

Overview of the situation

Figures 1-5

Malaria transmission in Mexico has fallen sharply over the last decade. After a 25,023 case malaria outbreak on the Oaxaca coast in 1998, the number of cases began to drop and reached 2,357 in 2008. No cases by *Plasmodium falciparum* were reported in that same year. It is estimated that malaria-endemic areas cover 58% of the country and are located in the coastal plain, in spurs of the western Sierra Madre, on the country's Pacific coast and on its southern border, where they are confined to rural areas of some states on the Pacific coast.

A total of 22 states have been free of transmission since 2004. In 2008, malaria transmission was highly focalized in the states of Chiapas and Oaxaca, with only a few cases reported in other states. Both internal migration flows within and between rural areas, and immigration from Central American countries play an important role in transmission dynamics.

The principal malaria vector species in Mexico are *Anopheles albimanus* in the coastal region and lowlands, and *A. pseudopunctipennis* further inland. In Chiapas, the state that currently reports the highest concentration of cases, *A. pseudopunctipennis* is the primary vector among the rural, indigenous population.

The decrease in malaria transmission in

recent years can have a positive impact on the development of agricultural and livestock production, on industrial, fishing and mining development poles, and on the country's tourist areas. Given the current context, the main objectives of the control program are to consolidate the reduction in number of cases and affected localities, to eliminate *P. falciparum* transmission, and to prevent the reestablishment of transmission in areas that are currently free of malaria.

Morbidity and mortality trends

Figures 4 – 9

The number of cases of malaria in Mexico fell consistently over the last decade and culminated in 2008, when no cases of *P. falciparum* malaria were reported. Moreover, the number of cases by *P. vivax* was 68% lower than in 2000. No deaths or hospitalizations from malaria have been reported in the past 10 years.

Geographical distribution

Figures 1, 12-19

Malaria in Mexico is confined to three endemic areas in the country's southeastern, northwestern and Pacific regions. In these foci, in spite of the significant drop in the number of cases, transmission persists in several municipalities. However, even within those municipalities, the number of affected localities has been reduced

considerably. Nonetheless, there still is a risk of disease dissemination and the reestablishment of transmission.

The Municipality of Tapachula, in the State of Chiapas registered 245 cases in 2008. This is 10% of the total nationwide, and the highest number of cases reported that year. Tapachula was followed by the municipalities of San Pedro de Pochutla, in the State of Oaxaca, and Palenque, in Chiapas, with 225 and 192 reported cases of malaria, respectively. Ocosingo, another Chiapas Municipality, also reported a significant number of cases. These municipalities in Chiapas and Oaxaca are the primary areas of focalization in the southeastern region, which claims over 80% of the country's malaria transmission. Migration is a determining factor in transmission and the cause of frequent outbreaks. Seven municipalities contributed 50% of the national burden of the disease in 2008; of these, six are in the states of Chiapas and Oaxaca. The only exception is the Municipality of Batopilas, in the State of Chihuahua in northeastern Mexico, which reported the highest number of cases in that region.

Malaria transmission in the Pacific area is focalized in the municipalities of Del Nayar and Mesquital, in the states of Nayarit and Durango, respectively. The highest incidence rate (21 cases per 1,000 population) in 2008 was reported in Mesquital. Frequent migration between these municipalities makes case treatment and follow-up difficult. Once cases are identified, continuing treatment is difficult as a result of this migration between municipalities.

In 2008, 115 municipalities reported cases of malaria; of those, 64 municipalities reported fewer than five cases and 12 reported over 50 cases each. In addition to a reduction in the

number of municipalities affected, and to the predominance of low incidence rates, there has also been a focalization of the problem at the local level. Although 545 localities continue to be sites of transmission, not only is the number small when compared to the 3,348 municipalities affected in 1998, it also represents a decrease of 546%. Today, 99% of the country's localities are considered transmission-free; this is a significant achievement, especially considering that 17,233 of them were affected in 1988.

Malaria in specific populations

Figures 25–28

In 2008, 7.3% of malaria cases in Mexico occurred among children below the age of five years, and almost 40%, among those 15 years of age or younger. These percentages are similar to those of Nicaragua, but lower than those reported in countries like Belize, Haiti and Panama.

Malaria transmission in Mexico is essentially rural. No cases of malaria were reported in urban areas in 2008. Although the Mexican information system does not record the ethnicity of malaria cases, the indigenous population is likely Mexico's most affected.

