

## 3 | Bolivia

### Overview of the situation

#### Figures 1-5

In Bolivia, malaria is endemic in two main areas - in the north and in the south of the country. Malaria transmission is most intense in the Amazon Departments of Beni and Pando, which border Brazil and Peru. *Plasmodium falciparum*-borne malaria is highly focal in this region of the country, where transmission peaks are associated with the harvesting activities in which a large part of the population is engaged. The perpetuation of malaria transmission can be traced to the difficulties in timely access to health services and poor living conditions of the population groups that move around to harvest Brazil nuts in those regions.

In 2008, 9,748 cases of malaria were reported in Bolivia, of which 836 were *P. falciparum*-borne, making it the country with the smallest percentage of transmission by *P. falciparum* in the Amazon region. The Department of Beni reported 5,826 cases (59%), most of them in people involved in carrying out harvesting activities in the adjacent Department of Pando. As in the rest of the Amazon region of the neighboring countries, *Anopheles darlingi* is the principal species of malaria vector. As part of the vector control activities, entomological studies were recently conducted in areas of high malaria transmission in the Departments of Beni and Pando; mosqui-

to biting rates were found between 1.2 and 242 bites per night inside dwellings. The Municipality of Guayaramerin, adjacent to the border with the Brazilian State of Rondonia, has the second highest number of cases and is an important urban malaria transmission area.

In southern Bolivia, on the border with Argentina and Paraguay, malaria is concentrated in a few pockets in the Department of Tarija, where *Plasmodium vivax*-borne malaria predominates. In this region, Yacuiba reported 858 cases in 2008, making it the country's third-highest municipality in malaria incidence. In localities of this region with less intensive malaria transmission, *Anopheles pseudopunctipennis* is the responsible vector species.

### Morbidity and mortality trends

#### Figures 4 – 9

Malaria transmission in Bolivia has dropped considerably over the past 10 years. *P. vivax*-borne malaria was 30.6% lower in 2008 than the previous year, while the drop in *P. falciparum* transmission is almost 50% in the same period. The 9,748 cases reported in 2008 constitute the lowest figure since the 1998 epidemic, when 74,350 cases were reported. There have been no reported deaths from malaria in the country since 2003.

## Geographical distribution

### Figures 1, 12 – 19

The Municipality of Riberalta, in the Department of Beni, with 3,620 cases reported in 2008, accounts for 38.4% of the country's total malaria cases. This municipality along with the municipality of Guayaramerin accounted for 60% of Bolivia's malaria morbidity. This shows a high concentration of malaria cases in this region, which could offer a good opportunity for control efforts. While malaria transmission was found to exist in 66 municipalities in 2008, 19 of these reported less than 5 cases each, while 17 had more than 50. Only 13 municipalities reported 1 or more cases of *P.falciparum*-borne malaria and only 3 reported more than 10 cases transmitted by this parasite species during the period. Bolivia's malaria situation is better than that of its neighbors. Given its highly focal transmission, high impact operations can be expected to be successful in the short term.

In 2006, the malaria program, which had previously used the total populations of malaria-endemic municipalities, adjusted the population at risk. Even so, Annual Parasite Incidence (API) dropped, particularly in the high-risk municipalities. Furthermore, the number of malaria-endemic municipalities gradually decreased, from 150 in 2005 to 66 in 2008.

## Malaria in priority groups

### Figures 25 – 28

In 2008, 9.4% of the malaria cases reported in Bolivia were among children under the age of 5.

Malaria transmission in urban areas, namely the municipality of Guayaramerin, in the Department of Pando, accounted for 11% of the total cases.

Although the malaria information system does not record the ethnic origin of the cases, because of Bolivia's demographic characteristics, most of these are considered indigenous. This is especially obvious among the Brazil nut harvesters in the Departments of Beni and Pando, where over 60% of the cases are reported.

The individual reporting-based information system under implementation since 2007 made it possible to determine that in 2008, 6.3% of the cases of malaria among women of childbearing age in the Departments of Beni and Pando were in pregnant women. Inasmuch as the general fertility rate in Bolivia is close to 110 per 1,000 (11%), the reported percentage of pregnant women with malaria could mean that a sizeable number of such women with malaria are not being reported as being pregnant and are possibly not receiving the special care they need.

