COUNTRY BRIEFING

Eliminating malaria in MALAYSIA

Malaysia is pursuing spatially progressive malaria elimination and aims to eliminate nationwide by 2020.

Overview

Malaysia achieved a 71 percent reduction in reported malaria cases between 2000 and 2014, and is categorized in the pre-elimination phase by the World Health Organization (WHO). Intensive control efforts have reduced the incidence of *Plasmodium vivax* and *P. falciparum* in Malaysia; in 2014, *P. knowlesi* accounted for the majority of indigenous cases[1,2] *P. malariae* is also present in Malaysia and causes a small number of infections.[3]

About one-third (32 percent) of total malaria cases occur in Peninsular Malaysia, and the majority of these are found in the central, southeastern and northern coastal regions.[4,5] Mosquito vectors in peninsular Malaysia include *Anopheles maculatus*, *An. sundaicus*, *An. letifer*, *An. campestris*, and *An. dirus*.[6,7] The remaining 68 percent of cases are found in Malaysian Borneo, primarily the states of Sabah and Sarawak.[7] Primary mosquito vectors in Sabah are *An. balabacencis*, *An. sundaicus*, and *An. flavirostris*; in Sarawak, the vector ecology is slightly different and includes *An. donaldi* and *An. latens*.[4]

Young working males are the most at-risk population, and about half of Malaysians diagnosed with malaria reportedly work in agriculture and other outdoor labor. Other high-risk populations include indigenous groups, jungle workers, and immigrants from endemic countries. Malaysia has a large number of imported malaria cases, primarily from Indonesian and Filipino workers seeking employment in Malaysia's growing economy.[7,8]

Current successful practices of the malaria control program in Malaysia include 100 percent confirmatory testing of all suspected malaria cases, mandatory reporting of detected cases, integrated vector management, strong community participation in control activities, and a cadre of volunteer primary health care workers selected from the community and trained in malaria diagnosis and treatment.[9] Malaysia is a country partner of the Asia Pacific Malaria Elimination Network (APMEN), a network composed of 18 Asia Pacific countries and other stakeholders working together to eliminate malaria in the region. Malaysia is currently working to achieve national elimination by 2020.[10,11]

*At a Glance**[1,2]

3,157	Local cases of malaria
9	Deaths from malaria
4	% population living in areas of active transmission (total population: 29.9 million)
0.1	Annual parasite incidence (cases/1,000 total population/year)
0.2	% slide positivity rate

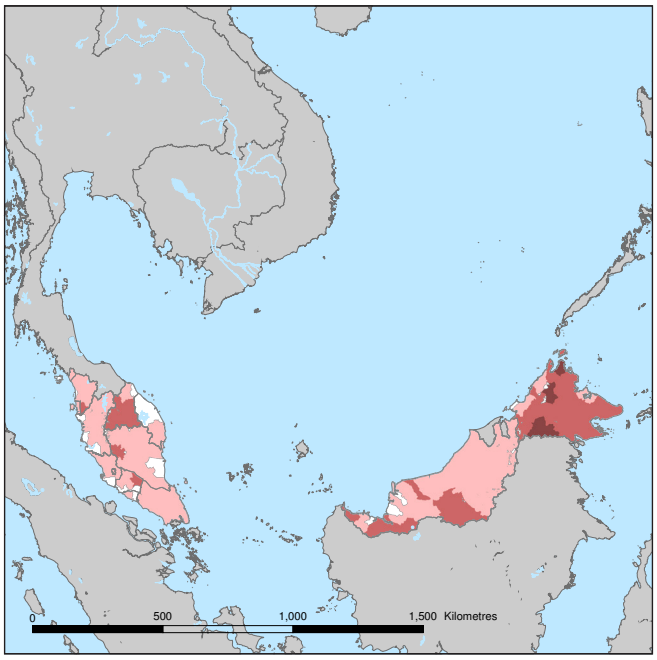
Progress Toward Elimination

Malaysia's malaria program is one of the oldest in the world. Environmental management techniques were implemented as early as 1901 and consisted of breeding site identification of malaria vectors and systematic attacks against mosquito larvae.[12,13] Anti-malaria campaigns were initially carried out in the politically and economically important coastal cities of Peninsular Malaysia, then known as Malaya. By 1911, a Malaria Advisory Board had formed, and control efforts expanded to other cities as well as to plantations and estates.[7] During the next decade, malaria control efforts were focused on decreasing the malaria disease burden in rubber plantation workers, and malaria deaths declined from 73 per 1,000 population in 1908 to 8 per 1,000 population by 1920.[14,15]

Environmental management techniques were the mainstay of the malaria control program in Peninsular Malaysia from the 1920s to the 1940s. A project to study methods for vector control in hyperendemic jungle settings began in

