



Eliminating malaria in THAILAND

Thailand achieved a 77 percent decrease in reported malaria cases between 2000 and 2014 and aims to eliminate malaria by 2024.

Overview

Reported malaria cases in Thailand declined by 77 percent between 2000 and 2014, from 159,120 to 37,209 cases.¹ During that same time period, deaths due to malaria decreased by 94 percent, from 625 to 38 deaths.² The primary vectors responsible for malaria transmission are *Anopheles dirus* and *An. minimus*, with *An. maculatus* becoming increasingly important due to deforestation.^{3,4} Thailand has two transmission peaks, from June to August and October to November, coinciding with the rainy season and a corresponding increase in density of the main vectors.⁵

The vast majority of annual malaria transmission occurs in the densely forested border regions with Myanmar to the west and Cambodia to the east, with minimal transmission occurring in the central provinces.⁶ The border area between Cambodia and Thailand has grappled with malaria drug resistance since the 1970s, and a high level of population movement along border areas has exacerbated the recent spread of multidrug resistant *Plasmodium falciparum*, which has the potential to become untreatable with currently available antimalarials within a matter of years.^{7,8} The populations at greatest risk for malaria are economic migrants and other mobile groups living and working in forested border areas.⁶⁻⁸

Beginning in the late 1990s, intensive vector control measures such as indoor residual spraying (IRS) and free distribution of insecticide treated nets (ITNs), along with improved access to personal protection measures for at-risk populations, have resulted in a marked reduction in malaria incidence.⁹ The Thailand National Malaria Programme launched a spatially-progressive malaria elimination strategy in 2011 with a goal of achieving elimination in 80 percent of the country by 2020.⁶

At a Glance^{1,2}

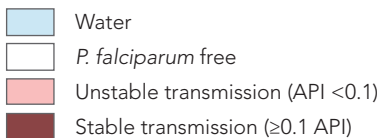
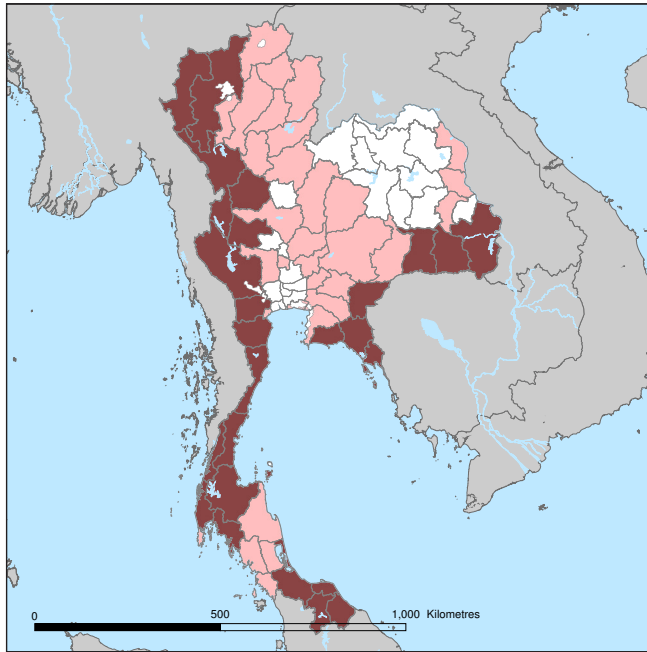
- 37,209** Total cases of malaria
(54% *P. vivax*)
- 38** Deaths from malaria
- 50** % of population at risk
(total population: 67.7 million)
- 0.56** Annual parasite incidence
(cases/1,000 total population/year)
- 2.2** % slide positivity rate

In 2016, the country declared a national malaria elimination goal of 2024 in its updated National Strategic Plan for Malaria Elimination 2017–2026.¹ Priorities under the latest strategic plan include (1) improved access and quality of treatment; (2) increased detection of symptomatic and asymptomatic malaria cases; (3) expanded coverage of malaria prevention measures including increased vector surveillance, vector control, and personal protection measures; and (4) the development of a system to eliminate drug resistant malaria parasites. This will be achieved by (1) collaborative national and regional surveillance; (2) the development of innovative technologies for malaria elimination; (3) partnerships among malaria elimination stakeholders at the national and international levels; and (4) community engagement.¹ Political support for the 2024 elimination goal is strengthened through Thailand's partnership in the Asia Pacific Malaria Elimination Network (APMEN), a network composed of 18 Asia Pacific countries and other stakeholders working to eliminate malaria in the region, as well as its involvement in the Asia Pacific Leaders Malaria Alliance (APLMA), which recently developed a roadmap for malaria elimination based on regional collaboration.^{10,11}