## Diagnosis and treatment

### Figures 20 – 24, 29 – 30

In 2008, the malaria program conducted 159,826 slides were examined in suspected cases with access to the health system. The SPR was 6.1%, lowest since 2000. Although the SPR in the Department of Beni, where most of the malaria cases are concentrated, was higher than that of other departments, it was lower than that reported in areas with higher levels of malaria transmission in other countries of the region, like Brazil and Colombia.

In 2008, 48% of the malaria cases were diagnosed within the first 72 hours after the onset of symptoms. Late initiation of treatment in a large number of cases is apparently a determining factor in continued malaria transmission in the most endemic areas.

In 2005, Bolivia started to use RDTs for malaria diagnosis and in 2008, 5,000 tests were used, amounting to 3% of all suspected cases examined.

Timely access to parasitological diagnostic test for malaria is impossible in difficult-to-reach scattered areas. Although no objective information exists about cases of fever among people who have no contact with the health system, their existence can be assumed in several malaria endemic areas, particularly in the Amazon region.

Bolivia was the second country in the region to introduce the use of ACTs for malaria treatment. The country has been using the ASU+MQ combination since 2001 as a first-line therapy for uncomplicated *P. falciparum* malaria. The introduction of ACT treatment in 2001 coincided with a marked decline in the number and percentage of *P. falciparum* malaria cases. However, despite the continued use of ACTs, the proportion of *P. falciparum* malaria rose between 2005 and 2007, dropping once again in 2008.

## Prevention and vector control

### Figures 31-33

While IRS continues to be one of the vector control strategies in Bolivia, its use declined simultaneously with the drop in the number of malaria cases between 2005 and 2008. The number of people protected by IRS in 2008 was almost 6 times smaller than in 2005; it should be noted, however, that over the past three years, a total of approximately 60,000 persons have been protected by LLINs, close in number to the total people protected by IRS in 2005, when malaria episodes in the country surpassed 20,000.

The widest coverage through the use of LLINs introduced in Bolivia in 2005, was reached in 2006, during the implementation of the project financed by the Global Fund. In 2007, with support from the USAID-funded AMI Initiative, the LLIN implementation strategy was launched in selected localities, with the adoption of a package of operating requirements focused on achieving good usage coverage in the localities benefited and appropriate handling to safeguard duration. In 2008, 5,000 LLINs were distributed.

## Financing of malaria control

### Figure 34

Between 2004 and 2006, Bolivia benefited from a malaria control project financed by the Global Fund. The financing was suspended in 2007 and a second project submitted during the 8th convocation of the GFATM was approved in 2008.

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

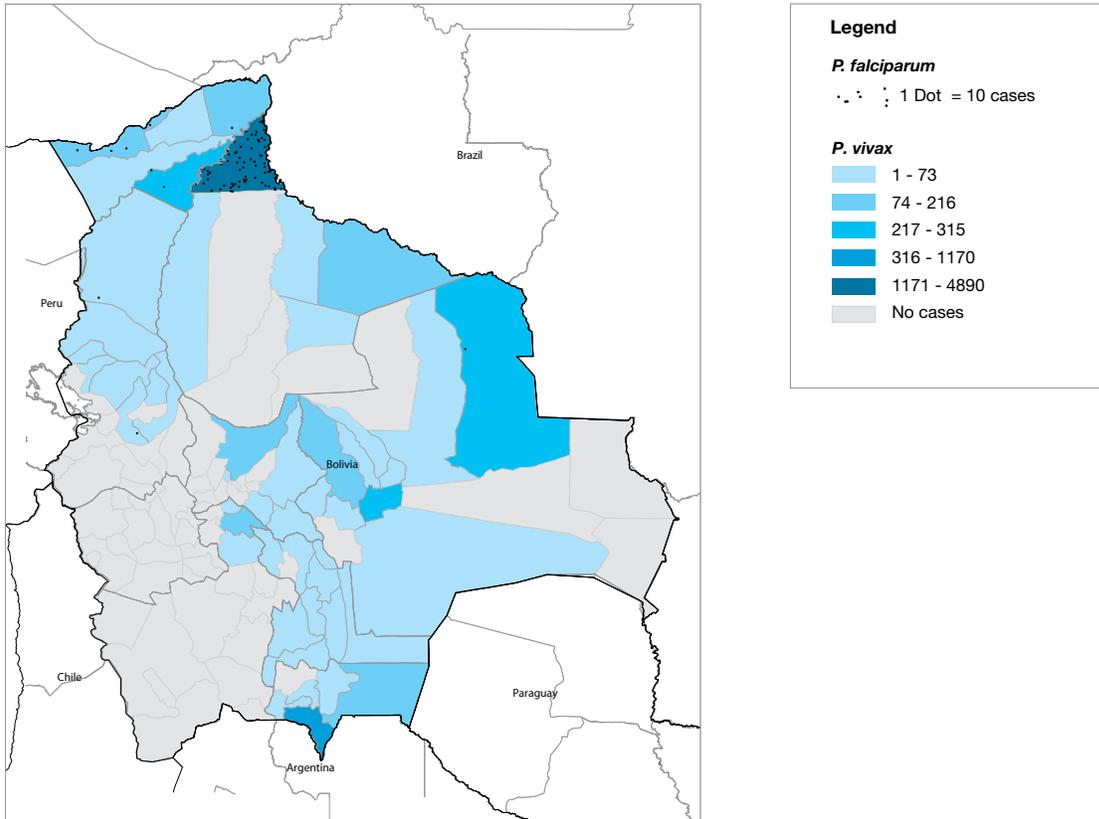
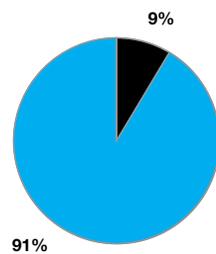