Diagnosis and treatment

Figures 20-24, 29–30

The national slide positivity rate in 2008 was 0.2%. This indicator has remained stable throughout the decade. Also, the number of slides examined in 2008 remained high, while the SPR remained low. Insofar as this indicator is concerned, Mexico's situation is similar to that noted in Central American countries like Panama and Nicaragua.

While the information system does not re-

cord the amount of time between the onset of symptoms and treatment, this variable is registered at the source, and efforts are underway to incorporate these data into information systems. The country does not use rapid diagnostic tests, though the tests are considered useful for special situations, such as those present in hard-to-reach communities and on migratory routes. In such cases, rapid tests can improve diagnosis and help provide early and complete treatment through a network of voluntary community collaborators.

Mexico's control strategy consists of focalized treatment, and includes the following: epidemiological risk-based locality stratification; elimination of *Anopheles* habitats and breeding sites with community participation; and elimination of parasite sources in the population presumed to be the reservoir. The latter is achieved through the administration of a monthly dose of chloroquine and primaquine for three consecutive months, followed by three-month intervals up to the completion of three years or 18 doses. Treatment is administered to laboratory-confirmed cases. Suppressive treatment is also administered in suspected cases that present malaria-like symptoms or to febrile patients from malaria-endemic areas.

The principal aim of the malaria control program today is to decrease transmission through a reduction in the number of cases and affected localities, to eliminate *P. falciparum* transmission, and to prevent reestablishment of transmission in non-endemic areas.

Prevention and vector control

Figures 31-33

The National Malaria Control Program has substantially reduced the use of indoor residual

spraying with insecticides. In 2008, spraying coverage reached 195 localities, or 29,781 dwellings. This measure is practically limited to outbreak control and to localities in areas bordering Guatemala and Belize. Breeding site and habitat control activities with community participation are the key vector control strategy, emphasizing areas favorable to *A. pseudopunctipennis* and *A. albimanus* survival. These activities are supplemented with chemical larval control measures using ethoxylated alcohol. Community participation in breeding site clearance and elimination of filamentary green algae was promoted in 878 localities, as a result of which 6,564 breeding sites were cleared with the participation of 82,090 people.

Strengthening social and community participation continues to be a challenge for the Program. The objective of said strategy is to consolidate insecticide-free malaria control and to integrate health promotion.

Financing of malaria control

Figure 34

The Control Program has kept up investment, which for 2008 reached MEX\$ 290.5 million (US\$ 22 million) exclusively for operating expenses, but excluding wages for program-specific personnel and the cost of epidemiological surveillance conducted by health sector units. The Federal Government provided these resources. The Health Secretariat, in coordination with state health secretariats, allocates public health funds to ensure the continued prevention and control activities. The country does not have access to funding from other sources or to grants from international organizations.

