criteria of state selection, which included ensuring representation of the three broad malaria program structural models in Nigeria.

DISCLOSURE OF POTENTIAL CONFLICTS OF INTEREST

The authors state that there were no conflict of interests in undertaking this study.

ACKNOWLEDGMENTS

The authors acknowledge Harvard University's Defeating Malaria: From the Genes to the Globe Initiative and the Harvard T.H. Chan School of Public Health for providing technical support for this work. In addition, we thank members of the Health Policy and Research Group of the University of Nigeria, Enugu campus, who provided useful feedback in the design, data collection, and analysis phases of this work.

FUNDING

Funding for this work was made possible through a generous grant from ExxonMobil Foundation.

ORCID

Michael R. Reich  <http://orcid.org/0000-0003-3338-0612>

REFERENCES

- [1] National Population Commission (NPC) [Nigeria], National Malaria Control Programme (NMCP) [Nigeria], and ICF International. Nigeria Malaria Indicator Survey 2010. Abuja, Nigeria: NPC, NMCP, and ICF International; 2012.
- [2] National Malaria Elimination Programme (NMEP), National Population Commission (NPopC), National Bureau of Statistics (NBS), and ICF International. Nigeria Malaria Indicator Survey 2015: Key indicators. Abuja, Nigeria, and Rockville, MD, USA: NMEP, NPopC, and ICF International; 2016.
- [3] Amazat J. Assessing the progress of malaria control in Nigeria. *World Health Popul* 2011; 12(3): 42-51.
- [4] World Health Organization. World malaria report. Geneva: World Health Organization; 2015. Available at http://apps.who.int/iris/bitstream/10665/200018/1/9789241565158_eng.pdf?ua=1 (accessed 22 April 2016)
- [5] World Health Organization. Progress and impact series: focus on Nigeria. 2012. Available at <http://www.rollbackmalaria.org/microsites/ProgressImpactSeries/docs/report11-en.pdf> (accessed 20 April 2016)
- [6] National Malaria Control Programme, sunMAP, World Health Organization and the INFORM Project. A description of the epidemiology of malaria to guide the planning of control in Nigeria. A report prepared for the Federal Ministry of Health, Nigeria, the Roll Back Malaria Partnership and the Department for International Development, UK. November 2013.
- [7] National Population Commission (NPC) [Nigeria] and ICF Macro. Nigeria Demographic and Health Survey 2008. Abuja, Nigeria: National Population Commission and ICF Macro; 2009.
- [8] National Population Commission (NPC) [Nigeria] and ICF International. Nigeria Demographic and Health Survey 2013. Abuja, Nigeria, and Rockville, MD, USA: NPC and ICF International; 2014.
- [9] Federal Ministry of Health Nigeria. A directory of health facilities in Nigeria. Abuja, Nigeria: Federal Ministry of Health; 2013.
- [10] National Malaria Elimination Programme (NMEP) and the Roll Back Malaria Partnership. National Malaria Strategic Plan 2014–2020. Abuja, Nigeria: Federal Ministry of Health; 2014.
- [11] Nigeria National Assembly. National Health Act. Abuja, Nigeria: National Assembly of the Federal Republic of Nigeria; 2014.
- [12] Federal Ministry of Health, Abuja, Nigeria. National Strategic Health Development Plan (NSHDP) 2010–2015. Abuja, Nigeria: Federal Ministry of Health, Nigeria; 2010.
- [13] Federal Ministry of Health Nigeria. Harmonized country plan of priority interventions 2014–2015. Abuja, Nigeria: Federal Ministry of Health; 2014. Available at <http://www.health.gov.ng/doc/HCPofP%20I.pdf> (accessed 28 April 2016)
- [14] Andrews R, Boyne GA, Law J, Walker RM. Centralization, organizational strategy, and public service performance. *J Public Adm Res Theory* 2009; 19(1): 57-80.
- [15] Bohte J, Meier KJ. Structure and the performance of public organizations: task difficulty and span of control. *Public Organization Review* 2001; 1(3): 341-354.
- [16] Mills A. Vertical vs. horizontal health programmes in Africa: idealism, pragmatism, resources and efficiency. *Soc Sci Med* 1983; 17(24): 1971-1981.