Figure 2. Proportion of cases by species, 2008



**Plasmodium species**

- *P. vivax*
- *P. falciparum* and mixed

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

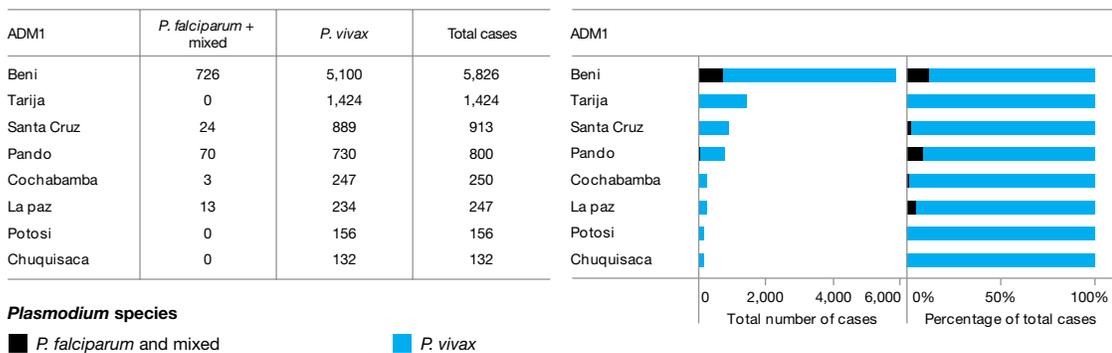


Figure 4. Number of cases by species, 2000 - 2008

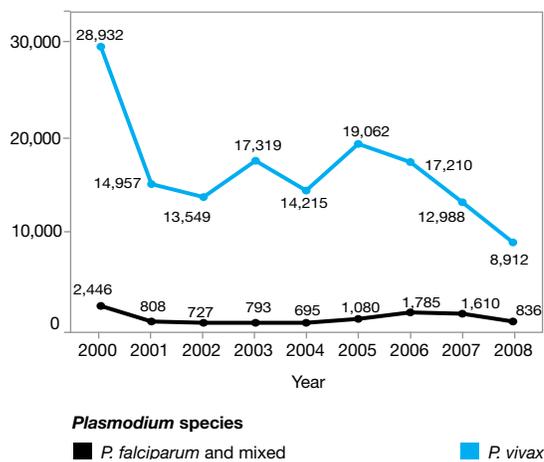


Figure 5. Number of malaria cases, 2000 - 2008

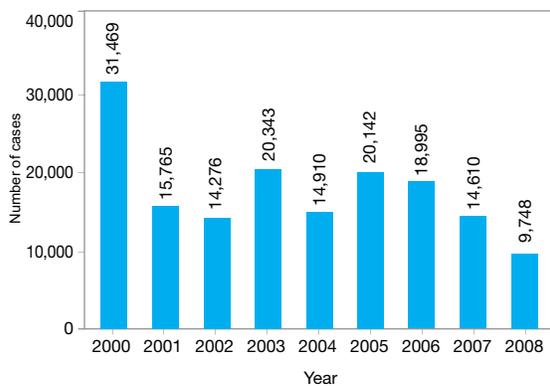


Figure 6. Number of malaria deaths, 2000-2008

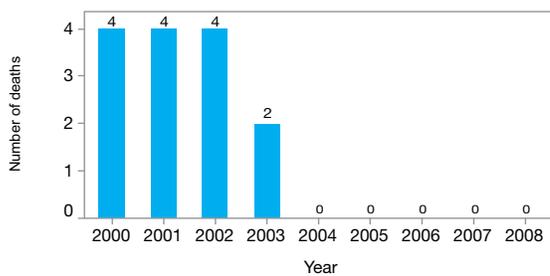