Figure 1. Number of cases by ADM 2 level (municipality, district), 2008

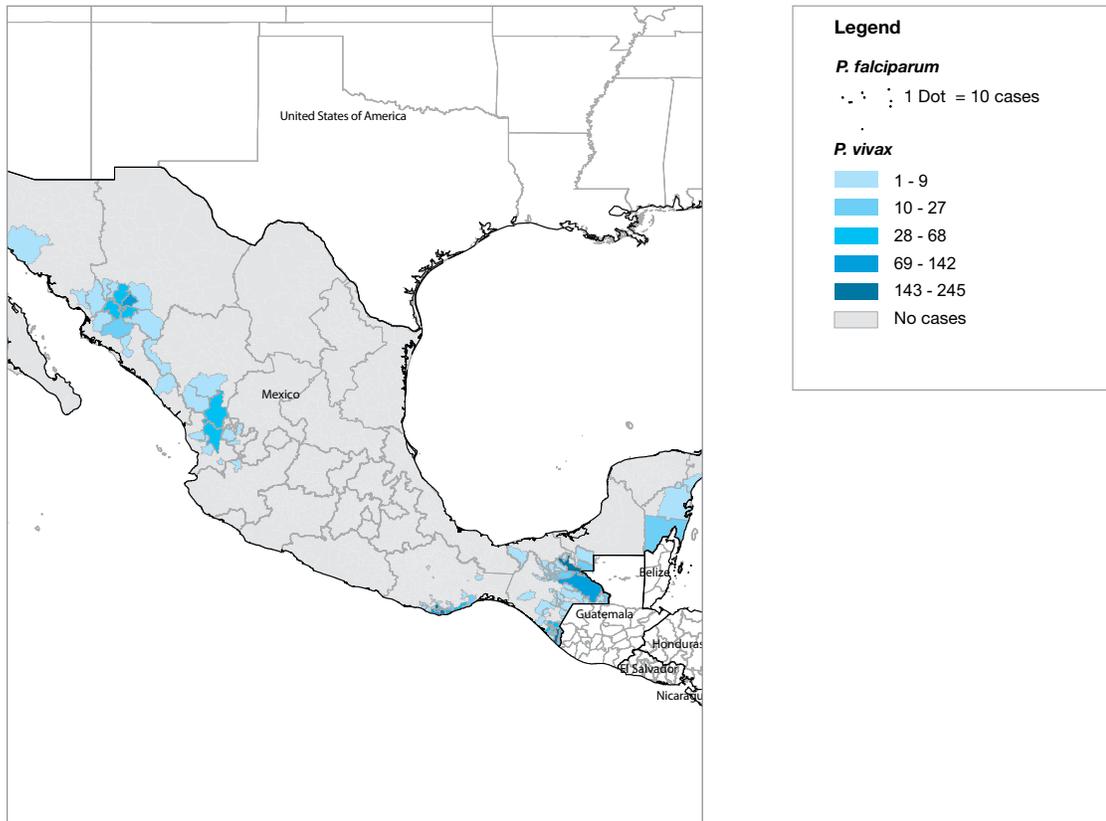


Figure 2. Proportion of cases by species, 2008

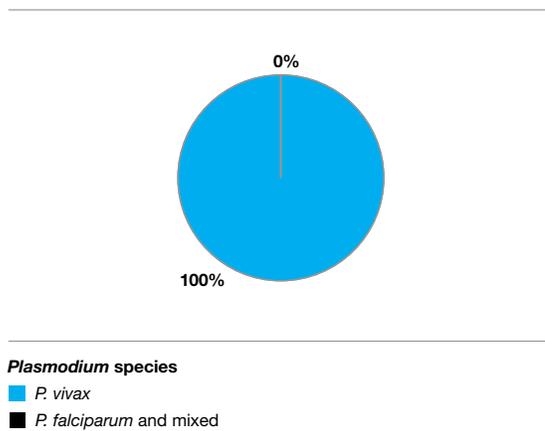


Figure 3. Number of malaria cases by species by ADM1 level in 2008

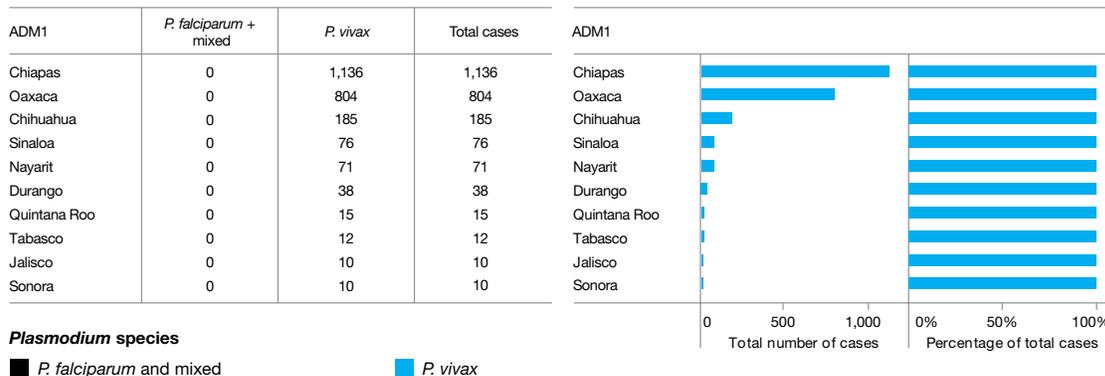


Figure 4. Number of cases by species, 2000-2008

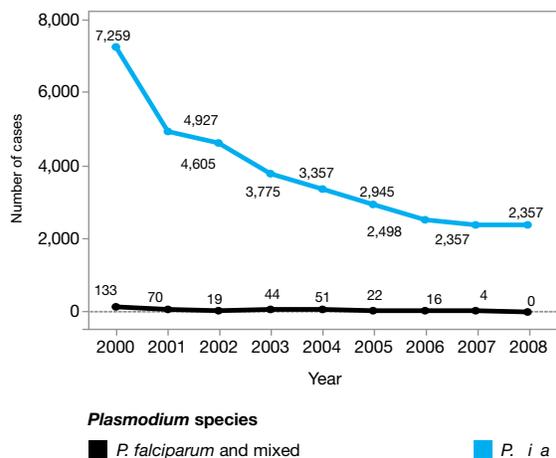


Figure 5. Number of malaria cases, 2000-2008

