Saudi Arabia has experienced a 99 percent decrease in reported malaria cases between 2000 and 2013 and is on track to achieve elimination by 2015.

Overview

Saudi Arabia is in the malaria elimination phase as classified by the World Health Organization (WHO) and reported just 34 local cases in 2013.1 The malaria burden has been quite low since 2000, with the majority of cases, both local and imported, occurring in Asir and Jazan provinces along the southwestern border with Yemen. Despite a considerable number of imported cases originating in Yemen, India, and Pakistan in recent years—2,479 were reported in 2013—only four malaria-related deaths have been reported in Saudi Arabia since 2000. All local cases in 2013 were Plasmodium falciparum infections, although imported cases in recent years have been increasingly P. vivax.1 The primary vector for malaria transmission is Anopheles arabiensis, prevalent mostly in the southwestern part of Saudi Arabia at altitudes below 2,000 meters. Secondary vectors include An. sergentii, An. stephensi, An. superpictus, and An. multicolor.2,3 Because most of the Arabian Peninsula is a desert climate, malaria transmission in Saudi Arabia is focal, primarily occurring along rivers and in oases, and the malaria program focuses its efforts in these areas.2 Transmission typically occurs between November and March.4

At a Glance

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local cases of malaria</td>
<td>34</td>
</tr>
<tr>
<td>(100% P. falciparum)</td>
<td></td>
</tr>
<tr>
<td>Deaths from malaria</td>
<td>0</td>
</tr>
<tr>
<td>(Last deaths reported in 2011)</td>
<td></td>
</tr>
<tr>
<td>% population living in areas of active transmission</td>
<td>0.1</td>
</tr>
<tr>
<td>(total population: 28.8 million)</td>
<td></td>
</tr>
<tr>
<td>Annual parasite incidence</td>
<td>0.001</td>
</tr>
<tr>
<td>(cases/1,000 total population/year)</td>
<td></td>
</tr>
<tr>
<td>% slide positivity rate</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Malaria Transmission Limits

*Plasmodium falciparum*

Transmission was defined as stable (PF API ≥ 0.1 per 1,000 people p.a.), unstable (PF API < 0.1 per 1,000 people p.a.) and no risk using medical intelligence data. The limits were further refined using temperature and aridity data. Data from International travel and health guidelines (ITHG) were used to zero risk defined areas.
Financing for malaria elimination activities in Saudi Arabia is provided entirely by the government, and coverage of vector control and surveillance activities within the remaining foci of transmission are high. The biggest challenge to malaria elimination in Saudi Arabia is the steady influx of imported cases across the Yemeni border. In response to this threat, a regional partnership was formed in 2007 when the goal of a malaria-free Arabian Peninsula by 2015 was outlined in a strategic plan approved by all peninsular countries.

Saudi Arabia has intensified its cross-border collaboration with Yemen, including coordinated malaria surveillance and long-lasting insecticide-treated bed net (LLIN) distribution, staff training exercises, and standardization of malaria drug policy between the countries. While Yemen still has areas of high transmission and is unlikely to eliminate in 2015, Saudi Arabia is on track to eliminate malaria by the end of this year, provided that strong political commitment is maintained and cross-border collaboration continues.

**Progress Toward Elimination**

Malaria in Saudi Arabia was first documented shortly after the Kingdom was established in 1932, when oil exploration brought an influx of workers into receptive areas along the Gulf Coast. In the 1940s, the estimated malaria attack rate in this area was 160 per 1,000 population and malaria caused an estimated 12 percent of all deaths among Saudi employees of the Arabian American Oil Company, prompting the initiation of concerted malaria control efforts. From 1948–1953, the oil company conducted aggressive indoor residual spraying (IRS) with DDT, and later dieldrin, in order to control local malaria. The success of these efforts prompted the Saudi government to create a national malaria program, called the Malaria Control Service (MCS), in 1956. The MCS was designed to target malaria endemic areas throughout the country with a particular focus on protecting pilgrims visiting Mecca and Medina in the west.

**Goal:** Eliminate malaria by the end of 2015.

**Reported Malaria Cases***

*Graph shows local cases only

The MCS partnered with WHO in 1963 to launch an ambitious pre-elimination program that involved malaria risk stratification and intensive IRS using DDT and dieldrin. When resistance to both insecticides was detected in some areas, IRS was replaced with larvicides, including Paris Green and temephos, as well as mass drug administration with chloroquine. By the 1970s, local malaria transmission had been eliminated in the east and north, with only limited transmission remaining in the southwest along the border with Yemen. This stronghold of malaria led to a re-evaluation of the malaria elimination goals, and ultimately the program switched its focus back to control in 1977 when it was decided that local elimination would not be feasible. In 1979, the rising number of imported cases in the southwest led to a collaboration between Saudi Arabia and Yemen, and strengthened control activities began in 1980 in the Jazan and Najran provinces. The Saudi national malaria program began distinguishing between local and imported cases beginning in 1990, and it became apparent that most reported cases were in fact imported from Yemen, highlighting the importance of continued cross-border collaboration.