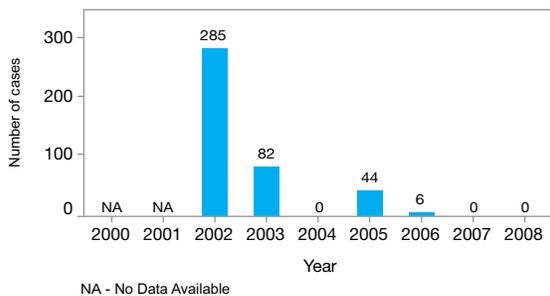
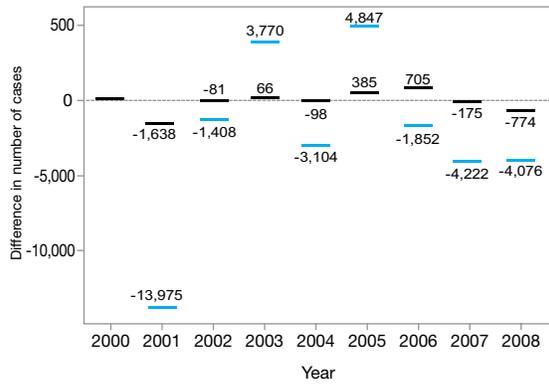


Figure 7. Number of hospitalized malaria cases, 2000 - 2008

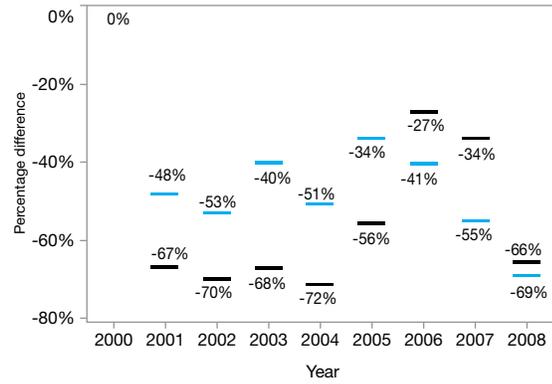


**Figure 8. Annual variations in number of cases**



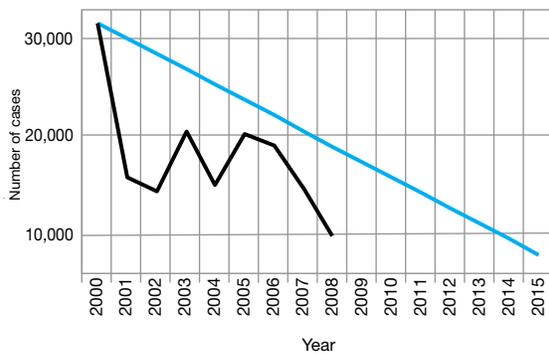
**Plasmodium species**  
 ■ *P. falciparum* and mixed      ■ *P. vivax*

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



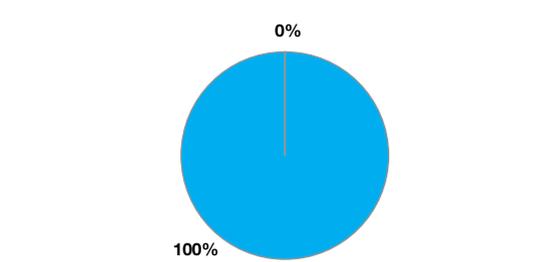
**Plasmodium species**  
 ■ *P. falciparum* and mixed      ■ *P. vivax*

