



Eliminating malaria in Nepal

Nepal has made significant progress in reducing its malaria burden in the past two decades and is now working to achieve national elimination by 2026.

At a Glance²

- 1,469** Total cases of malaria
(79% *P. vivax*)
- 0** Deaths from malaria
(Last death reported in 2011)
- 48** % population at risk
(total population: 28.2 million)
- 0.05** Annual parasite incidence
(cases/1,000 total population/year)
- 0.84** % slide positivity rate

Overview

Nepal has achieved an 89 percent decline in reported malaria cases since a spike in 2002, and is currently categorized in the pre-elimination phase by the World Health Organization (WHO).^{1,2} Mortality due to malaria has been historically low, with only 87 total reported deaths over the past decade and zero reported deaths in 2014.¹ This is likely because the majority of malaria cases in Nepal are caused by *Plasmodium vivax*, with *P. falciparum* primarily responsible for periodic outbreaks. While the proportion of cases caused by *P. falciparum* had been in steady decline since the 1960s, this trend has reversed in recent years. Between 1990 and 2005, *P. falciparum* accounted for an average of 11 percent of total cases, but since 2006 has risen to an average of 21 percent.^{1,3}

Malaria is endemic in 65 of Nepal's 75 districts, and thirteen districts are considered to be highly endemic by the Nepal National Malaria Control Program (NMCP).⁴ The country is divided into three ecological zones that run east to west: the Terai, or lowland plains, with a subtropical climate; the hill zone, which is more temperate; and the mountain zone, with an alpine climate.^{5,6} Historically, malaria cases have largely

been confined to the Terai, which is home to over half of Nepal's total population and shares a southern border with India.⁴ The primary mosquito vector in the Terai was *Anopheles minimus s.l.* until it was eliminated in the 1960s through indoor residual spraying (IRS). *An. fluviatilis*, present in both the Terai and hill zones, is now the primary vector, with *An. annularis* as a secondary vector. *An. maculatus willmori* is found in the mountain zone, although transmission is negligible and limited to lower altitudes.^{7,8} Malaria transmission occurs year round, peaking in July during the seasonal monsoon. Risk groups include ethnic minorities, the poor, young men, mobile populations, and people living in border areas.²

Nepal has recently made great progress in reducing the incidence of poverty while increasing access to healthcare and reducing health disparities, despite an extended period of political instability and numerous socioeconomic and geographical barriers. Essential health services, including diagnosis and treatment for malaria, are now free at all local health facilities.² Nepal is also a member 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.⁹ Over the next few years, the Nepal NMCP aims to increase coverage and quality of malaria interventions, build program management capacity, improve international and intersectoral collaboration, and strengthen reporting and surveillance in preparation for malaria elimination by 2026.²

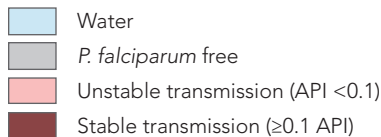
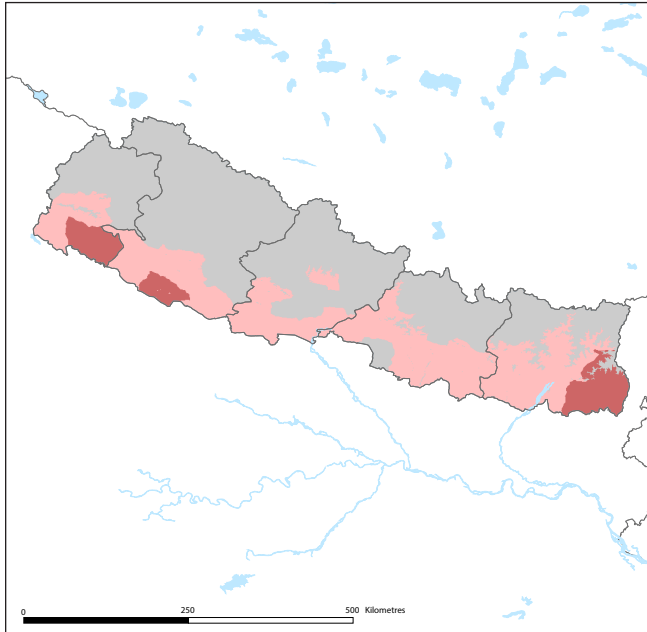
Progress Toward Elimination