During the 1990s, support for malaria control in Saudi Arabia waned and portions of the malaria control effort were integrated into the larger health system, which led to reduced quality and coverage of interventions. In addition, chloroquine resistance began to emerge, with treatment failure rates reaching 12 percent. Several localized outbreaks occurred during this period, peaking in 1998 with more than 40,000 cases, the majority reported in Jazan Province. In response to these outbreaks, the government refocused efforts to get malaria back under control, with a particular emphasis on the porous border with Yemen, which accounted for more than 15 percent of cases. A cross-border meeting was held in 1996 to coordinate surveillance, train health personnel on malaria control, and identify target border areas. In 1999, Saudi Arabia, along with neighboring countries in the Eastern Mediterranean Region of WHO, partnered with Roll Back Malaria to further strengthen intersectoral and cross-border collaboration.

In 2001, the collaboration with Yemen evolved into biannual cross-border meetings to strengthen control activities, share information, and promote communication, advocacy and health education among border populations. At this point, the financing and surveillance mechanisms for a robust national malaria control program were already in place and the Saudi Ministry of Health re-expressed its goal for national malaria elimination. In 2003, the National Malaria Strategy 2004–2007 was developed to inform pre-elimination activities, with a focus on improved case management with artemisin-based combination therapy (ACT), quality-assured lab confirmation of all cases, geographical information systems to guide vector and larval control activities, and ongoing cooperation with Yemen. The Saudi government showed its support for this strategy by committing substantial funds and publicly promoting the efforts of the malaria program.

In 2007, Saudi Arabia signed the Malaria-Free Arabian Peninsula Initiative, a project aimed at eliminating malaria in the entire peninsula by 2015 and funded by countries of the Gulf Cooperation Council. At this time, the second phase of the country’s elimination strategy (2007–2010) was implemented, emphasizing prompt detection and treatment of every single malaria case in the remaining foci of transmission. From 2007–2009, elimination efforts were intensified and included distribution of LLINs, active case detection and case investigation, and entomological surveillance. Saudi Arabia’s efforts toward elimination have yielded considerable success to date. Malaria cases have been on a steady decline since 2000, with imported cases outnumbering local by an increasing margin: in 2000, imported cases accounted for about a quarter of the total reported, while in 2013, 99% of reported cases were imported. In response to these trends, the current malaria elimination strategy has four primary components: 1) targeted vector control in remaining high-risk areas in the southwest; 2) rapid diagnosis and treatment using microscopy or rapid diagnostic tests (RDTs) and ACTs plus primaquine; 3) reactive case detection; and 4) active case detection at the border with Yemen.

### Eligibility for External Funding

| The Global Fund to Fight AIDS, Tuberculosis and Malaria | No |
| U.S. Government’s President’s Malaria Initiative | No |
| World Bank International Development Association | No |
Challenges to Eliminating Malaria

Cross-border importation
The risk of imported malaria from Yemen into Saudi Arabia presents the greatest threat to elimination. Nearly 70 percent of Yemen’s population lives in areas of malaria transmission and around 150,000 cases are reported within the country annually, although reporting is known to be incomplete due to political instability and security disruptions. This instability has led to increased human movement into Saudi Arabia in recent years. The risk of importation is further exacerbated by the regular influx of oil workers and religious pilgrims from malaria endemic countries.

Conclusion
For more than a decade, Saudi Arabia has demonstrated a strong political and financial commitment to malaria elimination, despite the ongoing challenge of controlling imported cases across its borders. Saudi Arabia continues to work in collaboration with the other countries of the Arabian Peninsula on cross-border initiatives and intensification of control efforts within Yemen. While the goal of a malaria-free Arabian Peninsula may not be immediately achievable due to the high transmission in Yemen, with continued vigilance at the border and sustained financial commitments, Saudi Arabia will be able to achieve national elimination by 2015.

Sources
About This Briefing

This Country Briefing was developed by the UCSF Global Health Group’s Malaria Elimination Initiative, in collaboration with 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.

Transmission Limits Map Sources


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.