

Implementing a quality-assured genomic data and sample collection system in Mozambique

Detecting antimalarial drug resistance, gene deletions and genetic diversity of *Plasmodium falciparum*

Background

Mozambique has the fourth-highest malaria burden globally, accounting for 4.2 percent of cases and 3.8 percent of malaria-related deaths.^[1] Within the country, the disease is the leading cause of morbidity and mortality, responsible for 10 million confirmed cases and 23,766 deaths in 2020, with children under five and pregnant women most at risk.^[1,2] To control malaria, the country's National Malaria Control Programme (NMCP) has identified surveillance system strengthening as one of six objectives in the 2017–2022 National Malaria Strategic Plan.^[3]

Surveillance helps to generate data that can be used to assess the effectiveness of malaria control strategies. Malaria Consortium is currently working with the NMCP to set up a high-resolution surveillance system that can inform decision-making by strengthening routine data quality, data use and data-to-action packages.

Genomic data — i.e. the DNA data of organisms — constitute an important addition to routine surveillance. These data can be used to identify the relationship between the malaria parasite, its population structure and malaria transmission intensity, thereby guiding programmatic decisions around reducing the burden of malaria. However, genomic capacities remain low in Africa, and in Mozambique in particular.

Country

Mozambique

Donor

Bill and Melinda Gates Foundation, through Fundação Manhiça

Length of project

March 2021 – February 2024

Partners

Barcelona Institute for Global Health (ISGlobal)
Centro de Investigação de Saúde de Manhiça
Ministry of Health, Mozambique
National Malaria Control Programme

Project outline and objectives

Between 2021 and 2024, with support from the Bill & Melinda Gates Foundation through Fundação Manhiça, we are collaborating with project partners to implement a functional malaria molecular surveillance system in health facilities across Mozambique. The GenMoz project will be carried out across 13 districts within 7 provinces, which have been chosen for their diverse (low and medium-to-high) transmission strata and settings (in terms of geography, climate, demographic characteristics and malaria control intervention types).

The study selected three main target groups: members of the general population, children 2–10 years and pregnant women attending their first antenatal care (ANC) consultation.

The project seeks to guide decision-making related to malaria control and elimination by monitoring the genetic markers of the *Plasmodium falciparum* parasite that indicate resistance to antimalarial drugs and diagnostics. Diagnostic resistance (deletions) refers to instances where *P. falciparum* parasites lack a particular gene and are, therefore, nearly undetectable by malaria rapid diagnostic tests.

The specific project objectives are to:

- develop data collection and analysis capacities for genomic data and surveillance among NMCP and health facility personnel in Mozambique to enhance detection and treatment of malaria infections
- create a catalogue of genomic data and epidemiological information to facilitate generation, visualisation and analysis of data.

Activities

Together with the NMCP, as well as health personnel at the health facilities and antenatal care consultations, we will:

- coordinate with Centro de Investigação de Saúde de Manhiça to develop a research protocol outlining sample collection procedures for field activities; the protocol will also be used obtain ethical clearance

- identify health workers and ANC consultation technicians for training and lead two rounds of training activities
- conduct data and sample collection in the project health facilities and ANC consultations, along with regular monitoring and supervision visits to oversee data collection activities in the health facilities and ensure quality of implementation
- lead the integration of genetic data into the country's integrated malaria information storage system (iMISS) to support the analysis, visualisation and generation of actionable data
- develop a data-to-action plan/integration of genomic approaches into NMCP plans
- establish and support a research uptake coordination committee of stakeholders to facilitate the presentation of research findings to relevant groups for policy uptake
- produce and disseminate learning, research and policy outputs at the local and national level.

Learning

Key learning outcomes will be determining:

- the prevalence of antimalarial drug and diagnostic resistance mutations in different malaria transmission areas in Mozambique (including any changes between years of implementation)
- the distribution (map) of the molecular markers for diagnoses and antimalarial drug resistance in the country
- whether malaria molecular indicators obtained from a sentinel study population (pregnant women attending ANC clinics) are similar to those obtained from clinical cases of all ages accessing health services.



References

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3. NMCP. Malaria strategic plan 2017–2022: For a malaria-free Mozambique. Mozambique: Ministry of Health; 2017. Available from: https://pdf.usaid.gov/pdf_docs/PA00W8CM.pdf.

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Cover image: Lab technician washes arrays used in genome-wide association studies.

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