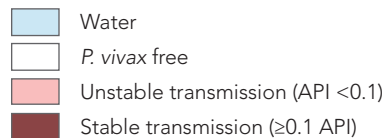
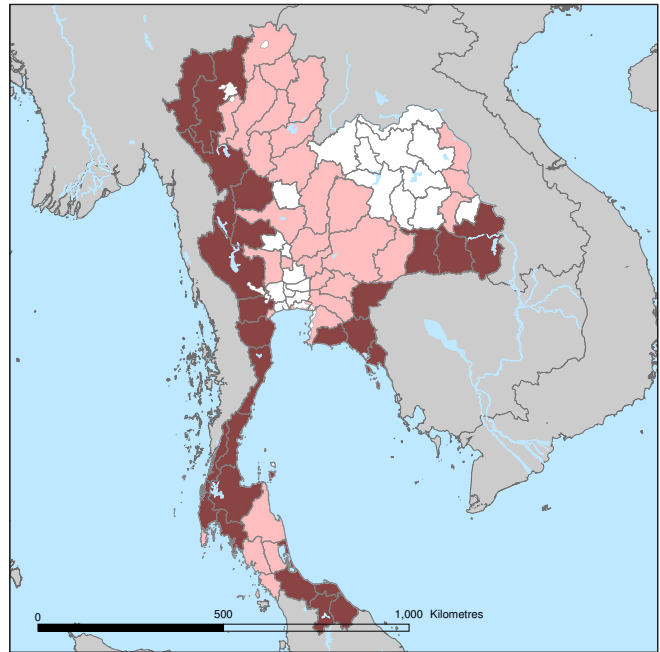


Malaria Transmission Limits

Plasmodium falciparum



Plasmodium vivax



P. falciparum/*P. vivax* malaria risk is classified into no risk, unstable risk of <0.1 case per 1,000 population (API) and stable risk of ≥0.1 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.

Progress Toward Elimination

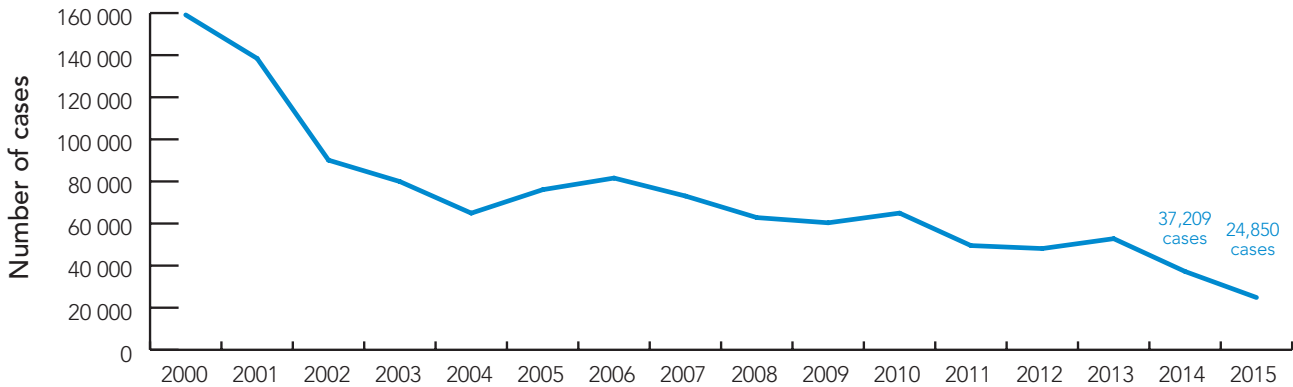
Early epidemiological data indicate that malaria has long been a significant health issue in Thailand. In 1943, Thailand established the country's first malaria unit in Chiang Mai Province; this unit was responsible for conducting malaria surveys and distributing the antimalarial drug, quinine.^{12,13} In 1947, malaria was a leading cause of death and the mortality rate was recorded at 300 deaths per 100,000 population.¹⁴ In 1949, with WHO and UNICEF support, Thailand implemented vector control activities in Chiang Mai to pilot indoor residual spraying (IRS) with the insecticide, DDT.¹⁵ Based on the success of these initial field trials and with support from the US Agency for International Development Assistance

(USAID), IRS with DDT was adopted for use throughout the country.¹⁵ By 1955, the control program covered 12 million people and in 1963 the malaria mortality rate dropped to 22.8 deaths per 100,000 population.¹⁶ In 1965, Thailand joined the World Health Organization's (WHO) Global Malaria Eradication Program (GMEP).¹⁵ In 1969, as a result of peak elimination operations in the country, the malaria mortality rate declined to 10.4 deaths per 100,000 population.¹³

Despite initial success, Thailand faced technical, financial, and operational challenges. After years of DDT spraying, malaria transmission declined but could not be interrupted.¹⁷ Deforestation and the implementation of large agricultural projects increased the rate of population movement in and



Reported Malaria Cases



There has been an overall downward trend of malaria since the year 2000. In 2013 an increase in cases was recorded—likely a result of more inclusive reporting.

