Iran has made impressive progress in reducing its malaria burden since the early 1990s and has a national goal to eliminate malaria by 2025.

**Overview**

Iran has achieved a 96 percent decrease in local malaria cases between 2000 and 2013, from 12,294 cases to just 519, and is categorized in the elimination phase by the World Health Organization (WHO). The country has reported only two malaria-related deaths since 2010, both of which occurred in imported cases.\(^1\) Several vectors are responsible for malaria transmission in Iran, and the four dominant vectors are *Anopheles stephensi*, *An. culicifacies*, *An. superpictus*, and the *An. fluviatilis* species complex.\(^2,3\) Nearly all malaria transmission occurs in the southeastern part of the country, near the Persian Gulf and the Gulf of Oman, as well as the border with Pakistan where most imported cases originate. The majority of local malaria cases in Iran are due to *Plasmodium vivax*; about one quarter of all imported cases are due to *P. falciparum*.\(^1,4\) Duration of malaria transmission varies throughout Iran, with a three to four month season in the north during the summer months, and a nine month season in the south with peaks in late spring and early autumn.\(^5\)

The vast majority of malaria cases over the past several years have been reported in three southeastern provinces—Hormozgan, Kerman, and Sistan and Baluchestan—all of which lie along or near the border with Pakistan.\(^4\) Socioeconomic conditions and access to health services in these provinces are lower in comparison to the rest of the country, presenting significant challenges for malaria control. In addition, imported cases occur in several provinces throughout Iran, requiring regular surveillance and outbreak preparedness.\(^5\) The national malaria program launched its strategic plan for elimination in 2010, focusing on improved access to early diagnosis and prompt treatment, expanded coverage of integrated vector management (IVM), and enhanced surveillance. Through these efforts, Iran is aiming to interrupt *P. falciparum* transmission by the end of 2015, and to become entirely malaria-free by 2025.\(^7,8\)

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**At a Glance\(^1\)**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local cases of malaria</td>
<td>519</td>
</tr>
<tr>
<td>(82% <em>P. vivax</em>)</td>
<td></td>
</tr>
<tr>
<td>Deaths from malaria</td>
<td>2</td>
</tr>
<tr>
<td>% population living in areas of active transmission</td>
<td>1.0</td>
</tr>
<tr>
<td>(total population: 77.4 million)</td>
<td></td>
</tr>
<tr>
<td>Annual parasite incidence</td>
<td>0.007</td>
</tr>
<tr>
<td>(cases/1,000 total population/year)</td>
<td></td>
</tr>
<tr>
<td>% slide positivity rate</td>
<td>0.13</td>
</tr>
</tbody>
</table>

**Progress Toward Elimination**

While malaria has been present in Iran since ancient times, the earliest records of the malaria burden are from the 1920s. A malarometric survey was conducted in 1921 in Gilan Province along the Caspian Sea, in which the parasite rate was 19 percent. In 1924, it was estimated that more than one-third of Iran’s 13 million population had contracted malaria. Most of the country was considered endemic and malaria was such a public health burden that it hampered economic development of the country.\(^7,10\) The first malaria research post was formed in 1934, with the establishment of the Malaria Unit within the Pasteur Institute of Iran. During the 1940s, the Iran Ministry of Health (MOH) collaborated with the US Army, the Iranian Army, landowners, oil companies, and other private sector organizations to conduct larval control and distribute free antimalarial drugs. The US Army then introduced indoor residual spraying (IRS) with DDT in 1945 and provided training for local staff.\(^10\) With the launch of Iran’s Malaria Control Program in 1950, IRS with DDT was conducted annually on a large scale in all endemic areas, covering nearly one-third of the population, and malaria incidence declined very dramatically.\(^11\)
The malaria program expanded its activities considerably throughout the 1950s. The Institute of Malariology was formed in 1951 in association with Tehran University, providing technical support and conducting research and training for malaria staff of the MOH. A Scientific Council made up of representatives from the MOH, Institute of Malariology, US Army, WHO, and Iranian universities made decisions on malaria strategies and procedures. In 1953, spray operations were decentralized and autonomous malaria control units were formed at the provincial level. These units received materials and equipment from the MOH, but planned their own operations using locally-hired spraymen. By 1956, malaria control had proven so effective that, after consultations with WHO and UNICEF, Iran formed a Malaria Eradication Organization (MEO); the national eradication campaign was formally launched in 1957.

