



# Eliminating malaria in PARAGUAY

Paraguay has reported only one local malaria case since 2010, and is seeking malaria-free certification from the World Health Organization in 2015.

## At a Glance<sup>1</sup>

- 0 Local cases of malaria (last case in 2011)
- 0 Deaths from malaria (last death in 1999)
- 16 % population living in formerly endemic areas (total population: 6.8 million)
- 0 Annual parasite incidence (cases/1,000 total population/year)
- 0 % slide positivity rate

## Overview

Paraguay reported its last local malaria case in 2011, although it is still categorized in the pre-elimination phase by the World Health Organization (WHO). In 2013, 11 cases were reported; all were imported and 64 percent were *Plasmodium falciparum* infections. Local transmission of *P. falciparum* was halted in 1996, and all local cases through 2011 were due to *P. vivax*. The last reported malaria-related death in Paraguay occurred in 1999.<sup>1,2</sup> Malaria transmission in Paraguay is primarily attributed to the *Anopheles darlingi* vector, a species that thrives in humid climates and dense forests. *An. albitarsis* contributes as a secondary vector of transmission.<sup>3,4</sup> Cases can occur year-round, but peak in spring and fall when rainfall increases.<sup>2</sup>

The majority of local malaria cases in recent years have occurred in Paraguay's southeastern provinces of Alto Paraná and Caaguazú, which border Brazil. Increased agricultural activity in Alto Paraná has led to extensive deforestation and the creation of ideal breeding conditions for *An. darlingi*; dam construction and uncontrolled population movement in

this area has further increased the risk of transmission.<sup>5</sup> The populations at greatest risk for malaria are forest workers and highly mobile indigenous groups like the Guarani who live in rural areas at or below the poverty line and have limited access to health services.<sup>4,6</sup>

Paraguay's National Program for Malaria Control switched its focus to elimination in 2011 with the launch of its National Plan for Malaria Elimination 2011–2015. Elimination strategies outlined in this plan prioritize strong case management over traditional vector control interventions and have a robust community engagement and education component.<sup>2</sup> These strategies have proven highly effective in interrupting and sustaining zero transmission since 2011, and in October 2014, Paraguay initiated proceedings with WHO to achieve certification of its malaria-free status.<sup>7</sup>

## Progress Toward Elimination

In the 1940s, Paraguay was highly malarious, with 80,000 cases and 2,000 deaths reported annually. More than 90 percent of the country was considered endemic, but Ciudad de Asunción, the capital of Paraguay and one of the largest cities in South America, remained nearly malaria free.<sup>5</sup> In 1957, El Servicio Nacional de Eradicación del Paludismo (SENEPA), the national malaria eradication service, was founded by the Ministry of Public Health and Social Welfare to control malaria. However, control activities were only conducted through 1961; from 1961 through 1967, SENEPA monitored cases but did not take any action to prevent transmission.<sup>8</sup>

A malaria outbreak in 1967 prompted SENEPA to launch a nationwide indoor residual spraying (IRS) campaign with DDT, conducted on a quarterly basis and accompanied by active case detection.<sup>9</sup> As a result, between 1969 and 1970, reported malaria cases fell by 90 percent. Within highly endemic Alto Paraná province, incidence dropped from 101.9 per 1,000 population in 1969 to 11.2 per 1,000 population in



1970.<sup>8</sup> Although DDT was initially successful in reducing the national malaria burden, it was not sufficient in preventing outbreaks over the next two decades. In the 1970s and 1980s, the agricultural sector rapidly expanded to meet international demand for soybeans and cotton, leading to an increase in the migration of farm workers from malaria endemic countries and subsequent malaria outbreaks.<sup>8</sup>