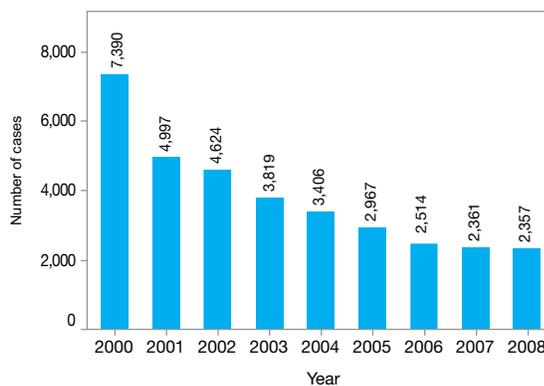


Figure 6. Number of malaria deaths, 2000-2008

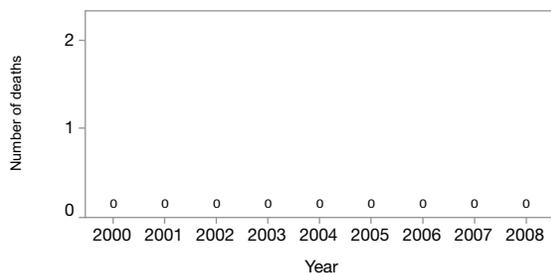
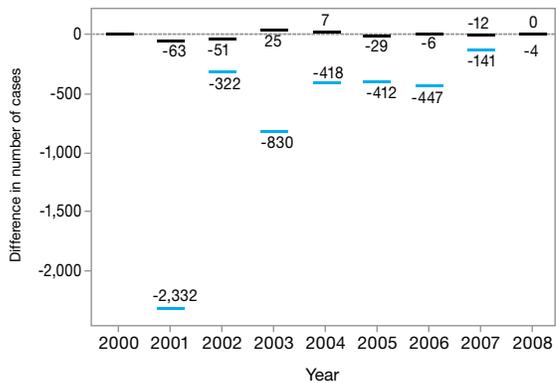


Figure 7. Number of hospitalized malaria cases, 2000 - 2008

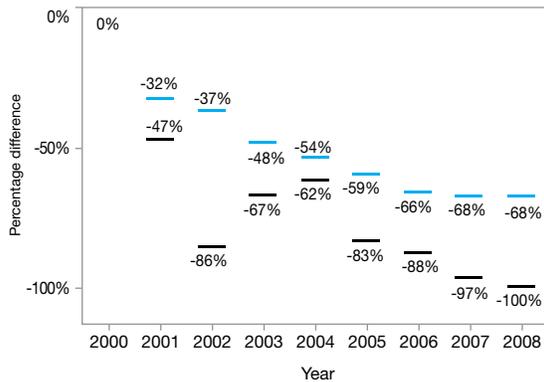


Figure 8. Annual variations in number of cases



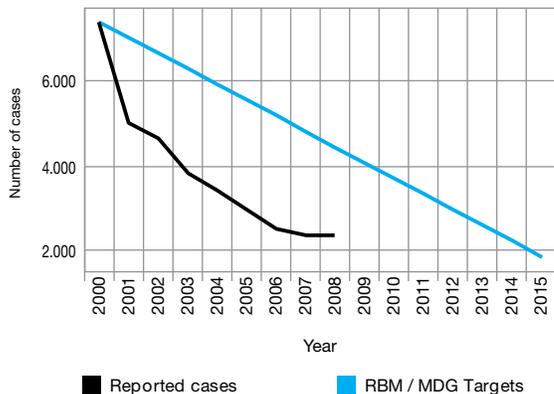
Plasmodium species
 ■ *P. falciparum* and mixed ■ *P. vivax*