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



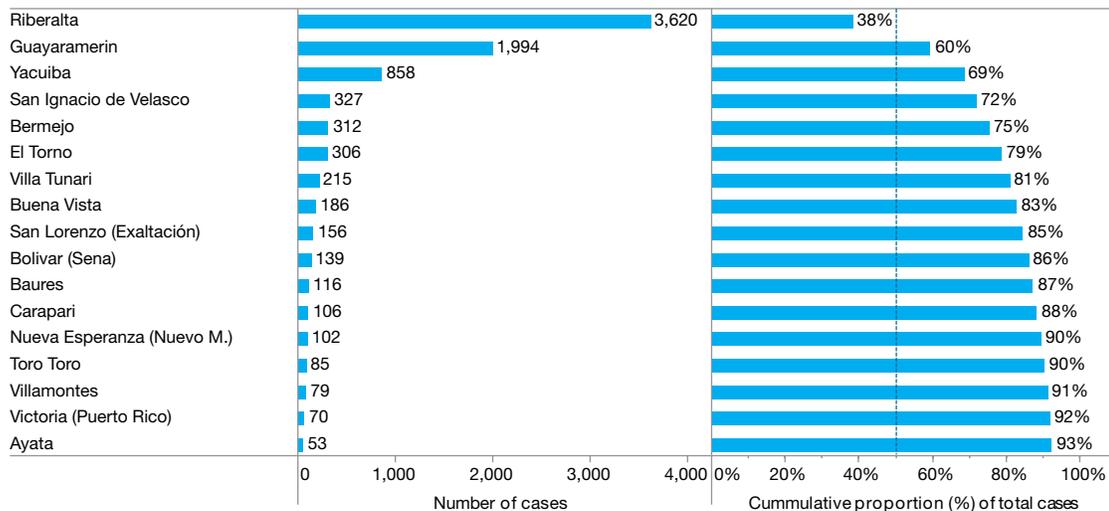
■ Reported cases      ■ RBM / MDG Targets

**Figure 11. Percentage of hospitalized cases, 2008**



**Percentage of cases**  
 ■ Outpatients  
 ■ Hospitalized

Figure 12. Districts (ADM2) with highest malaria burden and cumulative proportion of total cases in the country, 2008



\* See Annex A for a complete list.

Figure 13. Districts (ADM2) by number of malaria cases, 2008

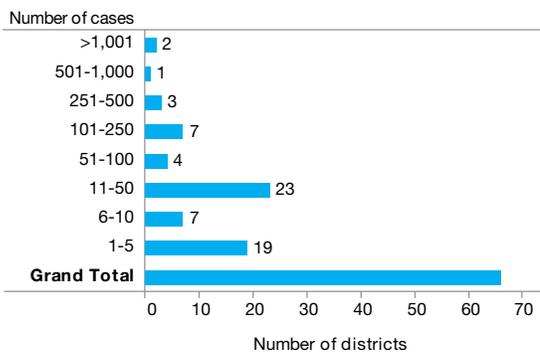


Figure 14. Districts (ADM2) by number of *P. falciparum* cases, 2008

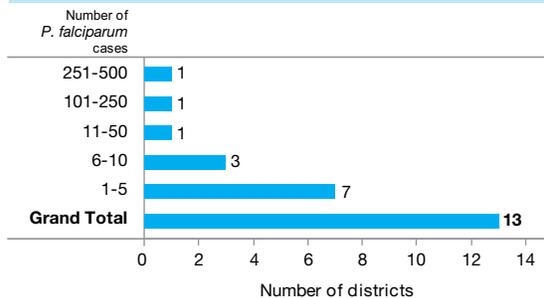


Figure 15. Districts (ADM2) by number of cases, API and percentage of *P. falciparum* cases, 2008

