

A photograph of four construction workers on a site. They are wearing blue hard hats and work clothes. One worker in the center is wearing a yellow tank top and grey pants, leaning on a rebar. Another worker on the right is wearing a blue jumpsuit and is working with a rebar. The background shows a construction site with yellow rebar cages, a body of water, and buildings under a blue sky with white clouds.

# Decision-making in the built environment as a public health intervention for malaria control — BEDMAC

## Connecting knowledge to understand the risks of malaria transmission in a changing climate

### Background

According to World Health Organization (WHO) estimates, malaria causes more than 200 million cases and over 600,000 deaths every year.<sup>[1]</sup> Most cases are in Africa and >80 percent of the deaths are among children under five years old. Malaria risk is influenced by interacting social, economic and environmental factors, including inadequate living conditions, poor socioeconomic development and extreme weather events. Climate change and rapid urbanisation in malaria-endemic countries are exacerbating malaria risk in ways that are poorly understood. Research into the multisectoral nature of malaria risk and the compounding effects of climate change and urbanisation has been limited.

To encourage a move towards a more comprehensive, coordinated and multipronged approach, the WHO/UN HABITAT multisectoral working group developed a conceptual framework for malaria control in urban environments.<sup>[2]</sup> Malaria Consortium is collaborating with Penn State University in the US and academic institutions/researchers in Panama and Africa to translate this framework into action. Transdisciplinary research looking at how climate change influences the root causes of malaria beyond the health sector will inform the development of built environment solutions that align with public health goals to strengthen urban malaria control in a changing climate.

### Country

Global

### Funders

National Science Foundation (US NSF)  
United Kingdom Research and Innovation — Natural Environment Research Council (UKRI NERC; funding source for Malaria Consortium)

Future Earth (FE)

Inter-American Institute (IAI)

### Length of project

August 2024 – July 2027

### Partners

Architectural Association of Kenya (AAK)  
Ardhi University, Tanzania  
Climate Central, US  
Global Council for Science and the Environment, US  
Higher Institute of Science and Technology of Mozambique (ISCTEM)  
Kenya Medical Research Institute (KEMRI)  
Ministry of Health Uganda  
Nigerian Institute of Medical Research (NIMR)  
Panamanian Foundation for Sustainable Tourism (APTSO)  
Penn State University, US  
University of Warwick, UK

## Project outline and objectives

The BEDMAC research project aims to build and validate transdisciplinary, cross-continental knowledge on the connections between climate, health and the built environment that can be linked to the risk of malaria transmission in a changing climate. By evaluating the interplay between the biophysical, human and technological factors that influence malaria transmission risks in Kenya, Mozambique, Nigeria, Panama, Tanzania and the US, this project will underpin the development of transformative disease management strategies related to the built environment that are replicable and scalable.

Project objectives:

- Understand local climate-related health threats and develop effective adaptation and mitigation strategies.
- Assess potential impacts of future compounding and cascading climate change events on malaria and other climate-sensitive health outcomes over different timescales.
- Perform intersectional analyses to evaluate differential malaria risks, existing and compounding vulnerabilities, and the impacts of climate change on vulnerable populations.
- Explore the potential direct or indirect health co-benefits, risks or unintended consequences of climate change mitigation and adaptation measures for individuals and communities, including how these may affect determinants of health and malaria risk.
- Develop and validate a decision support tool and implementation science framework that can be used to evaluate and improve the design of the physical and built environment. Implement physical and behavioural changes to adapt to and mitigate risk, enhance the built environment and improve malaria prevention.

## Activities

The project steering committee co-hosted a visioning and agenda-setting workshop to determine the actors and institutions involved in decision-making systems, possible built environment interventions and the theories of change behind them.

## References

1. World Health Organization (WHO). World malaria report 2025. WHO; 2025.
2. WHO, UN-HABITAT. Global framework for the response to malaria in urban areas. 2022. Available from: [www.who.int/publications/i/item/9789240061781](http://www.who.int/publications/i/item/9789240061781)

During a kick-off workshop, the project team identified common patterns in multinational comparative case studies. The research team are using these to identify macro-scale processes that inhibit equitable deployment of built environment interventions, to reduce/prevent malaria at the community level. Malaria Consortium's Jane Achan, Principal Technical Advisor, is supporting the incorporation of responses to climate-related risks into malaria programming.

Stakeholder engagement workshops and participatory research with communities will be carried out to define performance targets for local, health-focused adaptation strategies that are effective for community resilience.

A [project website](#) is providing a platform for internal and external communication, actively promoting project results, partnership opportunities and public awareness.

The project team will produce, test and evaluate open-access toolkits and decision support tools for use by built environment professionals.

## Outcomes and impact

The BEDMAC project contributes to the alignment of urban development with climate change responsiveness, while unlocking human health and wellbeing outcomes. Ultimately, this will mean fewer indoor mosquito bites and larval habitats in pilot areas, leading to a lower incidence of malaria, alongside heat-stress and respiratory co-benefits.

**Shift to a preventive and developmental approach in tackling malaria.** Accurate and reliable data will help key decision makers better understand, monitor and design interventions across sectors.

**Alignment of urban planning policy with climate change responsiveness and malaria prevention.** The outputs and outcomes of the research will underpin a decision support framework that can be integrated within built environment regulations at local, regional and national levels within malaria-endemic countries.

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
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