São Tomé and Príncipe has achieved an 83 percent decrease in reported malaria cases over the past decade and is making great progress toward elimination.

### Overview

São Tomé and Príncipe is a two-island archipelago located in the Gulf of Guinea off the coast of Gabon in West Africa. A distance of 140 kilometers (87 miles) separates the two islands, with most of the country’s population residing on São Tomé. The population of both islands is concentrated along the coastlines. The country has substantially reduced its malaria burden from a peak of almost 54,000 cases in 2004 to 9,261 in 2013. All but one of the malaria cases reported in 2013 were due to *Plasmodium falciparum*; the remaining case was due to *P. vivax*. *P. vivax* infections were more prevalent on the islands in the past, as were *P. malariae* and *P. ovale* infections. Anopheles gambiae is the primary vector responsible for malaria transmission, and is only present at altitudes lower than 200 meters.

São Tomé and Príncipe’s entire population is at risk for malaria, but a higher parasite prevalence has historically been recorded on the island of São Tomé. The malaria epidemiological profile of São Tomé is considered low but unstable, whereas transmission on Príncipe, a much smaller island with a very low population, has been low and stable since 2007. Transmission largely occurs along the lowland coastal areas of São Tomé due to high inland elevations that reduce vectorial capacity. Both islands are considered hypoendemic,

### At a Glance

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
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<tbody>
<tr>
<td>Total cases of malaria</td>
<td>9,261 (100% <em>P. falciparum</em>)</td>
</tr>
<tr>
<td>Deaths from malaria</td>
<td>11</td>
</tr>
<tr>
<td>% population living in areas of active transmission (total population: 0.2 million)</td>
<td>100</td>
</tr>
<tr>
<td>Annual parasite incidence (cases/1,000 total population/year)</td>
<td>48</td>
</tr>
<tr>
<td>% slide positivity rate</td>
<td>8.52</td>
</tr>
</tbody>
</table>

### Malaria Transmission Limits

*Plasmodium falciparum*

P. *falciparum* 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.
and most malaria cases are recorded during the rainy season between September and May; however, transmission on Príncipe relative to that on São Tomé has been negligible in recent years.\(^6,7\)

In 2004, the Centro National de Endemias (CNE) of São Tomé and Príncipe launched a malaria control strategy centered on early diagnosis and prompt treatment, high coverage of indoor residual spraying (IRS) and long-lasting insecticidal nets (LLINs), larval control, and mass screening and treatment.\(^8\) This combination of efforts, along with financial and technical support from global partners, led to a dramatic 96 percent decline in annual cases to just 2,421 in 2007, placing Príncipe on the brink of elimination and prompting the CNE to shift its overall strategic focus for both islands to pre-elimination. A performance review of the National Program to Fight Malaria (PNLP) in 2011 highlighted the importance of strengthened surveillance and reporting, improved outbreak response preparedness, targeted application of vector control using stratification and mapping, and overall program capacity building.\(^2,9\) These recommendations were incorporated into São Tomé and Príncipe’s 2012–2016 strategic plan, which sets the country on a path to pre-elimination by 2016.\(^10\)

### Progress Toward Elimination

Malaria likely arrived in São Tomé and Príncipe in the 1500s when the islands were first inhabited by Portuguese and African settlers.\(^1\) São Tomé and Príncipe launched a formal malaria elimination program after receiving independence from Portugal in the early 1980s.\(^11,12\) Upon implementing biannual IRS with DDT and weekly chemoprophylaxis with chloroquine, São Tomé and Príncipe drove down parasite prevalence from 19 percent to 0.6 percent and recorded zero malaria-attributable deaths in 1981.\(^13\) Between 1981 and 1983, there was no evidence of new malaria cases. Control measures were ceased in 1984 due to several factors, including

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**Goals:**

1. By 2016, reduce malaria morbidity and mortality in São Tomé by 60 percent of 2011 levels.
2. By 2016, reduce malaria incidence to less than one indigenous case per 1,000 inhabitants in Príncipe.

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**Reported Malaria Cases**

The launch of an intensive vector control and mass screen and treat campaign in 2004 caused a dramatic case decline in just three years. Case fluctuations since 2007 can be attributed to political instability, poor coordination among partners, and insufficient program capacity to carry out malaria elimination interventions.

*Sao Tome & Principe does not distinguish between local and imported when reporting case numbers; no case data is available prior to 1995.

a lack of funding and community support for IRS, the emergence of chloroquine- and DDT-resistant strains of *P. falciparum* and *An. gambiae*, and inadequate political commitment. As a result, a major epidemic occurred in 1985 and 1986. Over the next several years, malaria control activities remained minimal, consisting primarily of case management with chloroquine despite the presence of drug resistance, and by 1997, overall malaria prevalence was 53 percent on São Tomé and 35 percent on Príncipe.4,11