- [17] Atun RA, Bennett S, Duran A. When do vertical (stand-alone) programmes have a place in health systems? Policy brief health systems and policy analysis. Geneva: World Health Organization; 2008.
- [18] Elzinga G. Vertical–horizontal synergy of the health workforce. 2005. Available at <http://www.who.int/bulletin/volumes/83/4/editorial10405/en/> (accessed 16 July 2016)
- [19] World Health Organization. The 3 by 5 initiative. Geneva: World Health Organization; 2005. Available at <http://www.who.int/3by5/en> (accessed 16 July 2016)
- [20] Chen L, Evans T, Anand S, Boufford JI, Brown H, Chowdhury M, Cueto M, Dare L, Dussault G, Elzinga G, et al. Human resources for health: overcoming the crisis. *Lancet* 2004; 364 (9449): 1984-1990.
- [21] World Bank. Country and lending groups. 2016. Available at http://data.worldbank.org/about/country-and-lending-groups#Lower_middle_income (accessed 28 June 2016)
- [22] Malaria Atlas Project. The spatial distribution of *Plasmodium falciparum* malaria endemicity map in Nigeria. 2010. Available at <http://www.map.ox.ac.uk/explore/countries/NGA/> (accessed 20 April 2016)
- [23] Nicola K, Gemma H, Elaine C, Sabina R, Sabi R. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol* 2013; 13: 117.
- [24] Ritchie J, Lewis J. Qualitative research practice: a guide for social science students and researchers. London: Sage; 2003.
- [25] Pope C, Ziebland S, Mays N. Analysing qualitative data. *Br Med J* 2000; 320(7227): 114-116.
- [26] Lincoln YS, Guba EG. But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. New directions for program evaluation. San Francisco: Jossey-Bass; 1996.
- [27] World Bank. Malaria Booster Project, Nigeria. 2005. Available at <http://www.worldbank.org/projects/P097921/malaria-control-booster-project?lang=en> (accessed 16 July 2016)
- [28] Katz I, Routh S, Bitran R, Hulme A, Avila C. Where will the money come from? Alternative mechanisms to HIV donor funding. *BMC Public Health* 2014; 14(1): 956.
- [29] Health Reform Foundation of Nigeria. Better health for all Nigerians. 2015. Available at <http://www.herfon.org/> (accessed 15 July 2016)
- [30] Private Sector Innovation Program for Health. A study of sustainability outcomes of donor funded programs. Nairobi, Kenya: Private Sector Innovation Program for Health; 2014.
- [31] Mutero CM, Kramer RA, Paul C, Lesser A, Miranda ML, Mboera LEG, Kiptui R, Kabatereine N, Ameshewa B. Factors influencing malaria control policy-making in Kenya, Uganda and Tanzania. *Malar J* 2014; 13(1): 305.
- [32] Mills A, Lubell Y, Hanson K. Malaria eradication: the economic, financial and institutional challenge. *Malar J* 2008; 7(Suppl 1).
- [33] Ghosh SK, Patil RR, Tiwari SN. Socio-economic–political–cultural aspects in malaria control programme implementation in southern India. *J Parasitol Res* 2012: 317908.
- [34] Gosling J, Case P, Tulloch J, Chandramohan D, Wegbreit J, Newby G, Gosling R. Effective program management: a cornerstone of malaria elimination. *Am J Trop Med Hyg* 2015; 93(1): 135-138.
- [35] United Kingdom foreign travel advice. August 2014. <https://www.gov.uk/foreign-travel-advice/nigeria>

