Turkey reported just 34 local cases of malaria in 2013 and is successfully working to achieve national elimination by the end of 2015.

**Overview**

Turkey achieved a 99 percent decrease in malaria between 2000 and 2013, from 11,381 to only 34 cases, and is categorized in the elimination phase by the World Health Organization (WHO). While there are no longer any active foci of transmission, malaria risk still exists in a very small region in the southeastern part of the country where epidemics have historically been centered. In fact, all local cases in 2013 were due to *Plasmodium vivax*, and were determined to be relapses from infections acquired during an outbreak in Mardin Province along the southeastern border with Syria in 2012.

The primary malaria vectors are *Anopheles sacharovi* and *An. superpictus*, with *An. maculipennis*, *An. pulcherimus*, *An. algeriensis* and others contributing as potential secondary vectors. Seasonal malaria transmission typically lasts from March to October.

Turkey launched a national malaria eradication program in 1957, which dramatically reduced the disease burden in a short period of time. By the end of 1974, 93 percent of the country was in the consolidation phase. Transmission of *P. vivax* was limited to focal areas in the southeast of the country, while *P. falciparum* and *P. malariae* had been successfully eliminated. However, several large-scale epidemics occurred over the next 30 years and the malaria situation

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**At a Glance**

- **34** Local cases of malaria (100 % *P. vivax*)
- **3** Deaths from malaria (due to imported *P. falciparum* cases)
- **0** % population living in areas of active transmission (total population: 74.9 million)
- **0.0005** Annual parasite incidence (cases/1,000 total population/year)
- **0.01** % slide positivity rate

*M all local cases were determined to be relapses from infections acquired in Mardin Province in 2012.

**Malaria Transmission Limits**

*Plasmodium vivax*

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*P. vivax* malaria risk is classified into no risk, unstable risk of <0.1 case per 1,000 population (API), low stable risk of ≥0.1 to <1.0 case per 1,000 population (API), and stable risk of ≥1.0 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.
did not begin to improve until the late 1990s. In 2009, Turkey launched a national strategy to eliminate malaria by the end of 2015.7

**Progress Toward Elimination**

Turkey has a tumultuous history with respect to malaria, which is thought to have been a major public health threat among ancient Anatolian civilizations.8 The first description of quartan malaria (*P. malariae*) was provided in the 4th century BC by Hippocrates, who lived in Kos (now Kas).6 The first recorded malaria epidemics occurred during the First World War (1914–1918), when 50 percent of Ottoman army soldiers were diagnosed with malaria and 75 percent of local children were also infected.5,9 Between 1917 and 1925, malaria prevalence in the three major cities of Turkey was greater than 60 percent, on average. After modern-day Turkey was established in 1924, malaria control activities were prioritized and implemented under the newly-formed Malaria Control Program in 1926 with three objectives: 1) treat infected persons with quinine; 2) reduce contact between people and mosquitoes; and 3) reduce the number of mosquitoes.9 Annual malaria cases initially declined rapidly as a result of these measures, yet the burden spiked to more than 120,000 cases by 1939 when the Second World War (1939–1945) broke out and malaria services were disrupted.8 Vector control campaigns conducted periodically during the war drained marshes and destroyed mosquito larval habitats, which helped to reduce total malaria cases to only 16,000 by 1945.9

After the conclusion of the Second World War, there was a global increase in malaria incidence. Turkey reestablished its control program and succeeded in reducing cases through the introduction of indoor residual spraying (IRS) with DDT, which brought cases down to about 1,500 in 1955.8,9 Following this success, and in accordance with WHO’s Global Malaria Eradication Program, Turkey established a national malaria eradication program in 1957.2 The program was highly successful in keeping case numbers low, and by 1968, Turkey had eliminated *P. falciparum* and confined *P. vivax* transmission to the Adana region, where only 248 local cases were reported.5

**Goal:**7 Achieve malaria elimination by the end of 2015.

**Reported Malaria Cases***

Turkey experienced an increase in malaria transmission in the mid-1990s due to migration and water resource development projects. Reported cases have steadily declined since 1994 and only 34 relapsing cases were reported in 2013.

*Graph shows total reported cases from 1990–1999; as of 2000, only local cases are shown.

Unfortunately, this success was not maintained as a result of several factors: 1) the relaxation of surveillance measures; 2) migration of seasonal workers from malaria-endemic areas within Turkey; and 3) a growing density of the An. sacharovi mosquito vector due to DDT resistance.\textsuperscript{2,8} In response to this rapid increase in cases, large-scale malaria control operations were reintroduced in 1978, and by 1979 the number of reported cases decreased to 29,324.\textsuperscript{9} However, during the early 1980s, the malaria situation deteriorated again, this time because of widespread insecticide resistance among An. sacharovi populations and increasing refusals from the community to accept IRS in their homes. Reported malaria cases nearly doubled from 34,154 cases in 1980 to 66,681 in 1983.\textsuperscript{5}