Figure 9. Percentage difference in number of cases compared to 2000



Plasmodium species
 ■ *P. falciparum* and mixed ■ *P. vivax*

Figure 10. Number of cases and RBM / MDG targets for 2010 and 2015

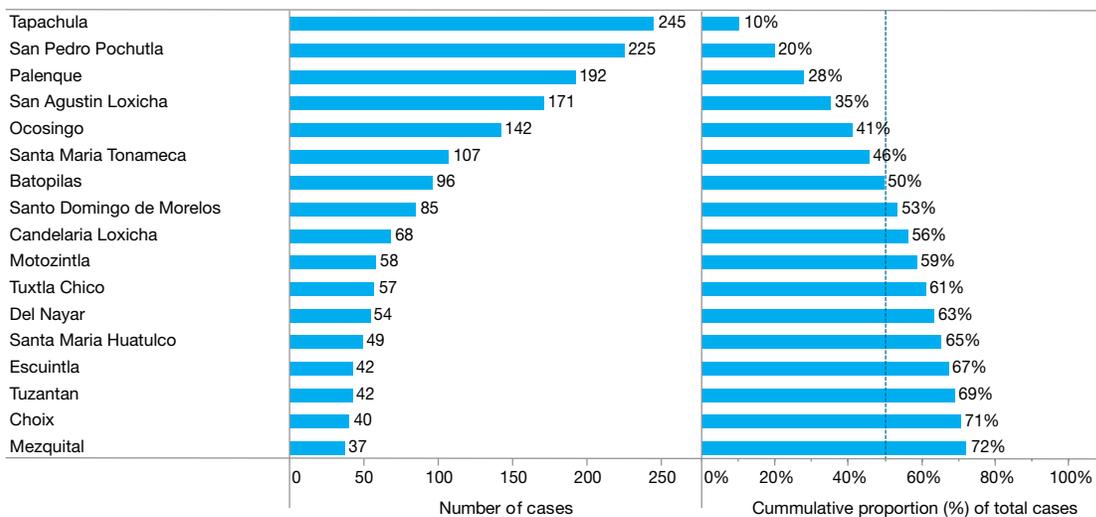


■ Reported cases ■ RBM / MDG Targets

Figure 11. Percentage of hospitalized cases, 2008

No Data Available

Figure 12. Districts with highest malaria burden and cumulative proportion of total cases in the country, 2008



* See Annex A for a complete list.

Figure 13. Districts by number of malaria cases, 2008

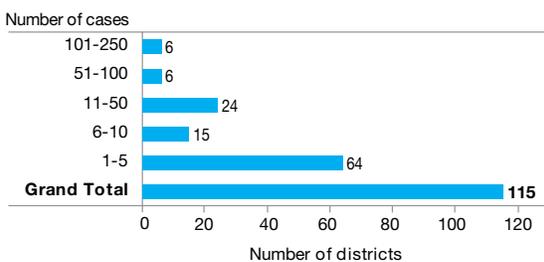


Figure 14. Districts (ADM2) by number of *P. falciparum* cases, 2008

No district reported cases of *P. falciparum* malaria in 2008

Figure 15. Districts by number of cases, API and percentage of *P. falciparum* cases, 2008