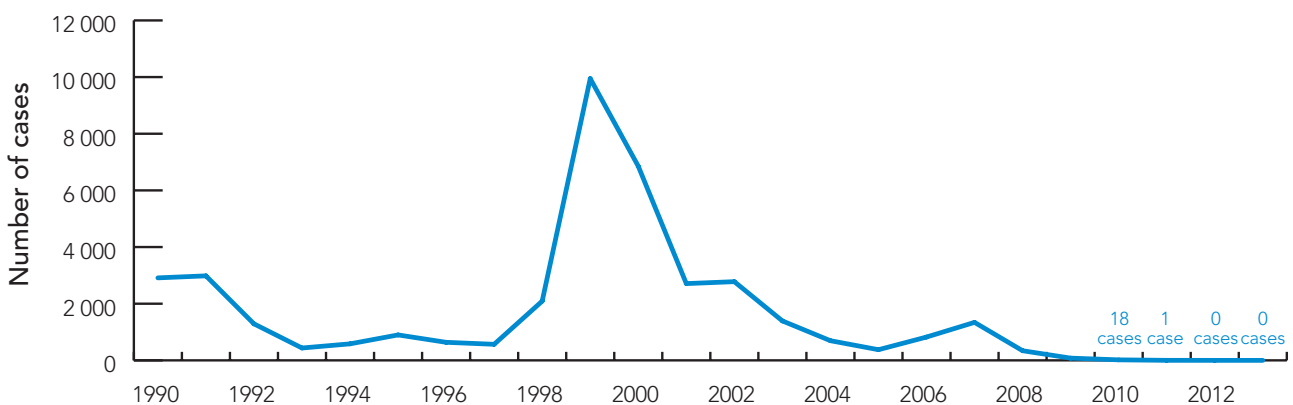
Migration between Paraguay and Brazil also increased in the 1970s, primarily due to the construction of a large dam on Paraguay's southeastern border with Brazil between 1975 and 1982. This contributed to a 1984 outbreak of malaria following the influx of Brazilian construction workers.<sup>10</sup> Between 1993 and 1997, Paraguay maintained an annual average of 600 reported cases of malaria. However, a malaria outbreak in 1999, thought to be due to cross-border migration, resulted in nearly 10,000 reported cases, with more than 80 percent occurring in Alto Paraná, Caaguazú, and Canindeyú.<sup>11</sup>

SENEPA implemented a national plan to control malaria in 2008, guided by three major strategies: 1) epidemiological surveillance for at-risk areas through active and passive

case detection at 4,200 reporting stations; 2) free health care provision for malaria patients, including testing services and comprehensive treatment; and 3) continued vector control programs. In order to reach its goal of an 80 percent reduction in malaria incidence by 2013, SENEPA aimed to strengthen its diagnostic and reporting networks to manage outbreaks and provide comprehensive coverage, improve entomological surveillance, and establish a behavior change communications plan for at-risk populations.<sup>6</sup>

These interventions were very successful in reducing transmission and the 80 percent reduction goal was achieved by 2010, prompting SENEPA to shift its focus from control to elimination.<sup>1</sup> Under the National Plan for Malaria Elimination 2011–2015, the program adjusted its strategies to prioritize 100 percent case confirmation, reporting, and radical treatment, quality control of diagnostic laboratories, and the introduction of geographical information systems to improve surveillance. SENEPA also called for expansion of entomological surveillance and community education for malaria prevention and treatment.<sup>2</sup> In 2011, when the elimination

## Reported Malaria Cases\*



Paraguay experienced malaria outbreaks in 1999–2000 and 2006–2007, but with increased surveillance and prompt treatment, cases rapidly declined. The last local case was reported in 2011.

\*Graph shows total reported cases from 1990–2009; as of 2010, only local cases are shown.

Source: World Health Organization, World Malaria Report 2014

**Goal:<sup>7</sup> Achieve WHO certification of malaria-free status in 2015.**



plan was implemented, ten malaria cases were reported, nine of which were imported. Since then, Paraguay has had 26 imported cases and zero local cases, prompting the program to initiate certification of malaria-free status with WHO in October 2014.<sup>1,7</sup>

## Eligibility for External Funding<sup>12-14</sup>

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

## Economic Indicators<sup>15</sup>

GNI per capita (US\$)	\$4,010
Country income classification	Lower middle
Total health expenditure per capita (US\$)	\$392
Total expenditure on health as % of GDP	10
Private health expenditure as % of total health expenditure	58

## Challenges to Eliminating Malaria

### Deforestation

The Alto Paraná Jungle and the Atlantic Rainforest of Alto Paraná are the most malarious areas of Paraguay. These regions have been exploited through deforestation, and irresponsible irrigation methods have left many stagnant bodies of water that provide favorable breeding grounds for mosquito vectors.<sup>6</sup>

### Poor and rural populations

Malarious areas in Paraguay are primarily remote and inhabited by indigenous people who often work in industries that require migration, such as coal mining, farming, logging, or trading. Malaria diagnosis and surveillance are difficult because of the challenges in accessing and treating these hard-to-reach populations.<sup>5,6</sup>

## Conclusion

Paraguay has made remarkable progress in the past fifteen years, reducing its malaria burden from nearly 10,000 cases in 1999 to zero in 2012 and 2013. With ongoing surveillance in the highly endemic areas along the border with Brazil, Paraguay can continue to maintain zero transmission and achieve its goal of malaria-free certification from WHO in 2015.

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## About This Briefing

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The **Global Health Group** at the University of California, San Francisco (UCSF) 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 works at global, regional and national levels to accelerate progress towards eradication by conducting operational research to improve surveillance and response, strengthening political and financial commitment for malaria elimination, and collaborating with country partners to shrink the malaria map.