China reported just 4,109 cases in 2013—96 percent of which were imported—and is working to achieve national elimination by 2020.

Overview

China has made tremendous progress toward malaria elimination in the past two decades. The country has achieved an 88 percent decrease in reported malaria cases since 2006, and of the 4,109 cases reported in 2013, just 77 were local and an additional 81 were unclassified. The majority of imported cases in 2013 were due to *Plasmodium falciparum*, while 89 percent of local cases were due to *P. vivax*.\(^1\) Malaria has been eliminated from most of the country; the remaining at-risk areas are in Tibet and Yunnan Province in the south where local transmission still occurs.\(^2,3\)

There were 23 malaria-related deaths in 2013, a 65 percent increase from the 14 deaths reported in 2012, although most deaths in recent years can be attributed to imported *P. falciparum*.\(^1,4\) Over half of the population in China lives in areas with no risk of malaria transmission, fewer than one percent live in high-transmission areas, and the remainder live in areas of low risk.\(^1\)

Due to China’s vast size and varying climate, malaria transmission differs throughout the country. The primary vectors are *Anopheles sinensis* and *An. anthropophagus*, found mainly in the central and northern regions and associated with *P. vivax* transmission, and *An. minimus* and *An. dirus*, found mainly in the southern regions and associated with *P. falciparum* transmission. Secondary vectors include *An. maculatus s.l.*, *An. aconitus*, *An. philippinensis*, and *An. harrisoni*.\(^5,6\) *P. falciparum* is endemic in southern China and has year-round transmission. *P. vivax*, which thrives in more temperate climates, is distributed throughout southern and central China with transmission primarily occurring between May and July.\(^7\) In southern China, most cases, both local and imported, occur among migrant workers living and traveling through forested border regions between China and neighboring Myanmar, Lao People’s Democratic Republic, and Vietnam.\(^3\) In other areas of the country, the majority of imported cases occur among workers returning from Africa.\(^2\)

Progress Toward Elimination

Descriptions of malaria in China go back thousands of years. According to available records, epidemics in the 1930s were severe: a 1931 outbreak in Yang-Tse-Kiang valley affected 60 percent of the 28 million population, and in 1933, an epidemic in Yunnan Province killed over 30,000 people.\(^5\) In the 1940s, at least 30 million malaria cases occurred nationally, with an annual mortality rate of about one percent.\(^11\) Prior to...
Eliminating malaria in CHINA

Malaria Transmission Limits

*Plasmodium falciparum*

*Plasmodium vivax*

Launching the NMCP in 1955, it was estimated that malaria was endemic in 70–80 percent of all counties in China. Data from 1954 indicated that there were nearly seven million cases, though the situation was likely far more severe due to underreporting. As a result of the devastating effects of malaria, particularly in rural areas, the NMCP was established at national, regional, and district levels with substantial government funding.

Malaria incidence in 1955 was 10 cases per 1,000 population with more than 5,500 malaria-related deaths. Because the NMCP increased testing and reporting capacity, reported malaria incidence actually increased to 15 cases per 1,000 population by 1960; however, malaria-related deaths decreased to fewer than 400, a 90 percent decline. Interventions in the 1950s and 1960s varied according to the differing epidemiological conditions throughout the country, and the NMCP implemented an integrated approach rather than focusing solely on indoor residual spraying (IRS). Prompt treatment, reduction of man-vector contact, and strengthening of personal protection measures were the priorities of the program, and were applied flexibly according to local conditions. Despite a major P. vivax epidemic outside of Beijing in the early 1960s, overall incidence and mortality rate continued to decline over the next decade.

By 1970, the Cultural Revolution had interrupted control operations, and malaria incidence more than tripled to nearly 30 cases per 1,000 population with 239 malaria-related deaths. A 1973 outbreak in central China resulted in
13 million cases, most of which were reported from five provinces: Anhui, Henan, Hubei, Jiangsu, and Shandong. These areas were densely populated which facilitated rapid transmission, and in order to bring the epidemic under control, the NMCP prioritized intersectoral collaboration between the affected provinces for all malaria control activities.11 Systematic control efforts were reinstated nationwide in 1978, led by provincial anti-epidemic services within the Chinese primary health care system. As a result, between 1980 and 1990, total malaria cases dropped significantly, from more than three million cases to fewer than 120,000. Between 1991 and 1998, more than 700,000 health workers were trained in epidemiology, entomology, parasitology, and malaria control interventions, in an effort to achieve coverage of 500 million people. Between 1991 and 1998, 15 million people were treated for malaria, 34 million received prophylactic drugs during transmission seasons, and more than 110 million residents benefited from IRS and insecticide-treated bed nets (ITNs).11 By 2000, no cases were reported in the northern provinces and only 29,039 cases were reported nationally, although underreporting during this period is believed to be likely.5,6 From 2000 to 2006, there was a substantial increase in malaria cases due to reemerging P. vivax in central China in the provinces of Anhui, Henan, Hubei, Hunan, and Jiangsu. Malaria incidence in these areas tripled from 0.03 per 1,000 population in 2002 to 0.09 per 1,000 population in 2006.6,13 Driven by this outbreak, national cases increased from nearly 30,000 in 2000 to more than 115,000 cases by 2006, after reaching a peak of 172,000 in 2002.1 Cross-border migration between Myanmar and Yunnan Province, a weak surveillance and reporting system, and potential parasite resistance to chloroquine, among other factors, are believed to have contributed significantly to the epidemic.6,14 In 2002, China received a Round 1 grant from the Global Fund to control malaria in the high-transmission regions of the country, namely Yunnan Province—which borders the Lao People’s Democratic Republic, Myanmar, and Vietnam—

