Seeking Research Questions from Implementers: Considerations for Leveraging Ground Actors Research Needs in the Fight against Malaria in West Africa.

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Abstract

Malaria, a parasitic infection, still a major public health threat and hence a heavy economic burden that hampers the development of countries especially in West Africa. Malaria and Neglected Tropical Diseases (NTD) altogether are now the third leading cause of death in ECOWAS region with 77% of deaths in children under 5 years due to malaria.

Countries and partners set ambitious goals for reducing the burden and eliminating malaria by 2030. To achieve these goals, West African countries program managers and researchers are engaged in a series of activities to address practical bottlenecks.

This article aims to evaluate the effectiveness of a collaboration between malaria program implementation and research needs in West African countries, related to malaria. It describes the crucial role and process managers and researchers can play in these countries, in assuring the identification of research related program implementation issues as well as solutions to those barriers in order to alleviate the burden.

Identifying research questions pertaining to each program through an implementation science approach, integrating health delivery and innovative approach to bottlenecks, and decision support to promote joint optimization of activities for malaria elimination. Managers and researcher discussed together programs difficulties being encountered and highlighted key research questions to be addressed.

Background

More than often, local social determinants of health are hidden, or just being overlooked by the funders, institutional researchers and health systems, hence slowing or reducing the program implementation and impact. In addition scores of the physical constraints that impede the regular and effective delivery of health interventions to those who need them are much more pronounced in Low-to-Middle-Income Countries (LMIC) than in resource-rich countries(1)

Bridging the research divide between obligations of donors, researchers and field actors is of paramount importance in the fight against diseases, especially malaria in Africa. This pandemic is often caught in a vicious circle, often being both cause and consequence of poverty. The efforts will require new ways of working with program implementers whereby local communities in West Africa commit their own resources, along with the external resources.

However, recent trends have shown a slow reduction in malaria mortality rate in in Africa in general, and the region in particular, (2), despite this reduction, death rates remain high in countries such as Nigeria, Burkina Faso and Niger, Mali a Cote d’Ivoire, Ghana (3), and Guinea prompting questions about weaknesses in the fight against malaria in these countries. An approach to identify these weaknesses, opportunities and the search for solutions to reduce this amenable mortality (a mortality is considered as amenable if it could have been avoided through optimal quality healthcare programs and technologies to

all those who can benefit), will improve control, and bring these countries to the level of pre-elimination targets.

This study was designed to assess the current weaknesses and bottlenecks in the implementation of malaria control programs, implemented through the World Bank loan project granted to 3 countries (Burkina Faso, Mali, and Niger) (4). However, we push forward our curiosity by expending our work and by administrating our survey to all the ECOWAS 15 countries (Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo). Doing so, we also envisioned South–South research collaboration, i.e. research collaboration between developing countries, in the region, that could emerge.

When identifying bottlenecks by implementing actors, the main objectives of our work were i) to guide these actors formulate research questions that could arise in regard to specific difficulties ii) when possible, to enable the project to finance research activities that could contribute to improve program and provide appropriate solutions toward elimination of malaria and neglected tropical diseases. Indeed, there are more and more evidence that the role of local knowledge-based organizations and players are "catalysts for ideas and in proposing practical solutions for implementation, governance and policy problems (5)".

Methodology

As local and primary providers, malaria program managers were approached in the 15 countries of the Economic Community of West African States (ECOWAS), including eight French-speaking, five English-speaking and two Portuguese-speaking countries. Two approaches were used: a questionnaire survey and the organization of a regional validation workshop through a West African regional malaria and NTD annual meeting. This paper will only focus on malaria.

a) The questionnaire survey

The questionnaire translated into the 3 official languages of ECOWAS, namely English, French and Portuguese, were sent to the managers of malaria and neglected tropical diseases control programs, in the last semester of trimester of 2016. The questionnaire was divided into two (2) parts: i) Bottlenecks in malaria program implementation ii) Priority research questions on malaria program. Each part covered seven thematic areas: **governance, human resources, drugs, service provision, use of prevention methods, monitoring and evaluation, and public support or buy-in**. We then sent the questionnaire through electronic messages (Email) to malaria and neglected tropical diseases control program managers/coordinators in the 15 ECOWAS countries, with instructions for completion.