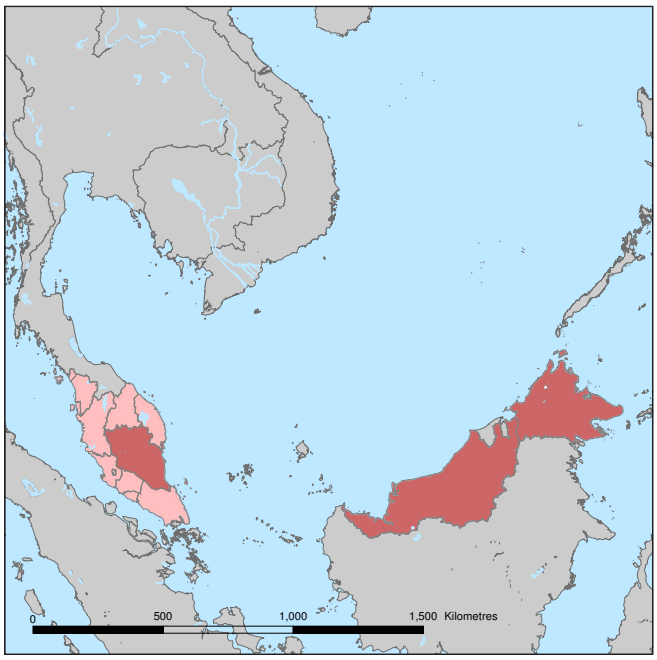
Malaria Transmission Limits

Plasmodium falciparum



Water
P. falciparum free
Unstable transmission (API <0.1)
Low stable transmission (0.1≥ API <1.0)
Stable transmission (≥1.0 API)

Plasmodium vivax



Water
P. vivax free
Unstable transmission (API <0.1)
Low stable transmission (0.1≥ API <1.0)
Stable transmission (≥1.0 API)

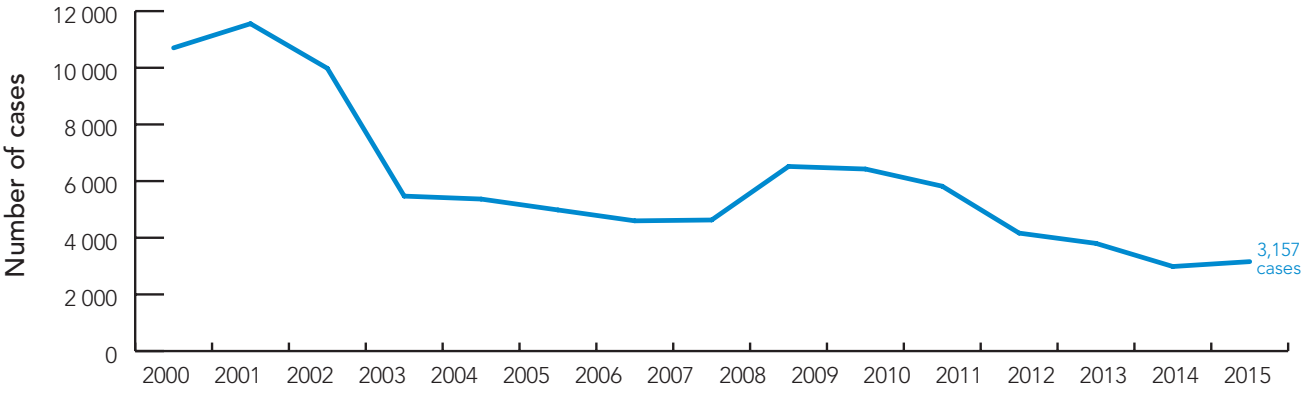
P. falciparum/P. vivax malaria risk is classified into no risk, unstable risk of <0.1 case per 1,000 population (API), low stable risk of ≥0.1 to <1.0 case per 1,000 population (API), and stable risk of ≥1.0 case per 1,000 population (API). Risk was defined using health management information system data and the transmission limits were further refined using temperature and aridity data. Data from the international travel and health guidelines (ITHG) were used to identify zero risk in certain cities, islands and other administrative areas.

Sabah, then known as North Borneo, in the early 1940s, but was interrupted by the Japanese invasion during World War II.[16] The project, known as the Tambunan Experiment, resumed from 1949 to 1952 and was pivotal in highlighting the importance of correct vector identification for control methods since different vectors vary in their breeding sites, biting habits, preferred habitats, and food sources.[16,17]

From 1960 to 1964, the Malaysian government carried out a successful malaria elimination pilot project in Sabah in collaboration with the WHO Global Malaria Eradication Program. Following the pilot, a malaria eradication program was formally implemented in Peninsular Malaysia in 1967, followed by implementation in East Malaysia in 1970. Over the next thirteen years, the number of malaria cases drastically decreased from 181,495 in 1967 to 44,226 in 1980. By 1980, malaria had been eliminated in many areas of Peninsular Malaysia, although cases were still high among ethnic minority groups and in Malaysian Borneo.[18]

Beginning in 1992, Malaysia focused on targeting high-risk populations, synchronizing prevention and control efforts across district borders, increasing surveillance, promoting community participation such as the training of health volunteers, scaling up vector control, and adopting rapid diagnostic testing and new treatment regimens for case management.[18] After an initial increase in incidence, likely attributable to improved laboratory diagnosis and reporting,

Reported Malaria Cases



Recent case reductions can be attributed to intensified surveillance among mobile populations.

