



Eliminating malaria in BOTSWANA

Botswana has achieved a 98 percent decrease in reported malaria cases between 2000 and 2011 and aims to eliminate malaria by 2015.

At a Glance¹

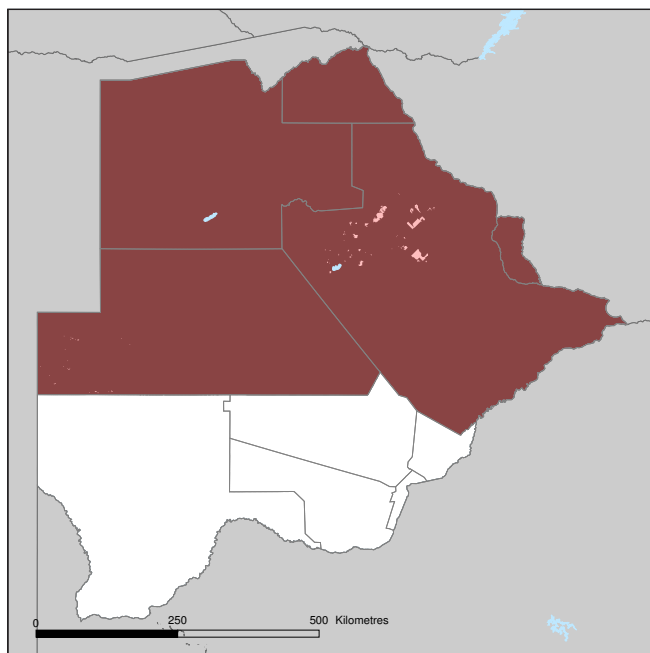
1,141	Reported cases of malaria (<i>P. falciparum</i> only)
8	Deaths from malaria
66	% of population at risk (total population: 2 million)
0.57	Annual parasite incidence (cases/1,000 total population/year)
N/A	% Slide positivity rate

Source: World Health Organization, World Malaria Report 2012

N/A: Data not available

Malaria Transmission Limits

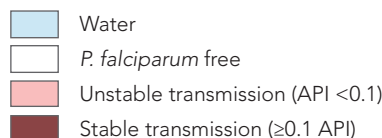
Plasmodium falciparum



Overview

Botswana lies along the southern endemic margin of transmission in sub-Saharan Africa and has reported a substantial decline in malaria; cases peaked at nearly 102,000 in 1997 and decreased to 1,141 cases in 2011.¹ In 2011, 100 percent of malaria cases in Botswana were due to *Plasmodium falciparum*.¹ *Anopheles gambiae*, *An. arabiensis*, and *An. funestus* are the vectors primarily responsible for malaria transmission, with *An. funestus* and *An. nili* serving as secondary vectors.²

About 66 percent of Botswana's population is at risk for malaria. The highest risk area is in the five northwestern districts along the borders with Zambia and Zimbabwe, which account for more than 80 percent of the country's malaria cases. The north-central districts experience focal transmission and are at high risk for outbreaks; the southern part of Botswana has not reported local malaria transmission since 2003.³ Malaria transmission is most intense in Chobe, Ngamiland, and Okavango districts, all of which neighbor higher-endemic Zambia. Transmission in these districts largely occurs during Botswana's rainy season, between November and May, with peaks from February to mid-April.⁴ However, malaria transmission overall remains very unstable in Botswana, fluctuating with the country's varying rainfall each year and resulting in sporadic malaria epidemics.



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.



Starting in 2009, Botswana began reorienting its programmatic focus from control to elimination by enhancing its surveillance systems, improving case management, and increasing malaria knowledge. Botswana is a member of the Elimination Eight (E8), a regional initiative composed of eight countries wherein the four “front-line” countries—Botswana, Namibia, South Africa, and Swaziland—embarking on malaria elimination coordinate their efforts with the four “second-line” countries—Angola, Mozambique, Zambia, and Zimbabwe.⁵ With improvements to the country’s surveillance system and enhanced cross-border coordination with higher endemic neighbors Zambia and Zimbabwe, Botswana is working to achieve malaria elimination by 2015.⁶