Note: Includes both Thai-national and migrant case data

Source: Bureau of Vector-borne Diseases, Department of Disease Control, Thailand

- Goals:¹**
- 95% of districts eliminate malaria transmission by 2021
 - Thailand is free from malaria by 2024

around forest and forest fringe areas.¹³ Simultaneously, the increase in human movement and expansion of rural populations into these forest and forest fringe areas introduced *An. dirus* as a principle vector; *An. dirus* proved a more efficient and difficult to control vector than *An. minimus*.¹⁸ In a WHO report released in 1974, both vectors also began to showcase exophilic behavior, complicating vector control efforts.¹⁹ Chloroquine (CQ)-resistant *P. falciparum* was first detected in 1960 and became increasingly prevalent over the next ten years.^{13,20} In 1969, the global eradication goals were no longer considered realistic and the GMEP was discontinued. In 1970, after 20 years of financial assistance, USAID withdrew support for malaria eradication in Thailand.¹³

In 1971, the national program reoriented and adopted a new strategy that focused on malaria control, as opposed to elimination.¹⁶ In 1973, as a result of increasing *P. falciparum* resistance to CQ, Thailand was the first country to introduce sulphadoxine-pyrimethamine (SP) as a first-line drug treatment for uncomplicated *P. falciparum* cases.^{15,21,22} Despite the introduction of SP, malaria cases increased. By 1976, as a result of increasing financial and operational constraints, the

national program significantly reduced operations—including vector control activities.¹⁵ Subsequently, Between 1969 and 1980, malaria cases in Thailand increased from 63,721 to 395,442 cases.¹³

The next two decades were characterized by significant malaria epidemics along the borders with Cambodia, Lao People’s Democratic Republic, and Malaysia.²³ Additionally, increasing parasite resistance to SP and weakened IRS operations contributed to an increase in malaria cases nationwide of over 473,000 cases in 1981.^{13,15,23} Shortly thereafter, financial support from USAID and Japan International Cooperation Agency (JICA) strengthened malaria control efforts by primarily expanding malaria clinics throughout the country, with a particular focus on malaria endemic areas along national borders.²¹

In an effort to curb parasite resistance, presumptive treatment of malaria was discouraged and changes to the national drug policy followed.²¹ These efforts, combined with an overall decrease in imported cases, led to a rapid decline in cases.^{13,15} In 1995, in response to increasing drug resistance, artemisinin-based combination therapy (ACTs)



was introduced and the private sector was banned from selling antimalarial drugs.^{5,6} However, outbreaks and consistently high malaria rates along national borders continued to hamper control efforts.

In 1996, the national malaria control program shifted from a vertical to a semi-vertical program and was integrated into the Bureau of Vector-Borne Diseases (BVBD). This shift initially limited the financial and human resources available for malaria control activities which contributed to an increase in cases through 1998.¹⁵ In 2001, Thailand implemented universal health care (UHC).¹³ UHC in Thailand covers Thai nationals free of charge, and certain classes of documented migrants have the option to “opt in” to the insurance scheme.¹³

Thailand received its first grant from the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) in 2002 and a subsequent grant in 2007 to improve access to health care services for high risk groups, including undocumented and “mobile migrants.”^{13,24} In 2008, artemisinin resistance of *P. falciparum* was confirmed in Trat province near the south-eastern border with Cambodia.¹³ The global threat of *P. falciparum* resistance to artemisinin derivatives prompted regional and global action to contain resistance and eliminate *P. falciparum* in the Greater Mekong Subregion (GMS).^{6,7} In January 2009, the Bill & Melinda Gates Foundation (BMGF) provided emergency funding for an immediate two year project to contain resistance, followed by a \$66 million, five year Global Fund grant in 2011 that allowed Thailand to expand control measures to the Thai-Myanmar border.^{6,25,26} Thailand is vigilant against antimalarial drug resistance and in 2015 changed its first-line drug policy for *P. falciparum* due to increasing treatment failure.² Treatment failure with CQ for *P. vivax* has also been documented in Thailand and is being monitored.²