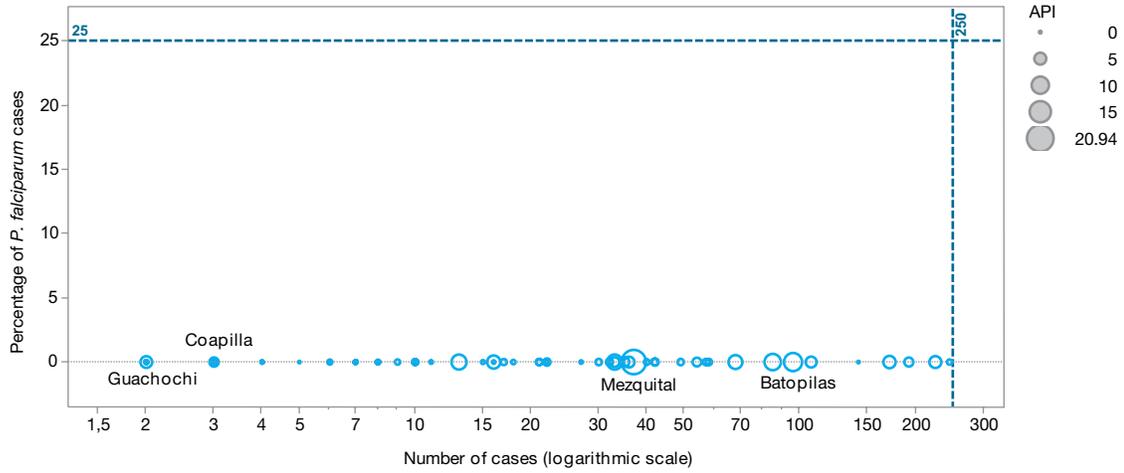


Figure 16. Annual Parasite Index (API) by districts (ADM2), 2008

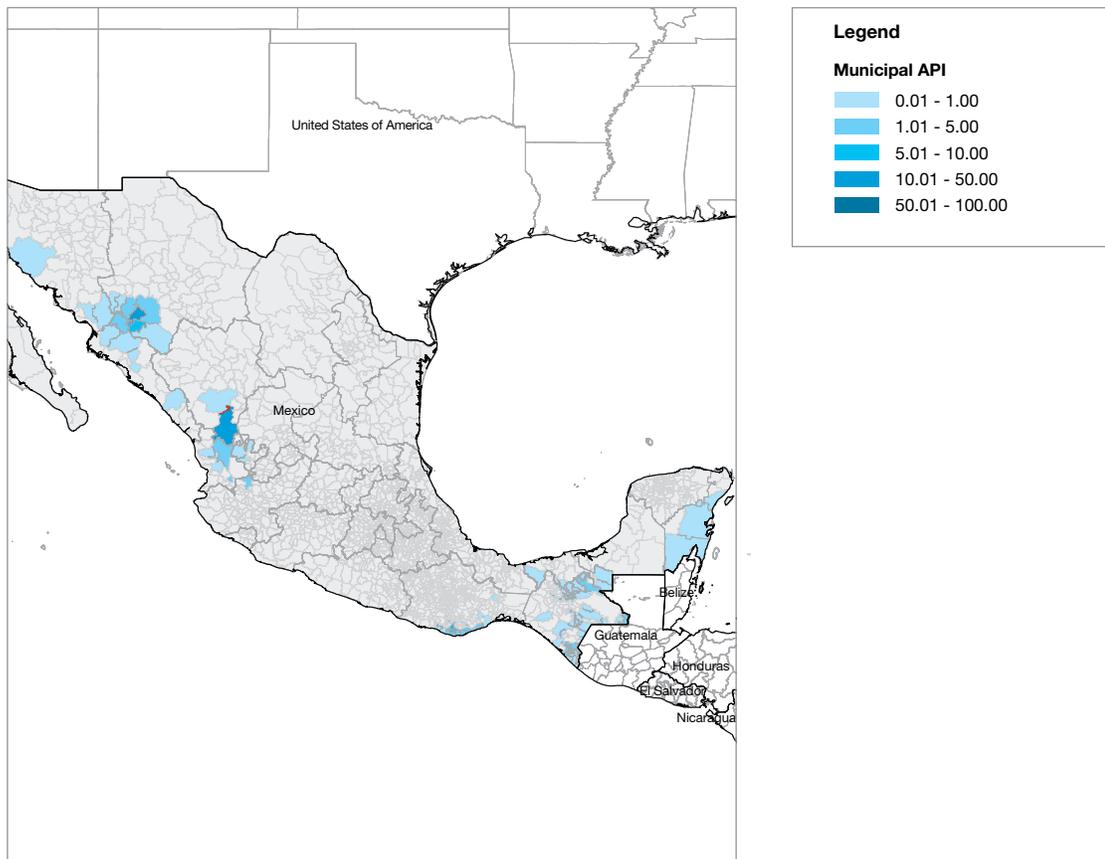


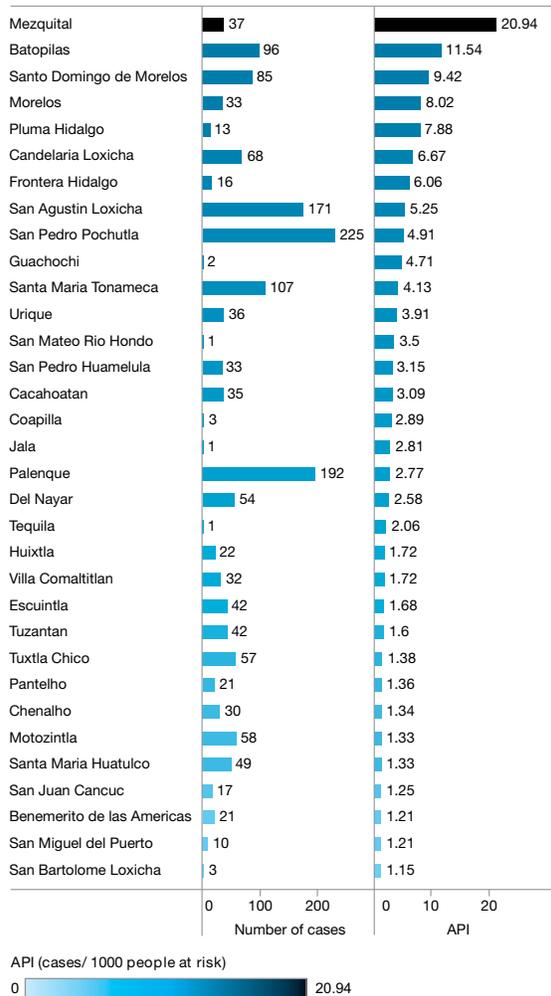
Figure 17. Population by malaria transmission risk, 2008