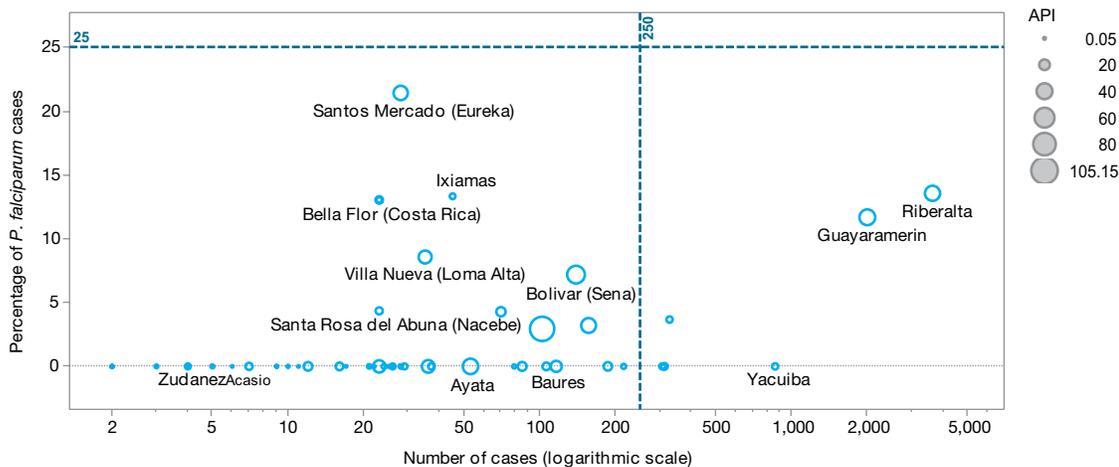


Figure 16. Annual Parasite Index (API) by districts (ADM2), 2008

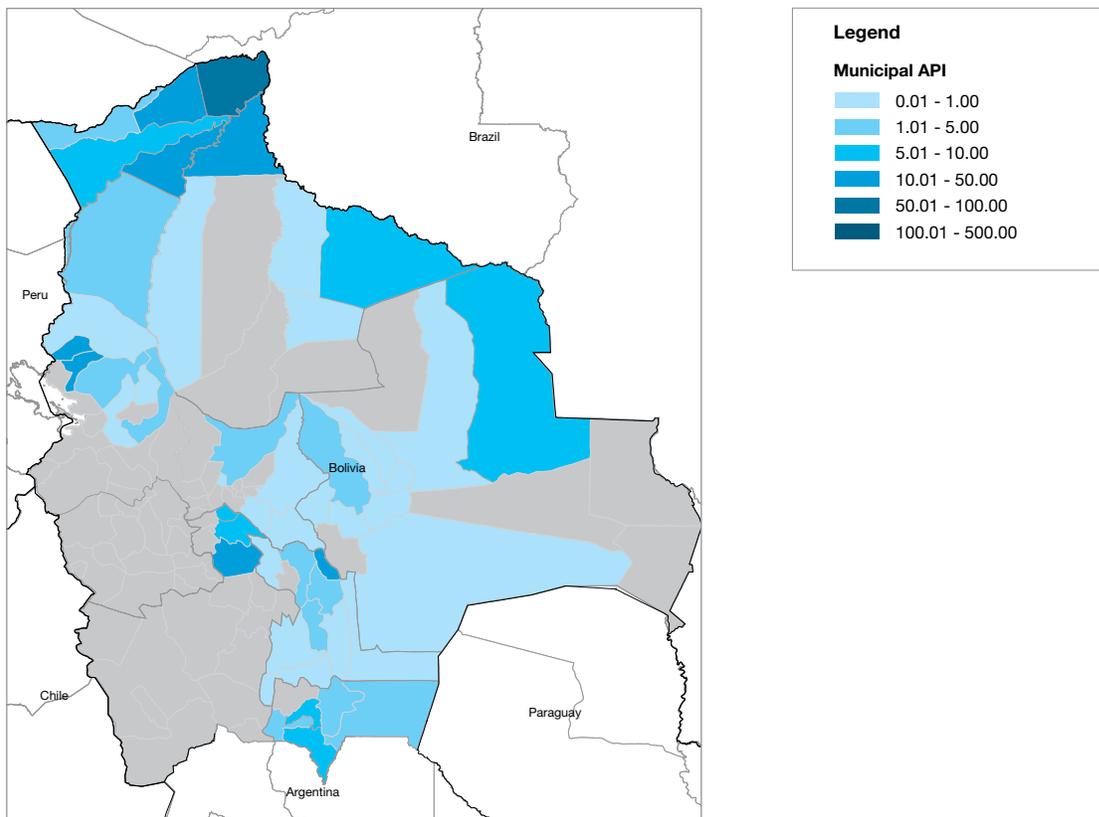
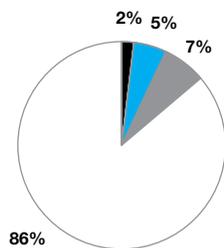