Malaria was a significant cause of morbidity and mortality in Nepal throughout much of the 20th century. In the 1920s, surveys in the Terai indicated that the average spleen rate among children was 80 percent, nearly half of the population suffered from malaria, and mortality rate was 10–15 percent. Nepal's malaria control program was first launched in 1950 as an operational field research unit affiliated with a hydropower project. Four years later, with support from the United States Government, the Insect-borne Disease Control unit was formed with the goal of controlling malaria in the Terai.¹⁰

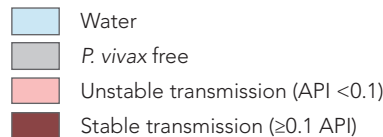
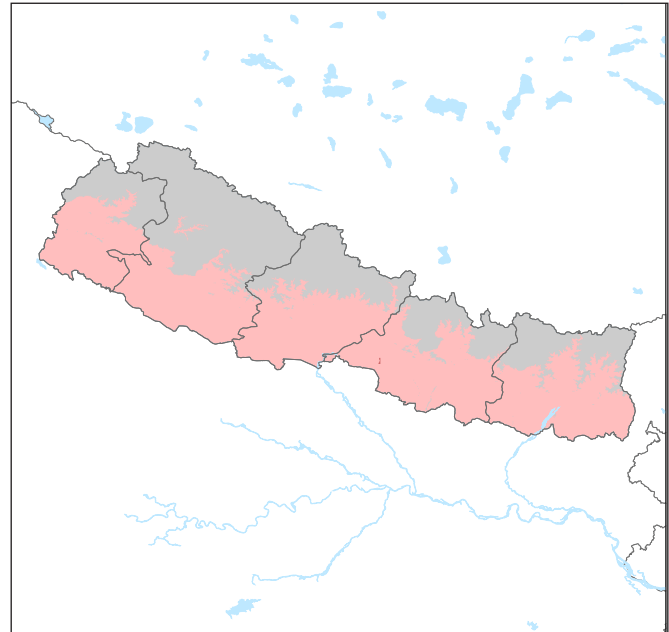


Malaria Transmission Limits

Plasmodium falciparum



Plasmodium vivax



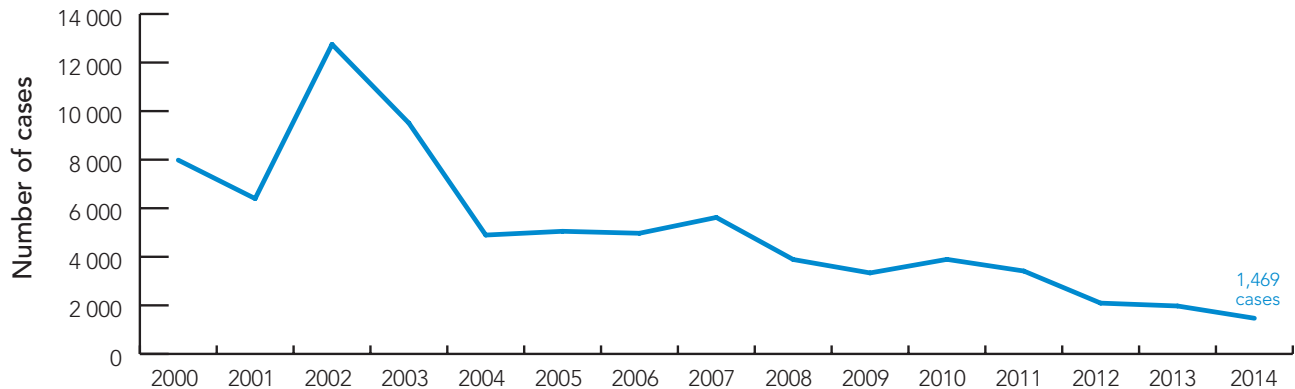
P. falciparum/*P. vivax* malaria risk is classified into no risk, unstable risk of <0.1 case per 1,000 population (API) and stable risk of ≥0.1 case per 1,000 population (API). Risk was defined using health management information system data and the transmission limits were further refined using temperature 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.