APPENDIX A

Topic	Sample Questions
Actors and relationships within the state malaria program	Who is involved in malaria program in your state?
Political and economic interests	In what ways have the actors contributed to the state malaria program?
Strategic decision making	What factors influence the behavior of persons in the state malaria program?
Financial control over the state malaria program	In what ways do the people in the state malaria program work together to align their resources and interests to those of the state and NMEP?
Program execution	How are goals and priorities set in the state malaria program?
Stakeholder confidence ^a	Please discuss your involvement in decision making with respect to the national and state malaria programs?
Financial control over the state malaria program	Who is involved in the budgetary process of your state malaria program?
Program execution	How much influence does the state malaria program have in deciding the size of its approved budget and how much is released from the treasury for program implementation?
Program execution	What is the greatest constraint you have in executing malaria programs in the state?
Stakeholder confidence ^a	In what way is your malaria team held accountable and how effective has this been?
Stakeholder confidence ^a	What factors have enabled or constrained your partnership with the state malaria program?
Stakeholder confidence ^a	In what ways do you influence the design and implementation of the national and state malaria programs?

^aQuestions under this topic were directed at development partners.

TABLE A1. Interview Guide

APPENDIX B: STATE SELECTION

State malaria program models

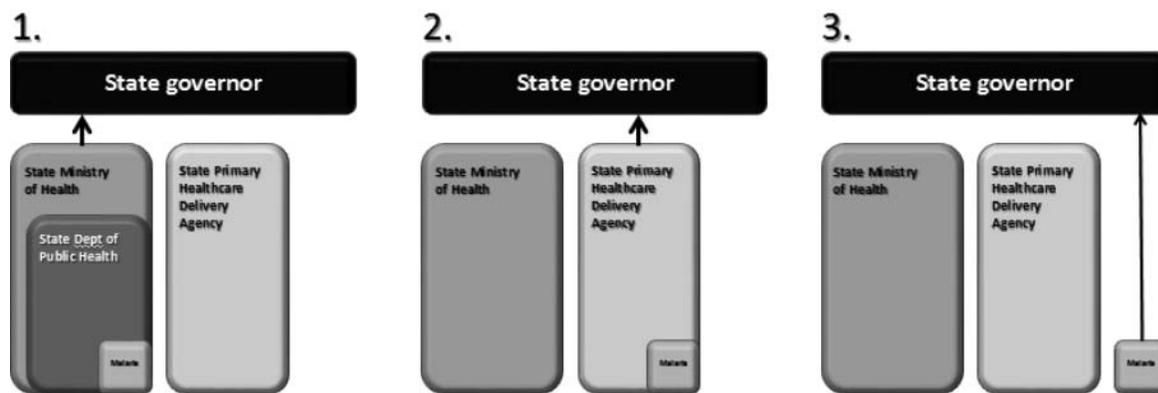


FIGURE B1. Diagram Showing the Different Malaria Program Models Available in States Across Nigeria

State	1	2	3
Abia	✓		
Adamawa	✓		
Akwa Ibom	✓		
Anambra	✓		
Bauchi	✓		
Bayelsa	✓		
Benue	✓		
Borno			
Cross River			✓
Delta	✓		
Ebonyi	✓		
Edo	✓		
Ekiti	✓		
Enugu	✓		
Federal Capital Territory	✓		
Gombe	✓		
Imo	✓		
Jigawa	✓		
Kaduna	✓		
Kano	✓		
Katsina	✓		
Kebbi	✓		
Kogi	✓		
Kwara	✓		
Lagos	✓		
Nassarawa	✓		
Niger		✓	
Ogun	✓		
Ondo	✓		
Osun	✓		
Oyo	✓		
Plateau	✓		
Rivers	✓		
Sokoto	✓		
Taraba	✓		
Yobe	✓		
Zamfara	✓		

TABLE B1. List of All States in Nigeria and an Indication of the Organizational Structure (Administrative Location) of Their Respective Malaria Programs as of May 2015

State Selection

The study was conducted in three states in Nigeria. Given the heterogeneity of program models at the state level, the proposed study focuses on states with different program models.