Several reminders were made, spread over two months, in order to have a significant response rate, at least 50% response rate. Once the filled questionnaires were sent back to us. As the countries have similarities as well as differences with regard to their governance, epidemiological trends, and even to their productivity in public health research and impact, we considered them initially separately through an

in–depth analysis. We then packed bottlenecks and questions into the seven “ECOWAS regional topics of interest” according to the thematic areas mentioned above. This analysis was then presented at the ECOWAS malaria regional workshop.

b) Organization of the regional validation workshop:

A two-day regional workshop was organized by the West African Health Organization (WAHO), which is an ECOWAS institution, to review malaria as well as NTD program in the region. The workshop took place in Bamako. The participants included not only malaria program manager of the countries, researchers, but also the broader health implementing and development stakeholders who have an interest in funding, and malaria program implementations in West Africa. Participants were included malaria program managers, NTD program managers, Directors of Health Services of the Ministries, monitoring/evaluation officers, project coordinators management units at the country level, the technical and financial partners (World Health Organization, World Bank, Helen Keller International, Malaria Consortium, Catholic Relief Services, and several WAHO officers).

The results of the questionnaire survey were analyzed, presented and discussed in plenary and in two group work sessions.

The first group’s sessions was organized with two groups for malaria, with 12 people in each group. Two (2) groups bringing together malaria program coordinators, researchers, partners and the regional project team worked to validate the research problems and questions in this area. The objective of each group was to review and complete the problems, prioritize and justify the research questions based on individual ratings and an average of the individual ratings. For the plenary session, each group must bring the selected top list 20 research questions. During the plenary following this first session of group work, the representative of each group share the top 20 list of each group. The questions of the participants permit to clarify some questions and the final list of malaria question was established after taking out the duplication.

A second session group work was organised by country. Each country participant’s worked together to select three priority research questions on the final list established after the plenary session then prioritize them over the next three years (2017, 2018 and 2019). A third plenary session gave opportunity to each country team to share their keys questions to address and plan them per year in 2017, 2018 and 2020.

The workshop was facilitated by a Professor in parasitology, one of the top researcher in malaria in West Africa. At the end of the workshop, the facilitator reformulated some of the questions and justifications in accordance with the adopted guidelines.

Results

Out of 15 countries, a total of 11 countries (Benin, Burkina Faso, Côte d'Ivoire, Gambia, Ghana, Guinea, Mali, Niger, Nigeria, Senegal, and Togo) responded to related to malaria.

The table 1 shows the bottlenecks identified by program managers/coordinators according to the seven areas addressed in the questionnaire. In all the seven thematic, there were the problem that can limit the efficacy of the program implementation.

The tables 2 and 3 show that the priority issues were related to (i)the SMC (Seasonal Malaria Chemo-prevention) implementation, especially the factors influencing adherence to the 2nd and 3rd day doses during distribution campaign; (ii) the contribution of community distributors in the management of severe malaria cases in children under 5 years of age, as part of the treatment that should be administered before transferring the patient to the nearby up-scale facility; (iii) the most efficient strategy for applying this chemo-prevention, (iv) the effectiveness and tolerance of ACTs in real world conditions of use and (v) the quality of malaria management at the different levels of the health system.

The keys research questions identified by the countries revolved around the factors influencing adherence to Day 2 and Day 3 doses in seasonal chemoprevention and were in the first place in Mali and Niger and the second place in Burkina (Table 4). This was followed by the contribution of community health workers in the administration of Intermittent Prevention and Treatment - IPT2 and IPT3 - in Burkina and Niger, the most efficient strategy in the implementation of SMC in Burkina in first position; the toxicological effects of administering multiple doses of Amodiaquine and Sulfadoxine Pyrimethamine (AQ-SP) in children and the impact of communication interventions in Mali and the therapeutic effectiveness of AQ-SP in Niger.

Discussion And Conclusion

This work helps identify keys challenges that limit the malaria program implementation and the priority research themes in malaria highlight similarities between countries at the level of malaria control programs.

