

Innovative strategies to be engaged as Sahel countries eye malaria elimination

Eight Sahel countries have signed up to defeat malaria. Professor William Brieger assesses the challenges and possibilities.

Eight countries in the Sahel region of West Africa are embarking on a joint venture known as the Sahel Malaria Elimination Initiative (SaME). They are mirroring a similar effort known as the Elimination Eight by eight countries in the southern African region. These efforts are bolstered by a 2017 malaria elimination framework document by the World Health Organization¹ that is intended

‘to provide malaria-endemic countries with a framework for malaria elimination. It gives guidance on the tools, activities, and dynamic strategies required to achieve interruption of transmission and to prevent re-establishment of malaria. It also describes the process for obtaining WHO certification of malaria elimination. The framework is meant to serve as a basis for national malaria elimination strategic plans and should be adapted to local contexts. The document emphasises that all countries should work towards the goal of malaria elimination, regardless of the intensity of transmission.’

The Roll Back Malaria (RBM) Partnership announced in Dakar on 31 August 2018 that the health ‘ministers from Burkina Faso, Cabo Verde, Chad, Mali, Mauritania, Niger, Senegal and The Gambia established a new regional platform to combine efforts on scaling up and sustaining universal coverage of anti-malarials and mobilising financing for elimination.’² The group plans a fast-track introduction of ‘innovative technologies to combat malaria and develop a sub-regional scorecard that will track progress towards the goal of eliminating malaria by 2030.’ This will build on the existing country scorecard that has been developed and implemented by AMLA2030 for all countries in the region and tracks roll out of key malaria and health interventions. The Sahel Malaria Elimination Initiative will be hosted by the West African Health Organization, a specialised agency of the Economic Community of West African States (ECOWAS).

RBM explains that while the eight countries will work together, they do not have a homogenous epidemiological picture or experience with malaria programming. The Sahel experiences 20 million annual malaria cases, according to RBM, and ‘the Sahel region has seen both achievements and setbacks in the fight against

the disease in recent years.’ These eight have a highly variable malaria experience.³ Burkina Faso and Niger continue to be among the countries with high malaria burdens. Cabo Verde is on target for malaria-free status by 2020. The Gambia, Mauritania and Senegal are reorienting their national malaria programme towards malaria elimination. A benefit of this epidemiological and programmatic diversity is that countries can learn important lessons from each other.

This elimination effort is not starting from scratch as there is a history of regional collaboration. First there was a declaration in May 2013 wherein Chad, Gambia, Mali, Mauritania, Niger and Senegal were to accelerate the fight against malaria. Then, later that year, another declaration was signed by these six Sahelian countries that focused on pastoralism in the region but addressed issues of regional development, health and resilience.⁴

Subsequently the World Bank approved US\$248 million in development assistance ‘to boost regional integration and improve access to essential services, increase the income and strengthen markets for over 2 million pastoralists and agro-pastoralists across six Sahelian countries.’⁵ Access of pastoralists to essential services like malaria interventions is a challenge in the region and is lower than the general population. Although parasite prevalence has been found to be lower than expected among pastoralists, ‘National Malaria Control Programs are making efforts to improve access to malaria prevention and case management for nomadic populations.’⁶

The SaME Initiative will use the following main approaches to accelerate the combined efforts towards the attainment of malaria elimination in the sub-region:

- Regional coordination
- Advocacy to keep malaria elimination high on the development and political agenda
- Sustainable financing mechanisms
- Cross-border collaboration and ensuring accountability
- Fast-track the introduction of innovative and progressive technologies
- Re-enforcing the Regional regulatory mechanism for quality of malaria commodities and introduction of new tools.
- Establish malaria observatory, regional surveillance, and best practice sharing.

Collaboration across borders on vector control is an example of needed regional coordination. According to Thomson et al.,⁷ climate variations have the potential to significantly impact vector-borne disease dynamics

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Village health worker explains community malaria treatment, while the chief looks on.

at multiple space and time scales. Weather and climate information (past, present and future) may be used for operational vector programmes. They noted that in the Sahel 'the long decline in rainfall during the 1970s and 1980s contributed to the retreat of malaria in this region.' Then 'the return to a higher rainfall regime in the last two decades may have contributed to the re-emergence of *Anopheles funestus* to some areas, including Niger, after an absence of many years.'