Between 1991 and 1996, malaria cases increased yet again, peaking at 84,345 cases in 1994, primarily because of the Southeastern Anatolia Irrigation Project, a regional water resources development project that included an agriculture and irrigation component and led to the construction of several dams and hydroelectric plants.\textsuperscript{10} An influx of migrant workers, many of whom came from Iraq, likely contributed to the increase in incidence as well.\textsuperscript{2,3} Beginning in 1996, total malaria cases fell significantly, declining from nearly 61,000 cases to only 11,432 in 2000. Much of this reduction may be linked to a decrease in military operations by the Turkish army along Turkey’s southeastern border with Iraq. Also during this period, other malaria-endemic countries in the region experienced a significant case decline, which helped to reduce Turkey’s malaria caseload.\textsuperscript{9}

Beginning in 2002, additional measures were put into place by Turkey’s malaria program to further reduce incidence: 1) improved monitoring of patients using antimalarial drugs, particularly chloroquine; 2) use of the most effective insecticides available; 3) application of IRS throughout entire provinces; and 4) increased patient access to malaria services through the Health Transformation Program, which sent mobile health teams to facilitate vector control operations and treat cases identified in the community.\textsuperscript{11} With these increased efforts, the number of cases dropped by 43 percent, from 9,182 in 2002 to 5,252 in 2004.\textsuperscript{1}

In 2005, Turkey and nine other malaria-endemic countries in the region endorsed the Tashkent Declaration—the move from malaria control to elimination in the WHO European region—which marked Turkey’s political commitment to eliminate malaria.\textsuperscript{12,13} Turkey continued to improve its malaria program efforts in 2007 by developing more efficient reporting and surveillance protocols. Further support for the program was provided by increasing the number of malaria workers conducting case investigation and response in malaria endemic provinces during the summer transmission months. Projects were also launched to improve the motivation of malaria workers.\textsuperscript{9}

In 2009, Turkey launched a national malaria elimination strategy and action plan aiming to eliminate malaria by the end of 2015. The WHO Regional Office for Europe and the Ministry of Health in Turkey also signed a biennial collaborative agreement to support Turkey’s national elimination campaign through the provision of technical support for planning, implementation, and evaluation of elimination activities; assisting with capacity-building for the malaria program staff on issues related to elimination; and supporting operational research on malaria.\textsuperscript{7} These efforts led to a rapid reduction in the number of authochthonous cases and active foci; the last local cases were reported in 2009. Turkey reported only nine and four relapsing cases in 2010 and 2011, respectively, but in 2012, an outbreak of 218 \textit{P. vivax} cases, both imported and local, was detected in the southeastern province of Mardin. Investigation indicated that the outbreak was due to importation by lorry drivers arriving from malaria-endemic countries and delayed diagnosis of index cases.\textsuperscript{6,14} The outbreak was rapidly controlled and surveillance intensified in the southeastern part of the country, and only 34 relapse cases and no new cases were reported in 2013.\textsuperscript{1}

### Eligibility for External Funding\textsuperscript{15–17}

<table>
<thead>
<tr>
<th>Fund/Initiative</th>
<th>Eligibility</th>
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</thead>
<tbody>
<tr>
<td>The Global Fund to Fight AIDS, Tuberculosis and Malaria</td>
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<tr>
<td>U.S. Government’s President’s Malaria Initiative</td>
<td>No</td>
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<tr>
<td>World Bank International Development Association</td>
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</table>
Eliminating malaria in Turkey

Challenges to Eliminating Malaria

Development projects in the southeastern region
The Southeastern Anatolia Project focused on creating sustainable economic activities for the region, including the construction of dams, power plants, and irrigation canals for increased agricultural activities. As a result of changes in water distribution, which led to increased mosquito breeding, malaria risk in this region is still a concern. However, Turkey has intensified its surveillance activities and the WHO Regional Office for Europe is providing technical support in disease management and prevention activities to help avert further outbreaks in this area.7

Imported malaria
Turkey’s location between Asia and Europe leads to a significant amount of travel through the country, increasing the potential risk of malaria importation. In the past, increasing migration from neighboring endemic countries has resulted in higher numbers of imported cases that contributed to local epidemics, as occurred in 1977 and 1993. In recent years, employment opportunities arising from large-scale development projects in Turkey, as well as political instability in the region, has led to greater international migration, largely from Iraq, the Islamic Republic of Iran, Pakistan, and the Syrian Arab Republic. Malaria risk in most of these countries has declined significantly, with the Islamic Republic of Iran nearing elimination, and Iraq and the Syrian Arab Republic now in the prevention of reintroduction phase.1,6 However, ongoing regional conflicts and the potential breakdown of health services in neighboring countries will continue to pose a threat to Turkey’s achievement of elimination.

Conclusion
Although Turkey has a turbulent history with malaria, the country reported only 34 relapsing cases in 2013 and has made significant progress toward national elimination. The country must now focus on maintaining these remarkable gains and preventing future epidemics through intensified border surveillance in order to meet its goal of elimination by the end of 2015.

Economic Indicators18

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNI per capita (US$)</td>
<td>$10,970</td>
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<tr>
<td>Country income classification</td>
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<tr>
<td>Total health expenditure per capita (US$)</td>
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<td>Total expenditure on health as % of GDP</td>
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<tr>
<td>Private health expenditure as % of total health expenditure</td>
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</tr>
</tbody>
</table>
Sources


Transmission Limits Map Sources

About This Briefing

This Country Briefing was developed by the UCSF Global Health Group’s Malaria Elimination Initiative, in collaboration with the WHO Regional Office for Europe and Turkey’s Ministry of Health. 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.