

Asia's invisible malaria

Malaria in Asia is a pervasive and diverse problem with about 2 billion people at risk.¹

Although *Plasmodium falciparum* and *Plasmodium vivax* account for the vast majority of clinical attacks in Asia, all four human plasmodia occur, as do zoonoses involving plasmodia of southeast Asian macaques,² and several dozen species of anopheline mosquito carry malaria in a wide variety of ecological niches.³ Despite the broad scope and complexity of the Asia malaria problem, it represents a small fraction of research endeavour and public funding in global malaria control efforts.^{4,5} This partly derives from quantitative WHO morbidity and mortality estimates that put less than 10% of the global burden in the region.⁶ But do the relatively large denominators of risk conceal more substantial burdens? In 2010, a *Lancet* paper by Dhingra and colleagues⁷ estimated that deaths attributable to malaria in India at 205 000 during 2006 compared with WHO's estimate of 15 000 in the same year.⁸ Many experts broadly criticised the verbal autopsy methods that underpinned the work of Dhingra and colleagues⁷ and suggested their estimates were inflated.⁹

Few experts dispute the epidemiological limitations of the WHO quantitative estimates of malaria morbidity and mortality, which amount to sums of confirmed cases and deaths reported by national malaria control programmes adjusted for surveillance systems of variable and often unquantifiable efficiency.¹⁰ The value of those estimates lies in the useful analysis of trends over time. In contrast, because level of endemicity and human population may be confidently measured, relatively robust estimates of the populations living at risk of unstable or stable endemic malaria are available from the Malaria Atlas Project and collaborators.¹¹ In Asia, people at risk of unstable *Plasmodium falciparum* malaria in 2010 exceeded African estimates by a factor of 23 (1·03 vs. 0·05 billion), whereas

roughly equal numbers of people lived under stable malaria transmission risk (0.66 in Asia vs 0.75 billion in Africa). The intense malaria transmission in much of sub-Saharan Africa may be considered the basis of its dominance in global morbidity and mortality estimates: in 2010 about 327 million Africans lived in places where *P falciparum* prevalence exceeded 40% in children aged 2–10 years compared with 16 million people in Asia.¹¹

Such intense malaria transmission, however, comes with a protective naturally acquired immunity that narrows vulnerability to threatening malaria to infants, small children, and pregnant women.¹² In a population sense, intense transmission does not exacerbate risk of severe malaria, but instead mitigates it. The converse might be true for Asia where low transmission dominates and all demographic groups are vulnerable. Finally, Dhingra and colleagues⁷ showed that 86% of deaths in India occurred beyond the reach of health-care systems providing diagnosis and reporting. These elements of probable substantial underestimation—broad vulnerability among large and isolated populations at risk—occur all across malarious Asia. The difference between actual and perceived malaria burdens in Asia, whatever number that may be, constitutes Asia’s invisible malaria burden. Effectively dealing with specific threats like artemisinin resistant *Plasmodium falciparum*¹³ will be challenged by emergence of such problems on a poorly understood epidemiological landscape.

Most malaria in Asia occurs among the rural poor living at the far edges of the profound economic progress of that region. They are often precisely, as Hay and colleagues⁹ expressed, “invisible”, not only in that epidemiological sense but also in social terms. Thus both the lay and expert communities engaging the global malaria problem do not see those suffering what may be a mostly invisible problem. The Wellcome Trust and Oxford University’s Eijkman-Oxford Clinical Research Unit have collaborated with the photographer Pearl Gan to visually express the human face of malaria in southeast Asia. The See Malaria

in Asia Project [<http://asiamalariaimages.com/>] aims to raise public awareness of malaria as a serious health problem for the region. It will engage the lay public with planned exhibitions later this year in Jakarta, Singapore, Phnom Penh, and Ho Chi Min City. The project dispatched Pearl Gan to remote communities where endemic malaria sickens and kills people. A selection of photographs from this project are shown in a Perspectives feature in this issue.¹⁴ Pearl Gan captures much in her art—humanity, dignity, suffering. Her lens exposes the reality of the isolation and poverty that gives malaria such freedom of harm and constraint of human development.

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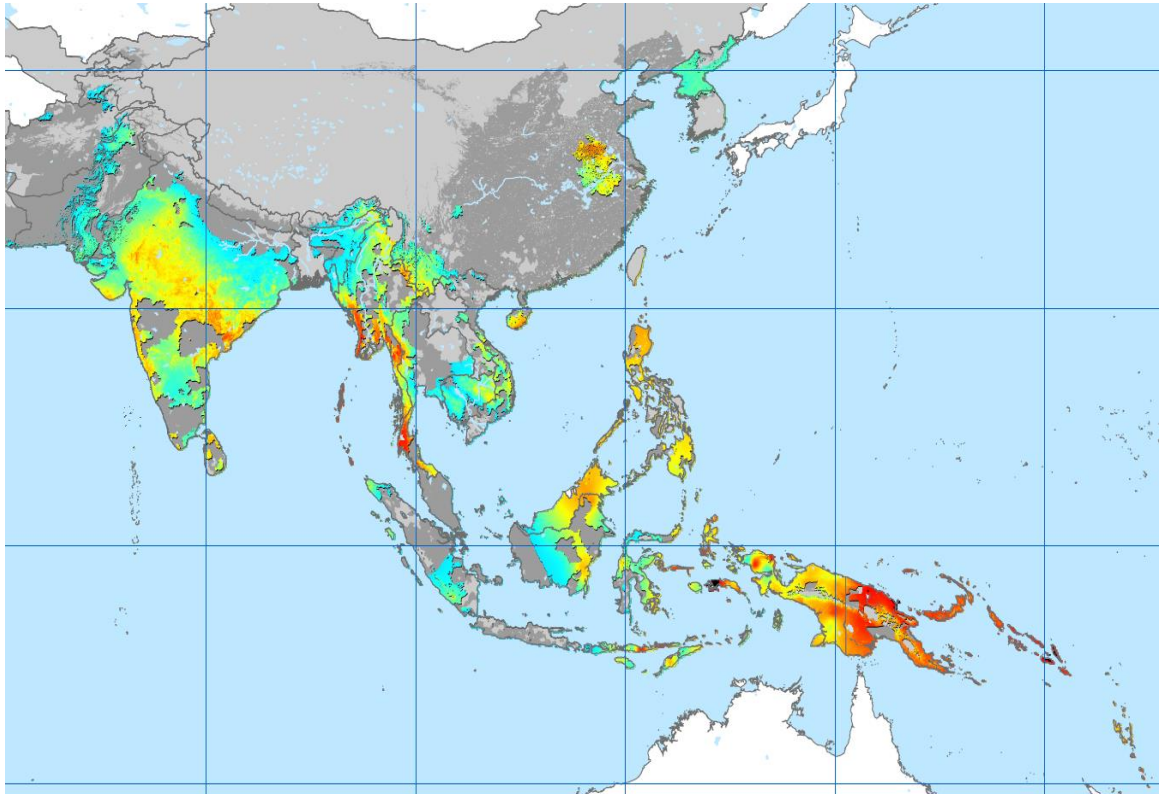


Figure: *Plasmodium vivax* endemicity in the Asia-Pacific region in 2010

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