After a pilot study conducted on Príncipe in 2003 indicated that IRS with alphacypermethrin was effective in reducing malaria transmission on the islands, the Ministry of Health and the CNE developed a national malaria control strategy consisting of broad scale-up of IRS and LLINs and improved diagnosis and treatment of malaria with artemisinin-based combination therapies (ACTs).12,14 With support from the Taiwan International Cooperation and Development Fund, the PNLP deployed a universal spraying program in 2004, which covered 90 percent of the population over three rounds of annual spraying. That same year, the country started promoting the widespread administration of sulfadoxine-pyrimethamine (SP) for intermittent preventive therapy (IPT) in pregnant women, and coverage rates steadily rose from 60 percent in 2005 to 85 percent in 2009.6,14 In 2005, São Tomé and Príncipe received a Round 4 grant from the Global Fund to conduct a nationwide bed net distribution campaign and to roll out ACTs as the country’s first-line treatment for uncomplicated malaria.15

Soon after receiving the Round 4 grant, the two islands’ malaria control activities began to diverge; it is not clear whether program variance was purposeful or occurred inadvertently due to differences in the islands’ malaria burdens and population densities. On Príncipe, larviciding began in 2007 to complement the island’s ongoing IRS activities, which shifted from universal coverage to focal IRS targeting communities at greater risk for epidemic malaria.7 On São Tomé, universal IRS campaigns occurred for three consecutive years, 2005 to 2007, with coverage rates declining from 87 percent in 2005 to 75 percent in 2007. In 2008, IRS was conducted only as an emergency intervention in the island’s highest burden areas, Lobata and Agua Grande districts, in response to outbreaks that led to a 130 percent spike in severe malaria. São Tomé shifted to focal IRS in 2009, although universal coverage remains a priority in Agua Grande and its neighboring districts.6

Following an impressive 95 percent reduction in malaria between 2004 and 2007, São Tomé and Príncipe received a Round 7 grant from the Global Fund in 2008 to consolidate efforts for malaria elimination. Key components of this grant included scaling up of integrated vector control interventions, effective case management, intensified epidemiological and entomological surveillance to identify and prioritize high risk areas and respond to outbreaks, community education and engagement, operational research, and overall health system and program management strengthening.16

The PNLP has documented the country’s progress toward elimination since 2006 through cross-sectional surveys using RDTs. Mass screening was performed on both islands in 2006, 2007, and 2009, on São Tomé in 2008, and on Príncipe in 2013. The 2008 survey revealed 3.5 percent prevalence of malaria on São Tomé, which generally has a higher malaria burden than Príncipe. Of the positive cases from the 2008 survey, 95 percent were asymptomatic and many were low-density infections. During the 2013 mass screening survey on Príncipe, only 0.1 percent of cases were positive and 65
percent of those cases were asymptomatic, highlighting the importance of using more active approaches for case detection.6,17

Under its National Strategic Plan for Malaria Pre-Elimination 2012–2016, the PNLP has outlined the key strategies and interventions necessary to reduce transmission on both islands by 2016. The primary objectives of the plan are to 1) build institutional capacity of the PNLP at all levels in order to effectively implement pre-elimination strategies; 2) test 100 percent of suspected malaria cases and treat according to national guidelines; 3) protect 100 percent of population at risk with appropriate and integrated vector control interventions; 4) strengthen surveillance system in order to detect and investigate all malaria cases within transmission foci; and 5) ensure that all districts have capacity to detect and respond to malaria outbreaks.10

**Challenges to Eliminating Malaria**

**Prompt responses to malaria outbreaks**

Progress toward malaria elimination in São Tomé and Principe relies on the country’s surveillance system and its ability to rapidly detect and respond to outbreaks. Although there are fewer than 200,000 residents between the two islands, the perennial nature of malaria transmission requires the islands to have sensitive and responsive surveillance measures; otherwise, delays in program reactions to increases in slide positivity rates, which are currently aggregated weekly, may quickly result in an epidemic. Further, the country’s warning system for malaria is different on the two islands; system responsiveness is considered fully operational on Principe but subpar for the epidemic-prone São Tomé due to poor performances in densely populated districts.6,10

**Importation of malaria**

São Tomé and Principe’s very small population and isolation from West Africa’s high malaria transmission rate has bolstered progress toward elimination. However, fishermen from São Tomé travel to Principe and set up temporary fishing villages for months at a time, regularly increasing the risk for imported malaria cases between islands. Malaria prevalence is higher on São Tomé than on Principe; thus, travelers from São Tomé may serve as sources for renewed malaria transmission. In addition, though the distance is far, increased migration and travel between mainland Africa and the islands are likely to introduce added risk. To address this, passengers with fever entering Principe via the airport or seaport are screened for malaria.6–7,10

**Sustained financial commitment**

São Tomé and Principe relies on external funding from the Global Fund and bilateral assistance from Taiwan for its elimination efforts. With shrinking donor budgets and new eligibility criteria for funding from the Global Fund, future funding options for malaria elimination may become more limited, necessitating a greater financial commitment from the government and other domestic sources. As malaria becomes a less acute public health issue for São Tomé and Principe, the country must find innovative ways to maintain funding for elimination.10

**Conclusion**

Through increased coordination of malaria activities between islands, further strengthening of surveillance and response systems, and sustained financial support for elimination from the Global Fund, Taiwan, and domestic funding mechanisms, São Tomé and Principe is on track to achieve its pre-elimination goals by 2016 and work toward national elimination.
Sources

17. Prazeres J. Sao Tome and Principe National Program to Fight Malaria. 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 São Tomé and Príncipe National Program to Fight Malaria. 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.Newby@ucsf.edu.

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.

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. Find MAP online at: www.map.ox.ac.uk.