An analysis was conducted across states in Nigeria, looking at the potential for impact (defined as the prevalence of

malaria^a in the state, under the premise that improvements in program outcomes in those states will save more lives) as well as the feasibility of implementation (This was assessed using the presence of Harvard programs, SOML, or other implementing partners as a proxy. The first two were given more weight).^b

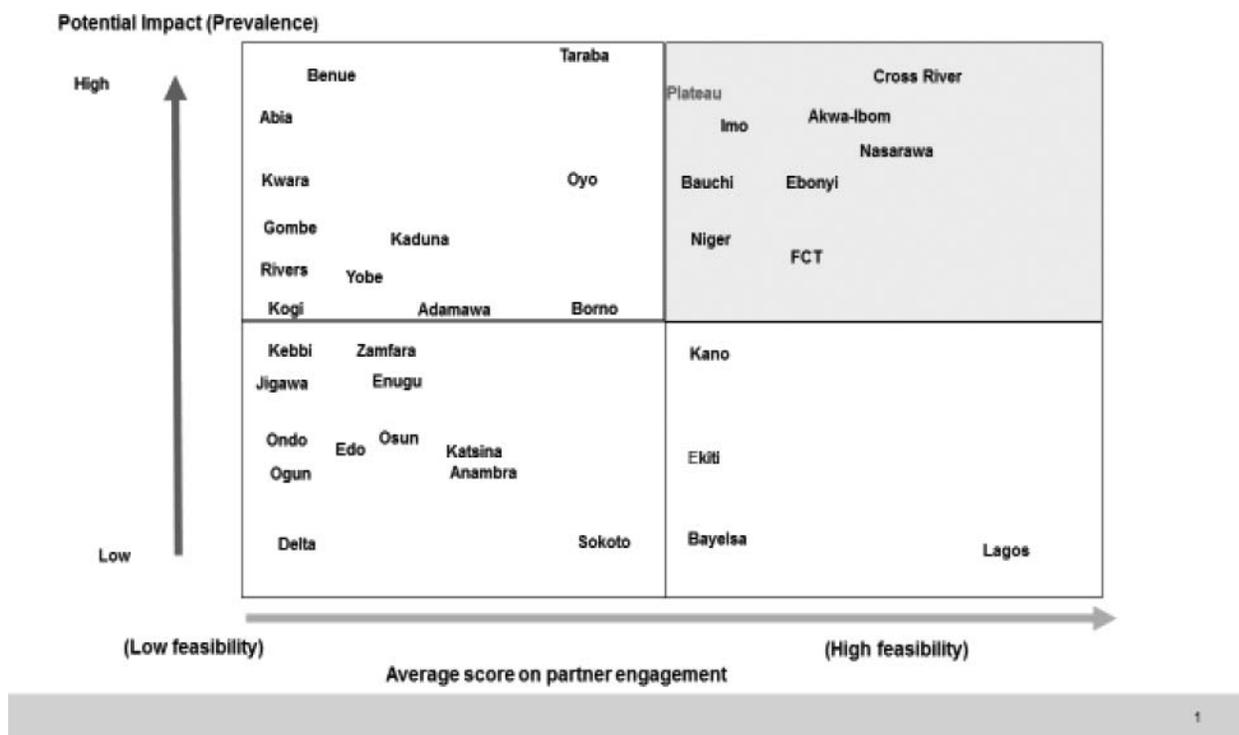


FIGURE B2. Graph Showing the Prevalence of Malaria in States Across Nigeria (Based on the 2010 Malaria Atlas Project Endemicity Map) and the Feasibility of Implementation (Assessed Using the Presence of Harvard Programs, Health Strategy and Delivery Foundation [HSDF]) Programs or Other Implementing Partners as a Proxy

From this analysis, the following states were selected:

- Cross River State:** Located in the Niger-Delta region of the country (oil-producing state). The security situation is reported as safe. The potential impact is high. The leadership is very keen on malaria impact/partnership (evidenced by SOML PDU engagement with the state). Finally, in our experience, Cross River is the only state where the malaria program is headed by a special adviser to the governor on malaria and community health (which is ideal for electing different state program models).
- Akwa Ibom State:** Also located in the Niger-Delta region of the country (oil-producing state). Exxon-Mobil has a strong presence in the state. The potential impact is high with a relatively safe security situation. There have been prior engagements with the state malaria program with SOML PDU.
- Niger State:** Located in the north-central region of the country. Although the prevalence is moderate, the security situation is reported to be safe. There has been a high level engagement by SOML PDU and other partners on data strengthening and on malaria.