**Goals:**10

1. Three consecutive years of zero indigenous cases in Type III (potential transmission) counties by 2015.
2. Three consecutive years of zero indigenous cases in Type II (low transmission) and most Type I (high transmission) counties (except for border counties of Yunnan) by 2018.
and the island of Hainan. Malaria program activities focused on limiting the spread of drug-resistant *P. falciparum* by improving access to diagnosis and treatment for mobile populations through the establishment of mobile clinics. Through a Global Fund Round 5 grant, China was able to roll back the resurgence of *P. vivax* in the central provinces, and strengthen its work in resource-poor areas by distributing long-lasting insecticide-treated bed nets (LLINs), providing microscopes and training to health workers, and supplying artemisinin-based combination therapies (ACT) for confirmed cases. A Global Fund Round 6 grant continued malaria control work in Yunnan along the border with Myanmar through the establishment of new health posts and strengthening of existing ones, and providing comprehensive malaria trainings to health workers who treated migrants crossing between China and Myanmar. Between 2002 and 2009, reported malaria cases in China declined by 64 percent and malaria-related deaths declined by 76 percent.

Building on this success, in 2010, the NMCP was awarded a National Strategy Application grant by the Global Fund to move from control to elimination by: 1) providing access to early, accurate diagnosis and prompt, effective, and safe treatment; 2) ensuring vector control measures for the populations at risk; 3) strengthening malaria health education by mobilizing community participation; 4) distributing ITNs to vulnerable, poor, and marginalized populations; 5) strengthening the national malaria surveillance system; and 6) providing effective program management to implement malaria control and elimination strategies.

Significant progress has been made under the elimination strategic plan, particularly the improvements to the surveillance system. China now utilizes a national, internet-based reporting system called the China Information System for Disease Control and Prevention (CISDCP), and recently rolled out the 1-3-7 system for malaria surveillance, which delineates a set of time-bound actions including case reporting to CISDCP within one day, thorough case investigation within three days, and focal investigation, reactive case detection, and targeted vector control intervention within seven days. In addition, the NMCP has established a network of malaria diagnosis reference laboratories to support accurate case diagnosis and validation, build malaria sample banks, and provide capacity training and technical support for malaria workers at all levels of the health system. Twenty reference laboratories have been established at the national and provincial levels to serve historically endemic areas of the country. Since the onset of elimination strategy implementation in 2010, malaria cases have declined 97 percent, placing the goal of national elimination by 2020 within very close reach.

### Challenges to Eliminating Malaria

**Transmission along the China-Myanmar border**

Although many of the countries that border China are malaria-endemic, the malaria situation in Myanmar is severe and China’s border province, Yunnan, is its highest-risk region. The areas along China’s border with Myanmar are the least developed and the population is comprised of ethnic minority groups who are highly mobile due to their occupations. These groups often live in areas where health services are very difficult to access and they tend to sleep in informal shelters in forests where protection from mosquitoes is minimal. Cross-border collaboration between China and Myanmar to address malaria transmission among these high-risk populations is facilitated through regional initiatives such as the PMI Greater Mekong Subregion project and APMEN, and China has received financial support for border malaria control from the Global Fund.

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### Eligibility for External Funding

<table>
<thead>
<tr>
<th>funds</th>
<th>eligible/discontinued in 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Global Fund to Fight AIDS, Tuberculosis and Malaria</td>
<td>No</td>
</tr>
<tr>
<td>U.S. Government’s President’s Malaria Initiative</td>
<td>Yes*</td>
</tr>
<tr>
<td>World Bank International Development Association</td>
<td>No</td>
</tr>
</tbody>
</table>

*PMI support for the Greater Mekong Subregion includes Yunnan Province; China is not eligible for national support from PMI.
**Imported cases from Africa**

Outside of the border region with Myanmar, the biggest threat to China’s successful achievement of elimination is the ongoing threat of importation from travelers returning from Africa. China has expanded its business investments in Africa in recent years, and an increasing number of Chinese nationals travel to and from countries with endemic *P. falciparum* transmission. Because much of China remains susceptible to transmission and the population in formerly-endemic provinces has low immunity, the risk of outbreaks is quite high. Maintaining rigorous surveillance as outlined in the 1-3-7 strategy will be essential to prevent malaria resurgence.23

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**Conclusion**

With a national strategic plan for elimination in place, and greatly improved surveillance and diagnostic capabilities, China has successfully brought malaria cases down to just 158 in 2013. Through continued cross-border collaboration with Myanmar and ongoing surveillance to detect imported cases, China is in an excellent position to achieve national elimination well in advance of its 2020 goal.

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**Sources**

2. Cao J. Jiangsu Institute of Parasitic Diseases. Personal communication; 2014.
Transmission Limits Maps Sources


About This Briefing

This Country Briefing was developed by the UCSF Global Health Group’s Malaria Elimination Initiative, in collaboration with the Jiangsu Institute of Parasitic Diseases. Malaria transmission risk maps were provided by the Malaria Atlas Project. This document was produced by Gretchen Newby; to send comments or for additional information about this work, please email Gretchen.Neby@ucsf.edu.