In 1958, responding to the global call for eradication, Nepal launched the Malaria Eradication Program, the country's first national public health program, in cooperation with WHO and the US Agency for International Development (USAID). Over the next several years, the vertically-run program made great progress in reducing the national malaria burden, achieving an annual parasite incidence (API) of 0.4 per 1,000 population by the late 1960s, which in turn contributed to the country's agricultural and socioeconomic development.¹⁰ However, these achievements could not be sustained due to several technical, logistical, and financial problems, and malaria cases began to rise again in the 1970s; API increased to 2.2 per 1,000 population by 1977. The program then reoriented toward malaria control in 1978.^{4,10}

Over the next 16 years, the malaria situation in Nepal deteriorated as a result of several factors, including poor management stemming from program restructuring and integration into the primary health care system, low quality diagnostic services, and the emergence of chloroquine and DDT resistance. In addition, unrest in nearby Bhutan in the early 1990s brought in a refugee population and an increase in imported cases. Several *P. falciparum* outbreaks occurred throughout this period. Then, in 1994, a National Plan of Operation for Malaria Control was developed by the NMCP, a key component of which was the stratification of Nepal's malarious areas for the first time. By this time, new drugs and insecticides had been adopted by the program and outbreaks could be controlled more quickly. The program was further



Reported Malaria Cases*



*Nepal does not distinguish between local and imported when reporting case numbers.

Source: World Health Organization, World Malaria Report 2015

- Goals:²**
1. Achieve 90% reduction in incidence of indigenous malaria cases by 2016
 2. Achieve national malaria elimination by 2026

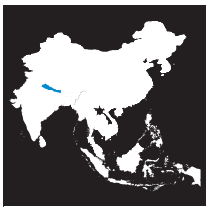
strengthened with the onset of the Roll Back Malaria initiative in 1998, focusing control efforts in the forested areas of the Terai where over 70 percent of the country's annual cases occurred.^{4,5}

From 2000 to 2004, Nepal participated in a USAID-funded regional collaboration with Bangladesh, Bhutan and India designed to improve surveillance and information-sharing for priority vector-borne diseases including malaria, and to establish a network for monitoring antimalarial drug and insecticide resistance. While relatively short in duration, the program strengthened Nepal's intergovernmental partnerships and helped establish vital infrastructure for cross-border collaborations.¹¹

Grant support from The Global Fund to Fight AIDS, Tuberculosis and Malaria launched in 2004, with the first round of funding aimed at improving malaria control efforts through the strengthening of the primary health care system in the 13 highly endemic districts.¹² Successive rounds of funding have focused on scaling-up coverage and quality of interventions in these districts, and expanding coverage to 2.5

million people living in high-risk areas of an additional 15 districts.^{10,13} Global Fund support has allowed the Nepal NMCP to increase coverage of quality diagnostics and treatment, including microscopy, rapid diagnostic tests, artemisinin-based combination therapies (ACTs) and primaquine, and vector control interventions including long-lasting insecticide treated nets (LLINs) and IRS.² Surveillance activities are robust, including insecticide and drug resistance monitoring at sentinel sites, weekly malaria case reporting through an Early Warning and Response System, and monthly reporting through the Health Management Information System. However, surveillance data from private sector health facilities are inadequately captured by these systems.²