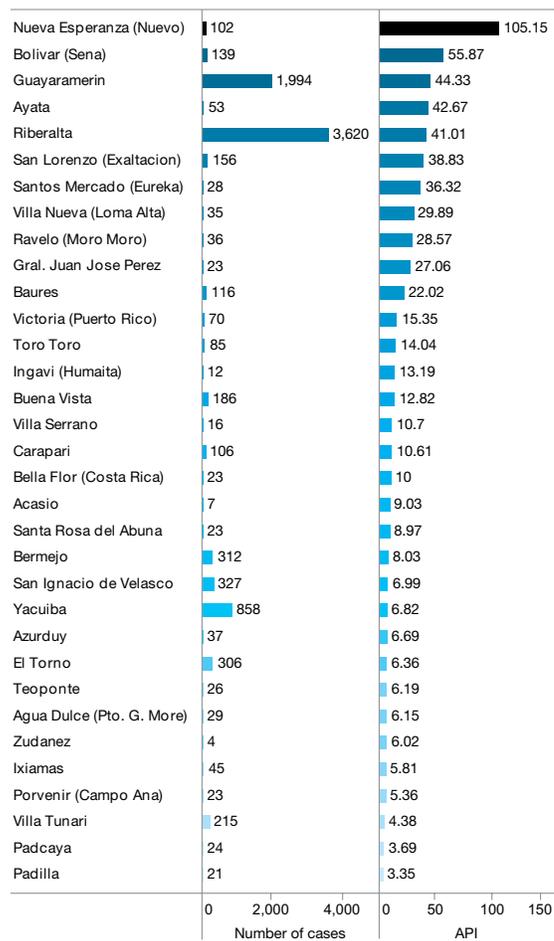
Figure 17. Population by malaria transmission risk, 2008



**Population**

- High risk (API > 10/1000)
- Medium risk (1/1000 < API < 10/1000)
- Low risk (API < 1/1000)
- Malaria free areas (No indigenous transmission)

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



API (cases/ 1000 people at risk)



\* See Annex A for a complete list

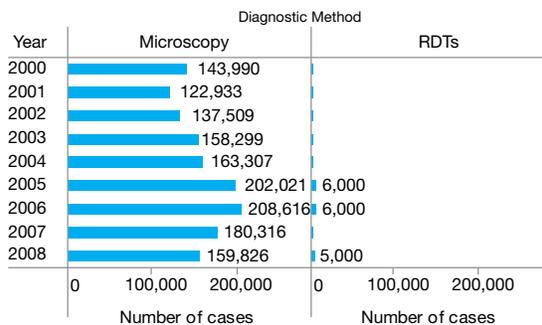
**Figure 19. Population by malaria transmission risk, 2000-08**

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	742,000	2,828,000	0	4,857,790
2001	337,000	1,434,000	100,000	6,753,268
2002	294,000	666,000	2,377,000	5,486,743
2003	1,429,000	339,000	1,544,000	5,712,922
2004	427,000	461,000	2,482,000	5,856,511
2005	368,000	423,000	2,887,000	5,749,219
2006	271,000	438,000	720,000	8,198,269
2007	271,388	438,495	849,532	8,268,107
2008	188,804	516,248	678,535	8,644,057

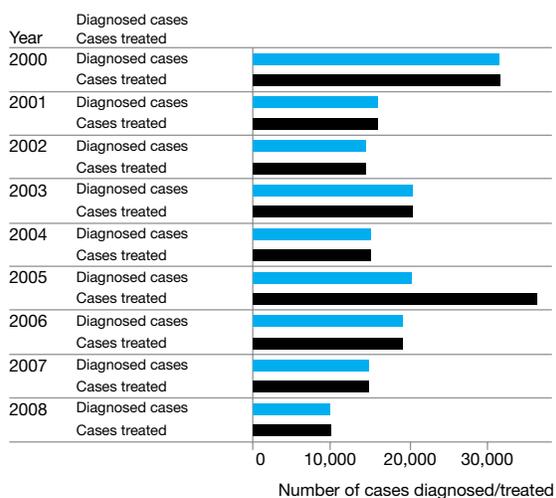
**Figure 20. Slides examined and Slide Positivity Rate (SPR), 2000-2008**