No Data Available

Figure 19. Population by malaria transmission risk, 2000-08

Year	High risk (API > 10/1000)	Medium risk (1/1000 < API < 10/1000)	Low risk (API < 1/1000)	Malaria free areas (No indigenous transmission)
2000	20,553,000	22,225,000	43,007,000	48,860,000
2001	21,313,000	24,026,000	43,376,000	46,348,000
2002	19,673,000	18,034,000	16,941,000	47,407,000
2003	19,673,000	18,034,000	16,941,000	47,406,000
2004	1,805,000	531,000	484,000	102,212,103
2005	1,128,000	726,000	953,000	103,645,475
2006	1,127,623	726,003	952,578	105,405,140
2007	1,127,623	726,003	952,578	105,405,140
2008	---	---	---	---

Figure 18. Annual Parasite Index (API) and number of cases by district, 2008



* See Annex A for a complete list.

--- No Data Available

Figure 20. Slides examined and Slide Positivity Rate (SPR), 2000-2008

Year	Number of slides examined	Number of slides positive	Slide Positivity Rate (%)
2000	2,003,569	7,390	0.37
2001	1,857,233	4,997	0.27
2002	1,852,553	4,624	0.25
2003	1,565,155	3,819	0.24
2004	1,454,575	3,406	0.23
2005	1,559,076	2,967	0.19
2006	1,316,403	2,514	0.19
2007	1,430,717	2,361	0.17
2008	1,246,780	2,357	0.19

Figure 21. Cases diagnosed by microscopy and RDTs, 2000-08

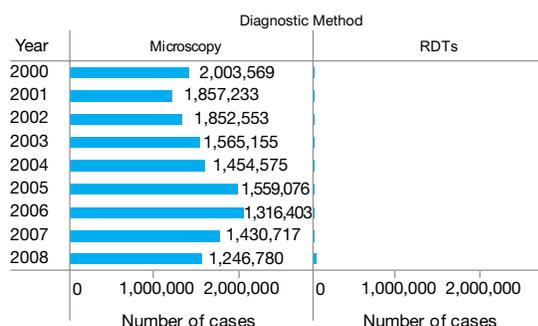
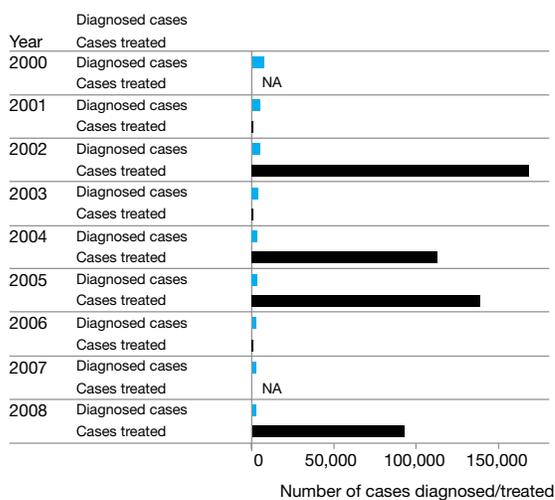


Figure 22. Number of cases diagnosed and cases treated, 2000-2008



NA- No Data Available

Figure 23. Slide Positivity Rate (SPR) by ADM1, 2008

ADM1	Examined	Total cases	SPR (%)
Chiapas	184,885	1,136	0.61
Oaxaca	120,620	804	0.67
Chihuahua	40,352	185	0.46
Sinaloa	30,401	76	0.25
Nayarit	73,278	71	0.1
Durango	6,079	38	0.63
Quintana Roo	62,120	15	0.02
Tabasco	80,459	12	0.01
Jalisco	30,615	10	0.03
Sonora	10,175	10	0.1
Aguascalientes	5,653	0	0
Baja Calif. Sur	108	0	0
Baja California	0	0	0
Campeche	73,999	0	0
Coahuila	0	0	0
Colima	15,201	0	0
Distrito Federal	4	0	0
Guanajuato	660	0	0
Guerrero	89,379	0	0
Hidalgo	10,738	0	0
Mexico	12,651	0	0
Michoacan	69,797	0	0
Morelos	31,534	0	0
Nuevo Leon	5,678	0	0
Puebla	15,190	0	0
Queretaro	14,967	0	0
San Luis Potosi	33,575	0	0
Tamaulipas	0	0	0
Tlaxcala	0	0	0
Veracruz	189,198	0	0
Yucatan	32,681	0	0
Zacatecas	6,783	0	0