Goals:[2,11] *1. Elimination of indigenous human malaria in East Malaysia (Sabah and Sarawak) by 2017*
2. National elimination of indigenous human malaria by 2020

the number of malaria cases in Malaysia steadily declined by 81 percent, from 59,208 in 1995 to 11,106 in 1999.[1]

The 95 percent decline in malaria cases since 1995 has been attributed to increased access to early diagnosis and treatment, nationwide distribution of insecticide-treated bed nets, and regular indoor residual spraying.[18] In 2011, the national malaria program strategy was reoriented from control to elimination, and the program is now working to eliminate malaria from West Malaysia by the end of 2015 and from East Malaysia by 2017. The National Malaria Elimination Strategic Plan 2011–2020 outlines seven key strategies to achieve these goals: 1) strengthen malaria surveillance system; 2) intensify control activities using integrated vector management; 3) ensure early detection of cases and prompt treatment; 4) heighten preparedness and early response to outbreaks; 5) enhance community awareness and knowledge of malaria through social mobilization; 6) strengthen human resources capacity; and 7) conduct operational research.[2,19]

Eligibility for External Funding[20–22]

The Global Fund to Fight AIDS, Tuberculosis and Malaria	No
U.S. Government's President's Malaria Initiative	No
World Bank International Development Association	No

Economic Indicators[23]

GNI per capita (US$)	$10,760
Country income classification	Upper middle
Total health expenditure per capita (US$)	$423
Total expenditure on health as % of GDP	4
Private health expenditure as % of total health expenditure	45

Challenges to Eliminating Malaria

Imported cases

In 2014, imported cases in Malaysia accounted for 20 percent of all cases in the country.[2] Many undocumented migrant workers from endemic countries come to Malaysia for employment opportunities, particularly in the states of Sabah and Sarawak where dam construction and plantation development has led to the clearance of forested areas, putting workers at great risk of exposure to malaria. Improved surveillance, collaboration with key industries and other government agencies, and cross-border cooperation with neighboring endemic countries are essential for addressing the ongoing threat of importation.[18,19]

Indigenous populations and forest malaria

Malaysia is home to many isolated indigenous tribal groups, some of which may not have the same level of access to health care as the rest of the population. Indigenous people frequently use traditional remedies before seeking care in a health facility, which can delay treatment. Many of these groups live within the forest or forest-fringe areas, where the vector ecology and transmission patterns of malaria present a unique challenge for vector control management.[24]

Increasing threat of *P. knowlesi*

The number of malaria cases due to the simian malaria parasite *P. knowlesi* has rapidly increased in recent years, particularly due to more frequent human access to forest inhabited by monkeys. However, relatively little is known about the geographical range, transmission patterns, and disease risk and severity associated with human *P. knowlesi* infections, which hinders the Malaysia malaria program's ability to prevent and manage this threat. More operational research and collaboration with other countries in Southeast Asia is necessary to determine the best interventions and approach to *P. knowlesi* elimination.[11,25]

Conclusion

Malaysia has a long history of successful malaria control and is now working toward a national goal of elimination by 2020. Effective vector control measures, a strong surveillance system, and access to early diagnosis and treatment along with the cooperation and collaboration with other agencies and neighboring countries in Southeast Asia are key to Malaysia's malaria program. With intensified focus on reducing *P. knowlesi* transmission in endemic areas of Malaysian Borneo and continued monitoring of importation, achieving the 2020 goal is very likely.

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Transmission Limits Maps Sources

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About This Briefing

This Country Briefing was developed by the UCSF Global Health Group's Malaria Elimination Initiative (MEI), in collaboration with the Vector Borne Disease Sector of the Malaysia Ministry of Health. To send comments or for additional information about this work, please email Anne.Bulchis@ucsf.edu.

UCSF Global Health Sciences
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The **Global Health Group** at the University of California, San Francisco is an 'action tank' dedicated to translating new approaches into large-scale action that improves the lives of millions of people. Launched in 2007, the UCSF Global Health Group's **Malaria Elimination Initiative (MEI)** works at global, regional, and national levels to accelerate progress toward malaria elimination in countries and regions that are paving the way for global malaria eradication. The MEI believes that global eradication of malaria is possible within a generation.

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map
malaria atlas project

The **Malaria Atlas Project (MAP)** provided the malaria transmission maps. MAP is committed to disseminating information on malaria risk, in partnership with malaria endemic countries, to guide malaria control and elimination globally.

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