Another challenge to vector control in the region is the issue of how mosquitoes repopulate areas after an extended dry season. Huestis et al. examined the response of *Anopheles coluzzii* and *Anopheles gambiae* to environmental cues in season change in the Sahel.⁸ They found that short photoperiod alone and to a lesser extent, lower nightly temperature (representing the early dry season), significantly increased longevity of *An. coluzzii* inducing aestivation ('hibernation' or dormancy). The additional research needed on vector is an example of the type of regional surveillance and coordination needed from SaME.

In addition to a history of cooperation, Sahelian countries share a unique malaria intervention, Seasonal Malaria Chemoprevention (SMC) that as the name

implies, built on the reality of highly seasonal transmission in the region. SMC grew out of over five years of research in several African settings to test the effect of what was originally termed Intermittent Preventive Treatment for Infants (and later children) or IPTi. In six trials in four countries as reported in *The Lancet*, 'IPTi had a protective efficacy of 30.3% (95% CI 19.8–39.4, $p < 0.0001$) against clinical malaria, 21.3% (8.2–32.5, $p = 0.002$) against the risk of anaemia, 38.1% (12.5–56.2, $p = 0.007$) against hospital admissions associated with malaria parasitaemia, and 22.9% (10.0–34.0, $p = 0.001$) against all-cause hospital admissions.' It took quite some time for the global community to determine what to do with these findings.

In March 2012 the Global Malaria Programme of the World Health Organization issued guidance that rebranded IPTi/c as SMC and targeted it for control of *Plasmodium falciparum* malaria in highly seasonal transmission areas of the Sahel sub-region in Africa. The intervention was defined as, 'The intermittent administration of full treatment courses of an antimalarial medicine during the malaria season to prevent malarial illness with the objective of maintaining therapeutic antimalarial drug concentrations in the blood throughout the period of greatest malarial risk.'

This move was preceded by regional meetings of national malaria control programmes in the region to discuss modalities as well as potential funding and technical partners. Like IPT for pregnant women, SMC would be given monthly for at least three months, but unlike IPTp, SMC would consist of a combination of two medicines, amodiaquine plus sulfadoxine-pyrimethamine (AQ+SP), which required a three daily doses (SP alone as used in IPTp consists on one dose). SMC could not therefore, be delivered effectively as a clinic-based intervention, but 'should be integrated into existing programmes, such as Community Case Management and other Community Health Workers schemes.'

Access to SMC by pre-school aged children as delivered by CHWs was found to be more equitable than sleeping under an LLIN. SMC has been recommended for school-age children, a neglected group that bears a substantial burden of malaria.

Considering school aged children, Maccario and colleagues piloted a comprehensive school-based intervention strategy, delivered by teachers, that included participatory malaria educational activities, distribution of long-lasting insecticide-treated nets (LLIN), and Intermittent Parasite Clearance in schools (IPCs) in southern Mali. The strategy was both feasible and affordable and is an example of a pilot intervention that SaME could expand to scale in the region.

Coldiron, Von Seidlein, and Grais observed that, 'SMC is not free of shortcomings. Its target zone includes many hard-to-reach areas, both because of poor infrastructure and because of political instability.' They see the need for 'scaled up, integration into a broader, community-based paradigm which includes other preventive and curative activities.' This is something the SaME group should plan.

Surveillance is another collaborative venture required of SaME members. As Tourre et al. reported, the



Mali: village side stagnant water lasts until well into the dry season

'discovery of a significant link between malaria risk and low-frequency rainfall variability related to the Atlantic Multi-decadal Oscillation (AMO). This result is critical for the health information systems in this region. Knowledge of the AMO phases would help local authorities to organise preparedness and prevention of malaria.'

Closely linked to surveillance is modeling the spatial and temporal variability of climate parameters, which is crucial to tackling malaria in the Sahel. This requires reliable observations of malaria outbreaks over a long time period. To date efforts are mainly linked to climate variables such as rainfall and temperature as well as specific landscape characteristics. Other environmental and socio-economic factors that are not included in this mechanistic malaria model.

The Sahel Malaria Elimination initiative offers a unique collaborative opportunity for countries to improve on the quality of proven interventions like SMC and test and take to scale new strategies like school-based malaria programmes. Regional coordination can produce better, timelier and longer-term surveillance and better understanding of and actions against malaria vectors. Readers will surely be anticipating the publishing of the regular progress malaria elimination scorecards as promised by SaME leadership.

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