Most of these bottlenecks highlighted by the work were the poor coordination and collaboration with partners, the skills and motivation of community health workers who were most often responsible for distributing medicines during mass treatment, the weaknesses of logistics in the supply and distribution chain, the poor use of means of prevention, the difficulties of access and quality of data, especially at the community level, and the low level of adherence of the population.

The problems that have emerged in malaria control programs in this work have already been reported by some authors in Africa (5–11) demonstrating the real difficulties for which solutions must be found in order to successfully implement programs.

In regards to research questions in our work, there is an urgent need for information on seasonal chemo-prevention in order to better implement it in malaria control and elimination, how to better involve communities in the fight against the disease, both community health workers and the general population in both programs.

The research questions on SMC seem justified, in line with a review of the strategy studies that pointed out that there is little implementation research that would have answered the questions about implementation strategy highlighted in this survey in the three countries. The majority of the research conducted was clinical studies of the effectiveness of the strategy. A few studies conducted in Africa (12–16) already provide some answers to operational questions. More research should be pursued in the countries of the project.

Moreover, this work was designed to assess the implementation and operational bottlenecks and success, of public health intervention in West Africa, and the linkage between program implementing actors and African researchers, and the constraints they face in a specific context. Researcher, especially local researcher should work in coordination with program actor in order to delivers appropriate solution for local problems. The New Partnership for Africa's Development (NEPAD)'s Consolidated Plan of Action 2005–2014 (CPA) and the Science Technology Innovation Strategy 2024 (17) attempted to have the continent's collective commitment towards an innovation-led knowledge development. It recognized that science and technology had to be produced and used to solve local African problems. Evidence base research intervention is often required by donors and governments in order to improve the implementation of public health activities.

The landscape of global health keeps on changing and as new innovation and new discovery in technology and emerging diseases (infectious and non-communicable). New discoveries either technically or "process, bring with it new grey area and non-known areas in implementing public health intervention. Consequently, evidence based is constantly evolving as well and need research. However Hassan (18) pointed out that there is harsh reality for many developing countries; whatever research expertise they may have, they are largely invisible and insignificant with the context of globalization, a context dominated by the North. In addition, Southern partners (especially developing countries) have generally identical social burdens and environmental conditions (19), therefore there is a need to increase the proportion of intra-regional collaboration.

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Declarations

There's no financial/personal interest or belief that could affect objectivity of the authors.

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“Not applicable”

Consent for publication

“Not applicable”. All Authors reviewed the contents and consented before publication

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Tables

Table 1: Bottlenecks in MALARIA program implementation in West Africa

Theme	Malaria
governance,	· Difficulty of access to information from some partners · Inadequate collaboration system with the private, para-public and religious communities at the district and regional levels. · Inadequate capacity for management and coordination of control at the regional and district levels. · What is the efficiency of the implementation of SMC strategy? · Low availability of funds to support program management activities · Weak cross-border collaboration and networking · Difficulty in delimiting partners' intervention zones
Human resources	· Lack of, low capacity, mobility · Lack of adequate Motivation · Lack of a career plan · Inadequate design capacity at the program level
Drugs	· Out of stock (management) · Low completeness and data quality · Low storage capacity (districts, sites) · Low follow-up of efficiency and resistance · Lack of SP(Sulfadoxine Pyrimethamine) · Low adverse reaction reporting · Weak quality control · Counterfeit medicines
Service provision	· Absence of initial treatment prior to transfer of severe malaria case · What outcome for tablets left to the parents after 1st SMC distribution? · Insufficiency of direct observed Sulfadoxine Pyrimethamine treatment · Organizational deficiency ANC(ante natal care) · Low coverage of pregnant women with IPT2 /3 at ANC · o Insufficient funding for LLIN EC campaign and operational costs) · Insufficient compliance with guidelines · Insufficient coverage of services