Progress Toward Elimination

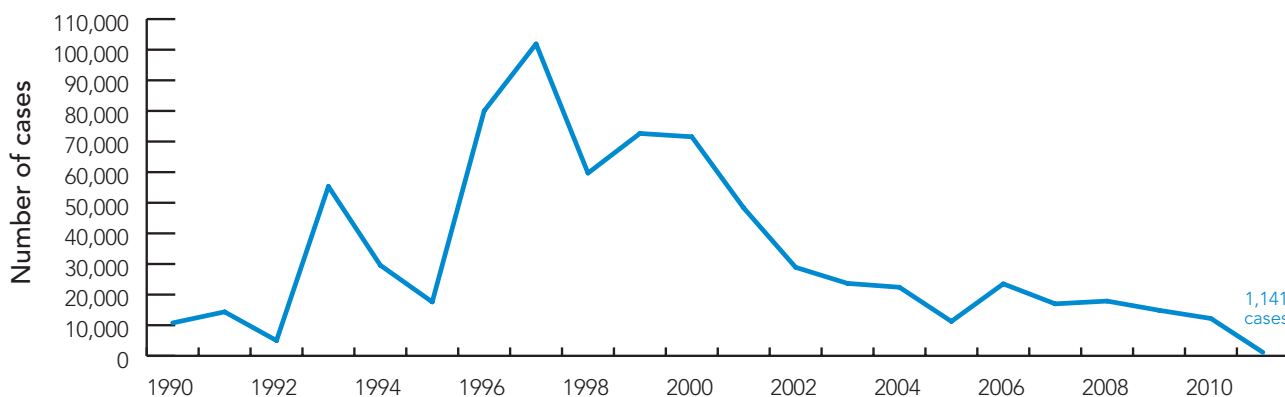
Botswana’s malaria control activities began in the mid-1940s and 1950s and featured a focus on indoor residual spraying (IRS) with DDT.⁷ Between 1961 and 1962, parasite rates in hyper-endemic districts, such as Chobe, recorded malaria prevalence as high as 43 percent. Following intensive IRS

activities, prevalence dropped to 14 percent by 1973.⁷ An alternative insecticide, Fenitrothion, briefly replaced DDT between 1971 and 1973. However, due to the poor efficacy of Fenitrothion, DDT was reinstated as the main insecticide. IRS with DDT served as Botswana’s principal vector control intervention against malaria through the 1970s.

During the early 1980s, Botswana experienced a serious drought that substantially—albeit briefly—reduced malaria cases. This led to a reduction in program funding, and when heavy rains returned in 1988, the malaria program was poorly prepared to address spikes in malaria cases and fatalities.^{8,9} In Kasane hospital, located in northern Botswana, over 500 malaria-attributed deaths occurred in 1988, which was a staggering 700 percent increase in the hospital’s malaria mortality from 1987.¹⁰ The country’s other major malaria epidemics—which occurred in 1993, 1996, and 1997—have always followed heavier than usual seasonal rains. Botswana’s most devastating malaria epidemic, in 1996, claimed 250 lives and resulted in over 180,000 cases.¹¹

GOAL: Achieve national malaria elimination by 2015.⁶

Reported Malaria Cases



Due to increasing investment in malaria control and scaling-up of malaria interventions, cases have decreased dramatically between 1997 and 2011, from over 100,000 during one of the worst malaria epidemics experienced in Botswana, to just 1,141.

Source: World Health Organization, World Malaria Report 2012



Until 1997, chloroquine served as the first-line malaria treatment for uncomplicated malaria in Botswana; however, in 1998, sulfadoxine-pyrimethamine (SP) replaced chloroquine as the first-line drug.⁸ In the same year, Botswana halted IRS with DDT, favoring pyrethroid insecticides because high-quality DDT was not readily available.¹² Botswana's National Malaria Control Program (NMCP) became decentralized to the district level in 1998, consolidating to two main offices in Gaborone and Francistown. Francistown hosts entomological research and vector control, whereas Gaborone oversees overall coordination, weekly malaria surveillance, advocacy, and case management.⁶ Under the coordination of district public health specialists, community and district health teams implement malaria activities, including reporting malaria cases on a weekly basis, monitoring case management practices, and linking communities with clinics and health posts for malaria education and intervention needs.

IRS still serves as Botswana's mainstay intervention; it helped to drive down malaria mortality by 90 percent between 2002 and 2007—from 29 deaths to only 3.¹³ However, the widespread acceptability of IRS may be declining,¹⁴ especially as the distribution of insecticide-treated nets (ITNs) has become a more popular vector control measure in Botswana. ITN ownership has increased from two percent in 2000 to 34 percent in 2011, an increase largely driven by a UNICEF, Clinton Health Access Initiative (CHAI), and Malaria No More (MNM)—supported mass distribution campaign of 32,000 ITNs in Okavango district in 2009.^{1,15} Further, the NMCP aims to provide free long-lasting insecticide-treated nets (LLIN) through health centers and then augment routine distribution with a mass campaign every three to five years.³ Artemether-lumefantrine, an artemisinin-combined therapy (ACT), replaced SP as Botswana's first-line drug for uncomplicated malaria in 2007; this treatment shift was prompted by escalating drug treatment failure rates for SP.