Heat map of Malaria prevalence in Nigeria

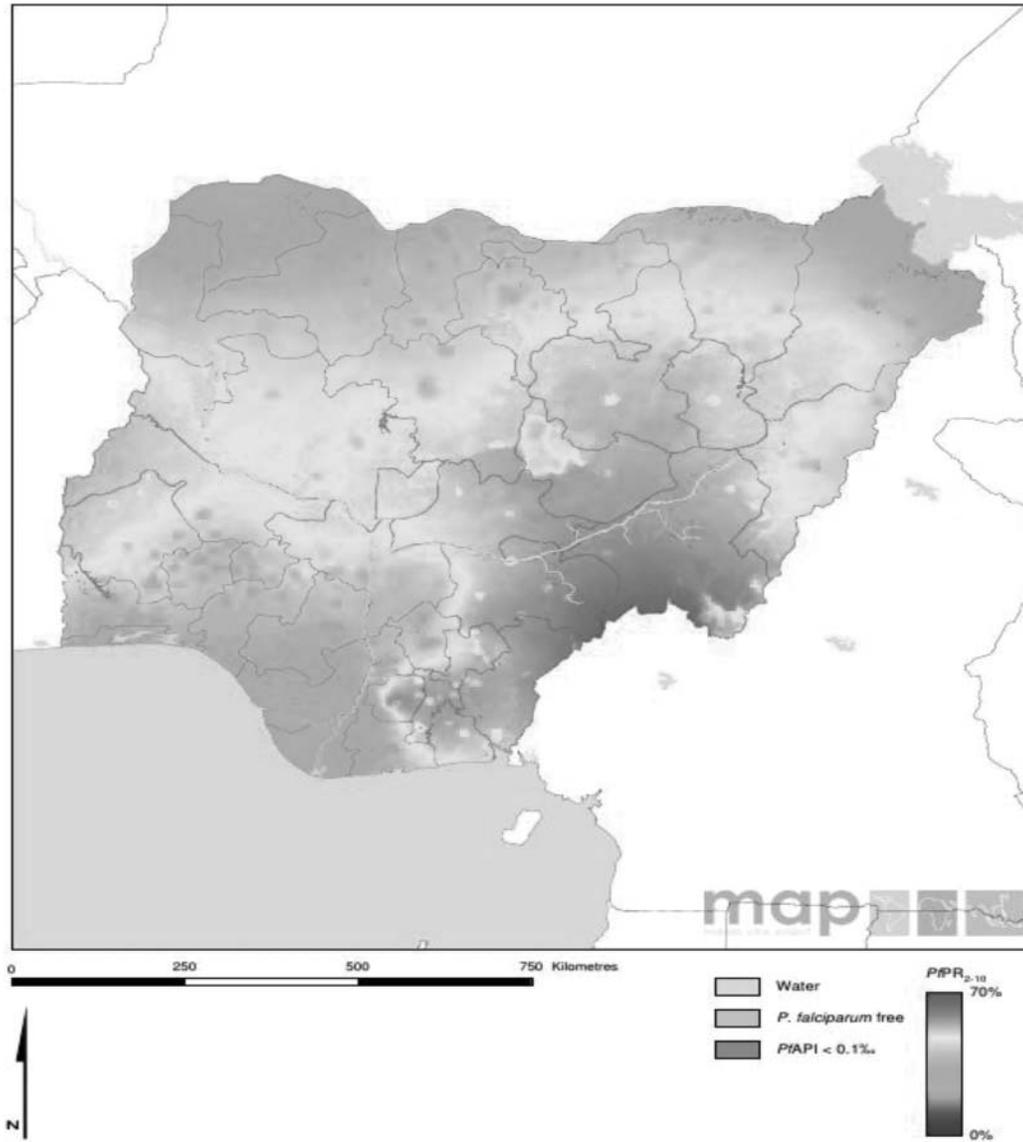


FIGURE B3. The Spatial Distribution of Plasmodium Falciparum Malaria Endemicity Map in Nigeria as of 2010. Source: Adapted from Ref. 22