Use of prevention methods	· Non-optimal use of LLINs, IPT · Absence of insecticides for impregnating curtains · Ignorance of the population's perceptions of the use of LLINs · Low utilization/late attendance of ANC for IPT/SP · Insufficient mechanism for monitoring home dosing · Insufficient coverage of services
Monitoring and evaluation	· Community and private data · Availability, quality, completeness, timeliness and archiving of data · Inadequate supervision · Insufficient dissemination of research results · Lack of data on mortality due to malaria · Weak monitoring system
Public support or buy-in	· Insufficient adoption of behaviors in favor of the fight · Insufficiency, reluctance, Non-adherence to the 02 home doses of the SMC by some parents · Fixed strategy disavowed by some parents, door-to-door preference as for NIDs(national Immunization Days)

(b) Research issues related to the malaria control program

Table2: Priority research questions on malaria programme in West Africa

RANK	RESEARCH QUESTIONS	JUSTIFICATIONS
1	What are the factors that influence adherence to Day 2 and Day 3 doses during SMC?	Ongoing strategy and insufficient data and monitoring of compliance with 2nd and 3rd doses in the community.
2	What is the contribution of Community Drug Distributors in the management of severe malaria cases in children under five years of age as part of pre-transfer treatment?	Inadequate pre-transfer treatment of severe malaria which delayed treatment
3	What is the most effective for seasonal malaria chemo-prevention strategy?	For a good implementation of SMC campaigns
4	How effective and tolerable are ACT(artemisinin-based combination therapy)under actual conditions of use?	Insufficient data on the efficacy and tolerability of ACTs under actual conditions of use.
5	What is the quality of malaria management at different levels of the health system?	Insufficient quality data on the management of malaria in health facilities, poor estimation of malaria cases
6	What are the adverse effects of antimalarial drugs (ACT, SP-QA)? [sulfadoxine–pyrimethamine (SP) + amodiaquine (AQ]	Insufficient documentation on the pharmacovigilance of antimalarial drugs in mass use (mass distribution) : toxicological effects especially hepatic.
7	How effective are insecticides in long-lasting insecticidal nets (LLINs) in vector control?	Lack of updated efficacy data on insecticides used in LLINs
8	What are the communication channels, supports and strategies that induce the most behavior change?	Slow behavioral change
9	What are the factors for non-use of LLINs in vector control?	Low level of public support for the use of LLINs
10	What is the performance of input supply chain systems?	Stock-outs, insufficient rational management of medicines.
11	What is the quality of the inputs/supply?	Circulation of counterfeit medicines, treatment failure, difficulty of diagnosis
12	What is the diagnostic performance of RDTs at the facility level?	Little is known about the performance of real-world/real-time RDTs (Rapid Diagnostic Test)
13	How effective are the medicines used in traditional medicine in the of malaria case management at the community level?	High use of traditional medicine by the population, low collaboration between traditional and modern medicine
14	What part NICT (new information and communication technology) has in the management of quality data?	Low level of completeness, timeliness and archiving

15	What is the level of morbidity and mortality attributable to malaria?	Evaluating the impact of control programs
16	Can CHWs contribute to improving the supervised administration of IPT-2 and IPT-3?	Low coverage of IPT-2 and IPT-3?
17	What system of collaboration should be put in place between Ministry of Health and other partners?	Insufficient coordination of activities.
18	What is the level of use and effectiveness of IRS (Indoor Residual Spraying) for malaria prevention at the community level?	Insufficient data on its efficiency
19	How effective is the mosquito repellent soap developed in Burkina Faso as part of a multicenter study?	Contributing to the search for alternative means of prevention to LLINs
20	What is the feasibility and effectiveness of impregnating nets with two insecticides?	Development of new means of vector control limiting the spread of resistance of malaria vectors
21	What is the comparative advantage of the Dihydroartemisinin(DHA)-Piperazine combination over SP-AQ?	Search for an alternative to SP-AQ as part of the SMC.