Figure 24. Time span between onset of symptoms and diagnosis, 2008

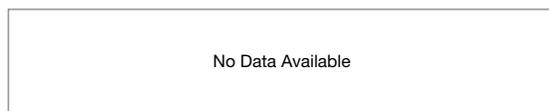


Figure 25. Number and percentage of cases by age group, 2008

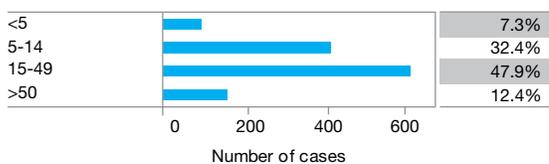


Figure 26. Number and percentage of cases by locality type, 2008

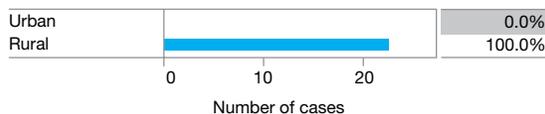


Figure 27. Number and percentage of cases in pregnant women among women of child bearing age, 2008

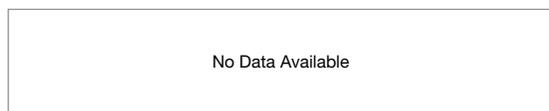


Figure 28. Number and percentage of cases in indigenous population, 2008

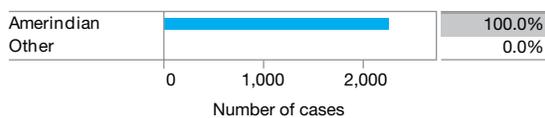


Figure 29. Proportion of *P. falciparum* cases, 2000-2008

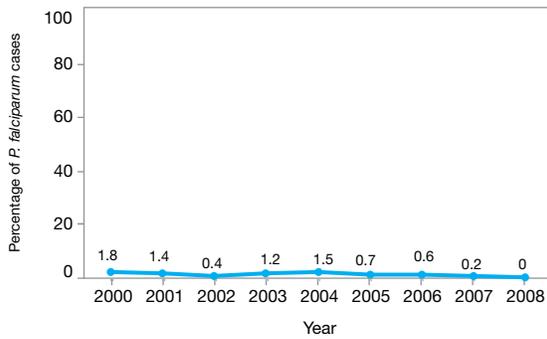


Figure 30. Number of ACT treatments distributed by year, 2000-08



Figure 31. Indoor residual spraying coverage by year, 2000-08

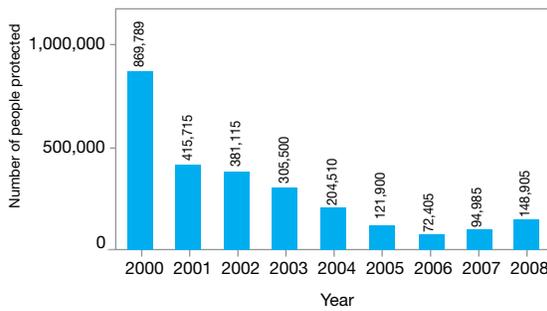


Figure 32. Number of LLINs distributed by year, 2000-2008

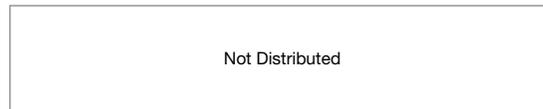


Figure 33. Number of ITNs distributed by year, 2000-08

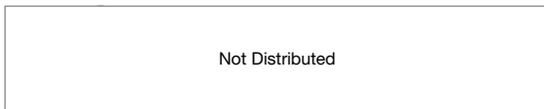
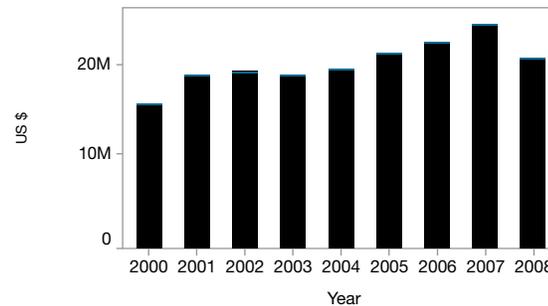


Figure 34. Sources for malaria control funds by year, 2000-08



Financing sources

- USAID
- UN agencies
- Other bilateral funds
- Global Fund
- Government