

At the Edge of Elimination: Malaysia's Malaria Journey in a Zoonotic Era

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Malaysia stands on the brink of a landmark public health success: the elimination of human malaria. From a peak of over 50,000 indigenous cases in the 1990s, the country has reported zero human malaria cases since 2018 - a trend sustained through 2022. This achievement reflects decades of strategic planning, innovation, and political commitment (World Health Organization [WHO], 2022). As Malaysia nears WHO certification for the elimination of the four main human species - *Plasmodium falciparum*, *P. vivax*, *P. malariae* and *P. ovale* - a new challenge emerges: the zoonotic transmission of *P. knowlesi*, now the predominant cause of malaria in the country (Cooper et al., 2020).

This editorial examines Malaysia's journey to malaria elimination, highlighting its integrated strategies, emerging challenges, and the imperative to rethink certification in the era of zoonotic malaria.

A Program Anchored in Integration and Innovation

Malaysia's malaria control program - spearheaded by the Vector-Borne Disease Control Division (VBDCD) under the Ministry of Health (MOH) - has evolved through phases of control, pre-elimination, and now elimination (MOH Malaysia, 2023). The national strategic plan emphasizes integrated vector management, case-based surveillance, and targeted interventions.

Innovations such as the real-time e-notification system and the Malaria Information System within the VEKPRO platform have strengthened surveillance, enabling rapid detection and response, even in remote and indigenous communities.

A key strength of Malaysia's approach lies in intersectoral collaboration. Partnerships between the Sabah State Health Department, the commercial agriculture sector, and the Sabah State Government's Forest Management Division have been crucial in mitigating cross-sectoral transmission risks.

Community engagement has also been instrumental. Grassroots initiatives such as Primary Health Care Volunteers in Sabah, Village Health Representatives in Sarawak, and Malaria Ambassadors in Peninsular Malaysia have supported surveillance, case detection, and vector control. The deployment of mobile teams targeting high-risk groups such as the Orang Asli and migrant workers, demonstrates a people-centered, equity-driven approach.

Zoonotic Malaria: The Next Frontier

While indigenous human malaria has been largely eliminated, *Plasmodium knowlesi*, a simian parasite transmitted from macaques via *Anopheles leucosphyrus* mosquitoes has emerged as a major public health concern, especially in Malaysian Borneo (Grigg et al., 2018). Unlike human-only malaria parasites, *P. knowlesi* cannot be eliminated through conventional human-targeted interventions.

Malaysia has responded by embracing One Health approaches that integrate human, animal, and environmental health. Current efforts include ecological risk mapping, community engagement in forest fringe areas, and operational research into personal protection and vector behavior (Wong et al., 2022). However, policy frameworks and funding structures remain centered on human malaria, highlighting the need for strategic realignment.

Certification in the Era of Zoonoses: A Call for Nuance

Despite meeting all prior criteria for elimination, Malaysia's certification has been delayed due to WHO's updated requirement: a "negligible risk" of zoonotic transmission (WHO, 2023). This poses a unique challenge for countries like Malaysia, where *P. knowlesi* though lacking sustained human-to-human transmission, remains entrenched in natural transmission cycles involving wildlife and sylvatic vectors (Singh & Daneshvar, 2013).

Expecting countries to demonstrate control over zoonotic reservoirs and forest-dwelling vectors shifts the burden from malaria elimination to broader ecological control, blurring the line between disease-specific certification and environmental health.

While *P. knowlesi* must be addressed through integrated strategies, penalizing countries for zoonotic malaria may set an unrealistic precedent. A revised certification framework is needed, one that recognizes the elimination of human malaria while supporting ongoing zoonotic control through a One Health lens.

Conclusions

Malaysia's malaria program exemplifies health system resilience, intersectoral coordination, and innovation. The elimination of human malaria is a milestone worth celebrating. Yet, the persistence of *P. knowlesi* demands sustained vigilance and a broader, integrated approach. As Malaysia navigates this evolving epidemiological landscape, it offers a model for the region and a compelling case for updating global malaria elimination frameworks.

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