In an effort to improve performance and reorient the NMCP toward malaria elimination, Botswana's Ministry of Health convened a malaria review task force to evaluate the country's malaria program in 2009.³ As a result, the NMCP identified several action items to drive Botswana closer to zero malaria transmission, including: (1) focusing interventions and implementation strategies on transmission hotspots where focal malaria occurs; (2) expanding the distribution and availability of educational materials about malaria elimination via a range of communication modalities; (3) improving the country's epidemic preparedness and response systems; and

(4) increasing the use and quality control of malaria diagnostic tools and corresponding treatment.

Botswana is also working to improve its surveillance system to enable prompt response to any emerging outbreaks. With support from several organizations, including Positive Innovation for the Next Generation (PING), Botswana launched a pilot project in 2011 that uses mobile phones to report and map confirmed malaria cases for 16 health facilities in Chobe district; initial results from the PING project demonstrate improved diagnosis rates and surveillance responsiveness to outbreaks; one year later, the NMCP's response time to health clinics reporting malaria outbreaks dramatically improved from four weeks to an average of three minutes.^{16,17}

In 2010, Botswana formalized the country's malaria elimination strategic plan⁶ and is currently strengthening key partnerships with assistance from the Southern Africa Roll Back Malaria Network (SARN). Botswana is aiming to expand cross-border coordination of malaria control activities with neighboring countries—particularly Zambia and Zimbabwe—through multi-country collaborations, including the Trans-Zambezi Malaria Initiative, to achieve the goal of eliminating malaria by 2015.¹⁸

Eligibility for External Funding^{19–21}

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

Economic Indicators²²

GNI per capita (US\$)	\$7,470
Country income classification	Upper middle
Total health expenditure per capita (US\$)	\$432
Total expenditure on health as % of GDP	5.1
Private health expenditure as % total health expenditure	39.2



Challenges to Eliminating Malaria

Surveillance system coverage

Botswana's ability to achieve its malaria elimination goal relies upon having a robust surveillance and response system that provides accurate and timely epidemiological and entomological data. In its malaria elimination strategic plan, Botswana aims to improve upon its current information system. Botswana has started to fill these gaps through pilot programs such as the Chobe mobile phone reporting program in partnership with PING. In addition, the NMCP conducted a malaria indicator survey in endemic areas in March 2012.²³ With its history of malaria epidemics, the success of eliminating malaria in Botswana hinges on strong surveillance and prompt response.

Consistent use of diagnostics

The prompt and accurate diagnosis of malaria is critical for effective treatment and prevention of onward transmission. As of 2009, most malaria cases remained clinically diagnosed rather than parasitologically confirmed in accordance with national policy; in fact, for every confirmed case of malaria, another nine unconfirmed cases received treatment in Botswana.³ This over-reliance on clinical diagnosis, unless rectified, is likely to make interrupting malaria transmission substantially more challenging.

Sustained financial commitment

Botswana is not eligible for financial support from traditional donor agencies, such as the Global Fund to Fight AIDS, Tuberculosis and Malaria; instead, Botswana relies on domestic funding streams provided and generated by the federal government and private sector partners. Further, malaria has become a less pressing public health issue for Botswana, and the Ministry of Health is faced with competing priorities like the country's comparably staggering HIV burden; for instance, the HIV/AIDS prevalence among adults ages 15 to 49 was 25 percent in 2009, whereas a similar percentage (28 percent) of the Botswana's whole population are simply at-risk for malaria but do not necessarily ever contract the disease. As a result, the country must increasingly identify ways to maintain financial resources—especially amidst competing public health priorities—to drive its malaria cases toward zero.

Conclusion

Botswana, a country that has endured several malaria epidemics and is still at risk for outbreaks, is working to improve its surveillance and response system. Through expanding surveillance capacity, sustained funding of its national malaria program and continued cross-border collaborations in malaria control, Botswana will be better able to accomplish its program goals and reach national elimination by 2015.



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Transmission Limits Maps Sources

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About This Briefing

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The Malaria Elimination Initiative at the **Global Health Group** of the University of California, San Francisco (www.globalhealthsciences.ucsf.edu/global-health-group) convenes the Malaria Elimination Group (www.malariaeliminationgroup.org), and supports countries actively pursuing elimination at the endemic margins of the disease. Funding for the Malaria Elimination Initiative is provided by the Bill & Melinda Gates Foundation and Exxon Mobil Corporation.



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.



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