NOTES TO APPENDIX B

- a ALMA heat map Q1 2014.²²
- b Potential impact: prevalence by state (source: ALMA heat map Q1 2014²²). Green zone, low prevalence;

Orange zones, medium prevalence; Red zones, high prevalence. Level of engagement, state with active SOML/ APIN presence; Security challenges, states with reported security challenge. Source: Ref. 35

APPENDIX C

	SMOH Location Akwa- Ibom	SA Location Cross River	SPHCDA/SMOH Location Niger		SMOH Location Akwa- Ibom	SA Location Cross River	SPHCDA/SMOH Location Niger
Prevention	(% Coverage)			Prevention	(Change in % Coverage between 2008 and 2013)		
Ownership of ITN (percentage of household with at least one ITN)	43.6	57.9	49.4	Ownership of ITN (percentage of household with at least one ITN)	29.9	42.2	44.2
Ranking	3	1	2	Ranking	3	2	1
Use by children (among children under age five in households with at least one ITN, the percentage who slept under an ITN the night before the survey)	31	46.9	18.4	Use by children (among children under age five in households with at least one ITN, the percentage who slept under an ITN the night before the survey)	-21.4	-24.2	1.2
Ranking	2	1	3	Ranking	2	3	1
Use by pregnant women (among pregnant women age 15–49 in households with at least one ITN, the percentage who slept under an ITN the night before the survey)	32.2	54.3	29.7	Use by pregnant women (among pregnant women age 15–49 in households with at least one ITN, the percentage who slept under an ITN the night before the survey)	-3.1	-1.3	4.3
Ranking	2	1	3	Ranking	3	2	1
IPTp (percentage of women age 15–49 with a live birth in the two years preceding the survey who, during the pregnancy preceding the last birth, received at least two doses of SP/ Fansidar)	7.3	18.2	34.5	IPTp (percentage of women age 15–49 with a live birth in the two years preceding the survey who, during the pregnancy preceding the last birth, received at least two doses of SP/ Fansidar)	-11.6	4.1	22.3
Ranking	3	2	1	Ranking	3	2	1
Prevention subtotal	10	5	9				
Diagnosis				Diagnosis ^a			
Malaria testing (percentage of children under age five with a fever in the two weeks preceding the survey, who had blood taken from a finger or heel for testing)—rapid diagnostic testing	8.9	11.7	35.3	Malaria testing (percentage of children under age five with a fever in the two weeks preceding the survey, who had blood taken from a finger or heel for testing) [#]			
Ranking	3	2	1	Ranking			
Treatment				Treatment			
	1.9	0.7	14		0.7	-4	12

(Continued on next page)

	SMOH Location Akwa- Ibom	SA Location Cross River	SPHCDA/SMOH Location Niger		SMOH Location Akwa- Ibom	SA Location Cross River	SPHCDA/SMOH Location Niger
Prevention	(% Coverage)			Prevention	(Change in % Coverage between 2008 and 2013)		
ACT use (percentage of children under age five with a fever in the two weeks preceding the survey who took any ACT the same or next day following the onset of fever)	6	4	2	ACT use (percentage of children under age five with a fever in the two weeks preceding the survey who took any ACT the same or next day following the onset of fever)			
Ranking	2	3	1	Ranking	2	3	1
Diagnosis and treatment subtotal	5	5	2				
Overall rank ^b	3	1	2	Overall rank ^b	3	2	1

TABLE C1. Breakdown of State Program Performance and Ranking in the Three States Using Three Malaria Service Delivery Domains (*Continued*). ^aRapid diagnostic testing data were not available in the NDHS 2008 because rapid diagnostic testing was not part of the case management protocol in 2008. ^bOverall rank is the ranking based on the summation of all ranks: 1 = best performer, 3 = lowest performer. Source: Adapted from Nigeria Demographic and Health Survey 2008 and 2013.^{7,8}