In 2011, Thailand formally committed to using a stratified approach to national malaria elimination. One of the major programmatic targets of the 2011 National Strategic Plan was to interrupt transmission in 60 percent of districts by 2016, which was achieved convincingly by 2013.^{6,27} In 2013, Thailand extended its national health care policy to include undocumented migrants by offering insurance for an annual premium.²⁸ An updated National Strategic Plan for Malaria Elimination 2016–2026 is currently in place and aims to:

- (1) eliminate malaria in 95 percent of districts by 2021;
- (2) decrease the API to 0.20 per 1,000 population by 2021;
- (3) reduce the malaria mortality rate to 0.01 per 100,000; and
- (3) to eliminate malaria in Thailand by 2024.¹

Eligibility for External Funding^{29–31}

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

*Thailand is expected to graduate from Global Fund Eligibility in 2017.

Economic Indicators³²

GNI per capita (US\$)	\$5,370
Country income classification	Upper middle
Total health expenditure per capita (US\$)	\$264
Total expenditure on health as % of GDP	5
Private health expenditure as % total health expenditure	20

Challenges to Eliminating Malaria

Multidrug drug resistance

In Thailand, the emergence of *P. falciparum* resistance to CQ (1960s), SP (1980–1990s), mefloquine (1990s) and, more recently, artemisinin derivatives (late 2000s), is a threat to national, regional, and global malaria elimination and eradication efforts.³³ In order to contain multidrug resistant *P. falciparum*, the WHO and other collaborators developed the Global Plan for Artemisinin Resistance Containment in 2011 and soon after the Strategy for Malaria Elimination in the Greater Mekong Subregion 2015–2030.^{7,34} The proposed strategy aims to eliminate malaria in the GMS by 2030, including the elimination of *P. falciparum* by 2025.⁷ Along with support from technical and implementing partners, regional initiatives were established to support the GMS in achieving the containment of *P. falciparum* resistance, including the WHO-led Response to Artemisinin Resistance in the Greater Mekong subregion (ERAR) and the Global Fund supported Regional Artemisinin Resistance Initiative (RAI).^{35,36} *P. vivax* resistance is also of increasing concern in



the region after CQ resistance has been documented as losing efficacy near the Thailand-Myanmar border.³³

Border malaria

Malaria transmission in Thailand is extremely focal but epidemiologically complex. In 2010, 90 percent of the total cases were in the 30 provinces with international borders.⁶ These provinces tend to be forest or forest fringe areas with efficient vectors, geographical disparities, multidrug resistance, and intensive population movement.³³ Mobile and migrant populations here tend to be exposed to malaria as a result of behavioral and occupational risks which increase susceptibility.³³ Furthermore, population groups on the Thailand-Myanmar and Thailand-Cambodia borders often live in remote, pocket villages and include dynamic combinations of ethnic minorities, undocumented migrant workers, and refugees with varying socio-cultural identities, languages, and lifestyles.³³ As a result, these groups may lack access to the formal health care system or face tremendous barriers in accessing health services, which further complicate malaria control activities.⁶ To counter these challenges, Thailand has established 329 malaria clinics throughout the country, most of which operate along international borders. Additionally, 460 community-based malaria posts were established with Global Fund support to improve access to diagnosis and treatment among vulnerable populations.⁶ In 2012, Thailand began recording malaria cases reported by non-governmental organizations working in the highly endemic border regions; this may initially increase the number of reported cases but with time should help drive down transmission.²

Financing

As an upper middle income country, Thailand is set to graduate from WHO financial assistance for malaria control at the end of 2016 and from Global Fund support in 2017.^{27,37} Uninterrupted and dependable funding is necessary for Thailand to achieve its national and regional elimination goals.²⁷ Although government health spending in Thailand is one of the highest in the region, the Thai Ministry of Health and key partners must ensure that adequate domestic financing and donor support will be available at all phases of elimination, including prevention of reintroduction.^{26,27} Recently, the National Malaria Eradication Administration Commission in Thailand approved a budget of 2.3 billion baht to be dispersed over a 5 year period for malaria elimination.³⁷ Additionally, a new Foundation for Disease Control is planned with financial support from the private sector and civil society.²⁷

Conclusion

In the last 10 years, the malaria burden in Thailand has been reduced substantially; however, serious challenges remain. National, bilateral, and regional efforts are in place to strengthen malaria elimination activities and contain *P. falciparum* drug resistance. Thailand continues to enhance its malaria surveillance throughout the country and target high-risk populations to achieve its elimination goals.



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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 cooperation with the Bureau of Vector-borne Diseases in Thailand. To send comments or for additional information about this work, please email Anne.Bulchis@ucsf.edu.



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malaria atlas project

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