While IRS with DDT proved very effective in most of the country, the eradication campaign faced major challenges in the south. In 1957, resistance to DDT was detected in An. stephensi, the primary vector in southern Iran, and DDT had to be discontinued. Resistance to its replacement, dieldrin, was subsequently detected in An. stephensi in 1959, and all IRS was discontinued in the south by 1960. Several alternative interventions were tested in southern Iran throughout the late 1950s and into the 1960s, including IRS with other insecticides (malathion and baygon), fumiga-
tion with dichlorvos, mass drug administration (MDA) with chloroquine-mediated salt, and biological larval control using Gambusia fish.\textsuperscript{13–16} While some interventions were able to bring incidence down significantly during the trial period, the most effective and applicable intervention was the use of Gambusia fish, and the program was expanded throughout the country.\textsuperscript{16} MDA was also continued among the large no-mad populations. By 1968, IRS with malathion had resumed in the southern provinces; other interventions included active case detection, prompt treatment, and chemical larviciding near cities, resulting in parasite rate reductions of 30–90 percent.\textsuperscript{17} In the same year, the northern part of the country entered the consolidation phase of the eradication program after successfully interrupting malaria transmission.\textsuperscript{9}

In 1973, malaria burden had dropped to approximately 12,000 cases, all restricted to the southeastern region. This success encouraged the government to integrate the malaria program into the general Communicable Diseases Control program, which led to a scaling back of malaria control activities and, ultimately, an increase in malaria incidence.\textsuperscript{9} In response to this increase, the malaria program regained its autonomy and began to re-strengthen its control activities by 1977. However, in 1980, 23 years after the malaria eradication strategy was launched, and without having eliminated malaria in the south, Iranian MOH officials decided to shift their goals away from elimination and instead focus on control.\textsuperscript{9,10}

Following the Iran-Iraq War (1980–1988), malaria control activities such as case diagnosis and treatment were integrated into basic health care services.\textsuperscript{5} Cases had steadily risen during the 1980s, and due to a reorganization of the government and an increase in international economic sanctions following the war, cases increased to nearly 90,000 by 1991. However, once malaria control measures resumed in the early 1990s, indigenous cases fell by 87 percent to just 12,294 by 2000.\textsuperscript{1,5} In 2003, Iran reported 17,060 malaria cases, 30 percent of which were imported from Pakistan and Afghanistan. In response to the disproportionately high malaria endemicity in the border regions, WHO/EMRO held the first cross-border malaria meeting in 2003 in Sistan and

### Goals:\textsuperscript{7,8}

1. Eliminate local \textit{P. falciparum} transmission by the end of 2015.
2. Reduce local \textit{P. vivax} transmission to fewer than 895 annual cases by the end of 2015.
3. Eliminate all forms of malaria by 2025.

*Graph shows local malaria cases only.

Baluchestan Province, in collaboration with national malaria program staff from Iran, Afghanistan, and Pakistan. The objective of the meeting was to increase cooperation in malaria control by conducting joint trainings and spray operations, improving surveillance efforts, sharing data, and monitoring efficacy of antimalarial drugs across borders.¹⁸

Starting in 2004, Iran began scaling up IRS, larviciding, and distribution of insecticide-treated nets. In 2008, the MOH received a Global Fund Round 7 grant to target 20 districts in the three southeastern provinces, covering 90 percent of the population at risk, with the goal of reducing local transmission by 80 percent through early detection, prompt and effective treatment, and the expansion of free malaria diagnostic and treatment services.¹⁹ A Global Fund Round 10 grant in 2011 supported the development of a malaria early warning system and epidemic preparedness plan and funded increased training of microscopists, rural malaria mobile teams, and community volunteers in targeted areas.⁸

Cases declined by 87% with the onset of Global Fund support, from 13,278 in 2007 to 1,710 in 2011.¹

In 2010, Iran’s National Strategic Plan for Malaria Elimination was ratified by the central government and the local governments of the three endemic southeastern provinces. The plan is centered around scale-up of IVM, expanded access to prompt diagnosis and treatment, and strengthening of surveillance, supported by monitoring and evaluation, operational research, and building and maintaining capacity of human resources. There is strong political support for elimination within the country and the region, and Iran has considerable academic expertise to draw upon from its local universities to guide elimination strategy development.²⁰

With only 519 local cases reported in 2013, Iran is very likely to achieve elimination well before 2025.

### Challenges to Eliminating Malaria

**Cross-border importation**
The vast majority of malaria cases in Iran occur in its southeastern provinces that share or are near the border with Pakistan. Uncontrolled population movement across the Pakistan border, and, to a lesser extent, the border with Afghanistan, leads to continued importation of malaria. Malaria control is less of a priority and operations are not as robust in these countries as compared to Iran, and in 2013, Pakistan and Afghanistan reported 281,755 and 39,263 malaria cases, respectively.¹ Thus, the threat of importation of malaria into Iran presents an ongoing challenge.

### Conclusion

Iran has made considerable progress in reducing its malaria burden over the last two decades. Although it faces a significant risk of malaria importation across its eastern border, Iran is working to improve its cross-border collaborations, particularly with regard to data exchange and coordination of interventions. Further, strengthened surveillance, outbreak preparedness, and rapid identification of transmission foci will put Iran in an excellent position to achieve malaria elimination well before its 2025 goal.
Sources


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 WHO Regional Office for the Eastern Mediterranean. 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.