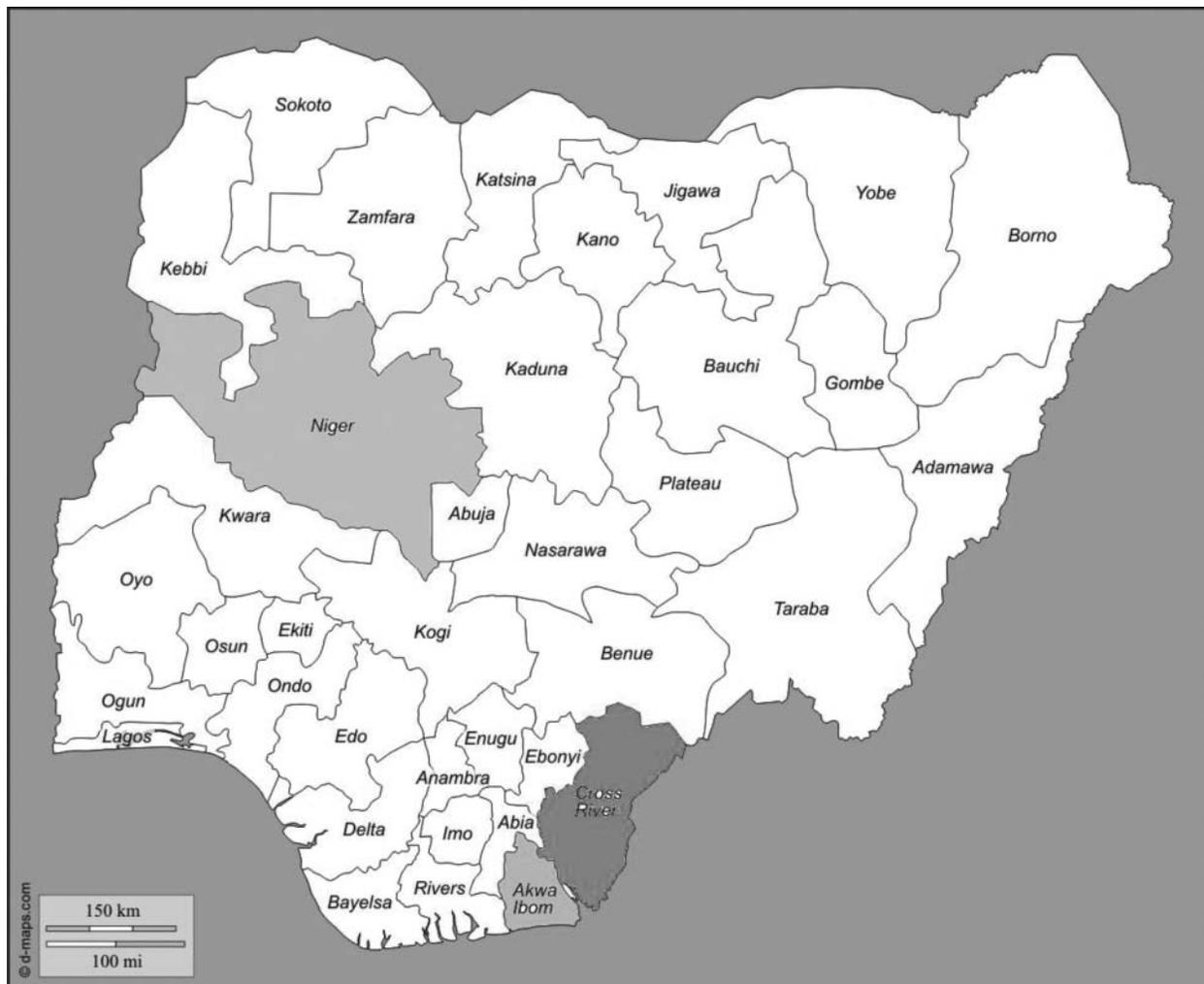


FIGURE C1. Map of Nigeria Showing Selected States for Study (Akwa Ibom State: Colored Pink; Cross River State Colored Blue; Niger State Colored Green)