Table 3: Priority research questions on malaria program in West Africa by domains

RANK	RESEARCH QUESTIONS	JUSTIFICATIONS
GOUVERNANCE		
1	What is the most efficient strategy (door-to-door, cluster sites...) for seasonal malaria chemo-prevention?	For a good implementation of SMC campaigns
2	What is the quality of malaria management at different levels of the health system?	Insufficient quality data on the management of malaria in health facilities, poor estimation of malaria cases
3	What part NICT (new information and communication technology) has in the management of quality data?	Faible niveau de complétude, de promptitude et d'archivage.
4	What system of collaboration should be put in place between Ministry of Health and other partners?	Insufficient coordination of activities
HUMAN RESOURCES		
1	What is the contribution of Community Drug Distributors in the management of severe malaria cases in children under five years of age as part of pre-transfer treatment?	Inadequate pre-transfer treatment of severe malaria which delayed treatment
2	Can CHWs contribute to improving the supervised administration of IPT-2 and IPT-3?	Low coverage of IPT-2 and IPT-3?
DRUD/malaria medicines		
1	How effective and tolerable are ACT (artemisinin-based combination therapy) under actual conditions of use?	Insufficient data on the efficacy and tolerability of ACTs under actual conditions of use.
2	What are the adverse effects of antimalarial drugs (ACT, SP-QA)? [sulfadoxine–pyrimethamine (SP) + amodiaquine (AQ]	Insufficient documentation on the pharmacovigilance of antimalarial drugs in mass use (mass distribution) : toxicological effects especially hepatic effects .
3	How effective are the medicines used in traditional medicine in the of malaria case management at the community level?	High use of traditional medicine by the population, low collaboration between traditional and modern medicine
4	What is the comparative advantage of the Dihydroartemisinin(DHA)-Piperazine combination over SP-AQ?	Search for an alternative to SP-AQ as part of the SMC.
SERVICE		
1	What is the quality of the inputs/supply?	Circulation of counterfeit medicines, treatment failure, difficulty of diagnosis
2	What is the performance of input supply	Stock-outs, insufficient rational

	chain systems?	management of medicines.
PREVENTION		
1	How effective are insecticides in long-lasting insecticidal nets (LLINs) in vector control?	Lack of updated efficacy data on insecticides used in LLINs
2	What are the factors for non-use of LLINs in vector control?	Peu d'adhésion des populations dans l'utilisation des MILDA.
3	What is the level of use and effectiveness of IRS (Indoor Residual Spraying) for malaria prevention at the community level?	Insufficient data on its efficiency
4	How effective is the mosquito repellent soap developed in Burkina Faso as part of a multicenter study?	Contributing to the search for alternative means of prevention to LLINs
5	What is the feasibility and effectiveness of impregnating nets with two insecticides?	Development of new means of vector control limiting the spread of resistance of malaria vectors
MONITORING AND EVALUATION		
1	What are the factors that influence adherence to Day 2 and Day 3 doses during SMC?	Ongoing strategy and insufficient data and monitoring of compliance with 2nd and 3rd doses in the community.
2	What is the diagnostic performance of RDTs at the facility level?	Little is known about the performance of real-world/real-time RDTs (Rapid Diagnostic Test)
3	What is the level of morbidity and mortality attributable to malaria?	Evaluating the impact of control programs
POPULATIONS Adherence/buy-in		
1	What are the communication channels, supports and strategies that induce the most behavior change?	Slow behavioral change

Table 4: Countries programming priority research questions on malaria

Countries	Priority issues MALARIA
Burkina Faso	What is the most efficient strategy (door-to-door, cluster sites...) for seasonal malaria chemo-prevention (SMC) ?
	What are the factors that influence adherence to Day 2 and Day 3 doses during SMC?
	What is the role of CHW in the supervised administration of IPT2 and IPT3 in pregnant women?
Mali	What are the factors that influence adherence to Day 2 and Day 3 doses during SMC campaign?
	What are the adverse toxicological effects of multiple administration of antimalarial drugs, SP-QA)? [sulfadoxine–pyrimethamine (SP) + amodiaquine (AQ] in children
	What is the impact of communication interventions on the adoption of behaviors favorable to the fight against malaria?
Niger	What are the factors that influence adherence to Day 2 and Day 3 doses during SMC campaign?
	Quelle est l'efficacité thérapeutique de l'AQ+SP ?
	What is the therapeutic effectiveness of QA+SP?
	What is the role of CHW in the supervised administration of IPT2 and IPT3 in pregnant women?