The ongoing financial, technical, and programmatic support from WHO and Global Fund, in combination with continued commitment from the Government of Nepal and the NMCP, has had a tremendous impact on the malaria situation in Nepal. Other than an outbreak of 12,750 cases in 2002, annual malaria cases have steadily declined, and API has remained below 1 per 1,000 population since 1993.^{3,5} The country met the 2015 targets laid out in the Millennium



Development Goals (50 malaria cases per 100,000 population and 0.03 deaths per 100,000 population) and by Roll Back Malaria (reducing malaria cases and deaths by 75 percent between 2000 and 2015) ahead of schedule, which led the NMCP to shift its focus toward elimination. The current strategic plan maps out a two-tiered approach to elimination, beginning with a 2011–2016 short-term focus on scaling up coverage of interventions and eliminating transmission foci, and a 2017–2026 long-term vision of national elimination through intensified surveillance, border screening, and mopping up of residual transmission.²

Eligibility for External Funding^{14–16}

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

Economic Indicators¹⁷

GNI per capita (US\$)	\$730
Country income classification	Low income
Total health expenditure per capita (US\$)	\$39
Total expenditure on health as % of GDP	6
Private health expenditure as % of total health expenditure	57

Challenges to Eliminating Malaria

Engagement with private sector

While Nepal has established a good infrastructure for surveillance, there is minimal case reporting coming from the private sector. Research conducted by the Global Fund in 2006 found that private sector health facilities treat a similar number of malaria patients as public facilities, suggesting that actual annual case incidence may be twice what is reported.^{10,12} Another concern is lack of oversight of diagnosis and treatment carried out by private sector health care providers; private facilities are not monitored and the NMCP

cannot ensure that national guidelines and quality assurance protocols for diagnosis and treatment are being followed. This increases the risk for emergence of drug resistance and weakens the program's ability to monitor importation and respond to outbreaks. These issues will become increasingly important as Nepal nears elimination.^{3,4}

Human resources

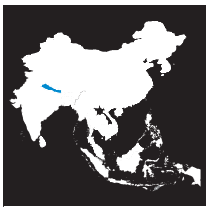
The Nepal NMCP has a severe shortage of trained staff, with several posts at all levels lying vacant. A lack of entomologists is of particular concern, since their expertise is essential for understanding changing transmission dynamics and using this data to inform vector control and outbreak preparedness strategies as the program approaches elimination. A high degree of staff turnover is another issue that negatively impacts the management and sustainability of program interventions. In the 2011–2016 pre-elimination phase of the strategic plan for malaria elimination, vacant posts have been identified and building staff capacity has been prioritized.^{2,4}

Importation

As indigenous malaria cases in Nepal have declined in recent years, the number of imported cases, largely from India, has increased. Migrant labor is the primary source of importation, with greater numbers of Nepalese workers crossing into India for economic opportunities and returning with *P. falciparum* malaria. Since the 13 districts with the highest burden of malaria lie along the Indian border, importation increases the vulnerability of this already at-risk population to *P. falciparum* outbreaks. Minimal cross-border collaborations have taken place since the conclusion of the USAID-funded surveillance program in 2004, and only two border posts have been established that screen travelers for malaria. The strategic plan calls for the establishment of additional border posts and intensified collaboration with the Indian government after 2016.^{2,4}

Conclusion

While the challenges Nepal faces on its path to elimination are significant, the NMCP has identified the major gaps and has outlined steps to address them in its two-tiered strategic plan. Through continued scale-up of malaria interventions among at-risk populations, cross-border collaboration with India, and the stabilizing effect of the new federalist government, Nepal will be well-equipped to achieve its pre-elimination goals by 2016 and prepared to focus on national elimination by 2026.



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Transmission Limits Map Source

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About This Briefing

This Country Briefing was developed by the UCSF Global Health Group's Malaria Elimination Initiative. To send comments or for additional information about this work, please email Anne.Bulchis@ucsf.edu.



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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