Year	Number of slides examined	Number of slides positive	Slide Positivity Rate (%)
2000	143,990	31,469	21.85
2001	122,933	15,765	12.82
2002	137,509	14,276	10.38
2003	158,299	20,343	12.85
2004	163,307	14,910	9.13
2005	202,021	20,142	9.97
2006	208,616	18,995	9.11
2007	180,316	14,610	8.05
2008	159,826	9,748	6.1

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



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

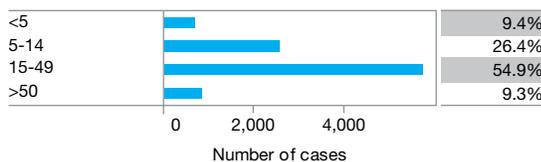


**Figure 23. Slide Positivity Rate (SPR) by ADM1, 2008**

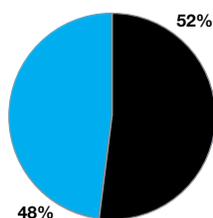
ADM1	Examined	Total cases	SPR (%)
Beni	65,694	5,826	8.87
Tarija	36,375	1,424	3.91
Santa Cruz	25,914	913	3.52
Pando	18,393	800	4.35
Cochabamba	1,729	250	14.46
La paz	4,121	247	5.99
Potosi	1,998	156	7.81
Chuquisaca	5,602	132	2.36
Oruro	---	0	0

--- Data not available

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



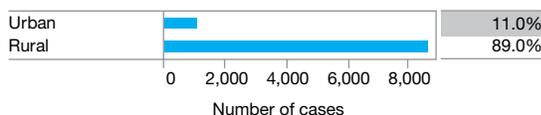
**Figure 24. Time span between onset of symptoms and diagnosis, 2008**



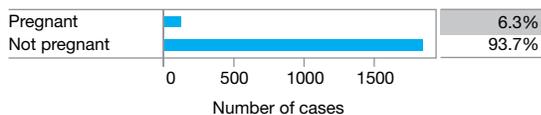
**Time span between onset of symptoms and diagnosis**

■ >72 hours  
■ <72 hours

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



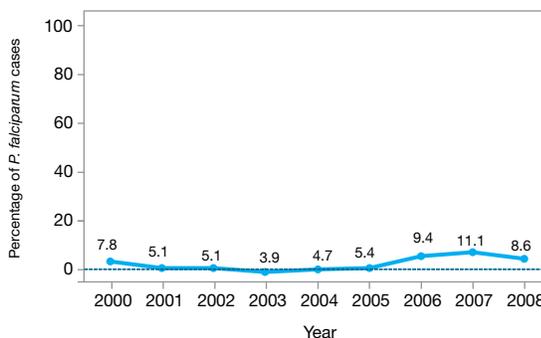
**Figure 27. Number and percentage of cases in pregnant women among women of child bearing age, 2008**



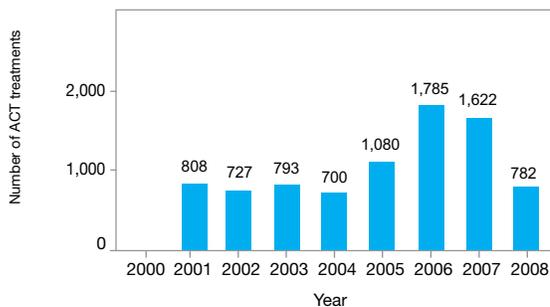
**Figure 28. Number and percentage of cases in indigenous population, 2008**

No Data Available

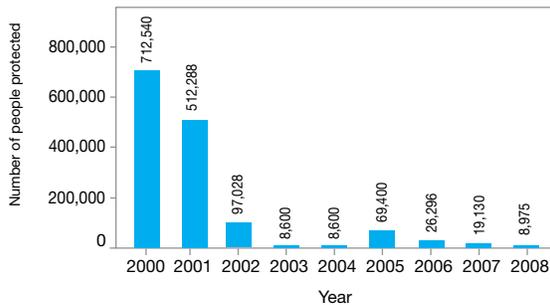
**Figure 29. Proportion of *P. falciparum* cases, 2000-2008**



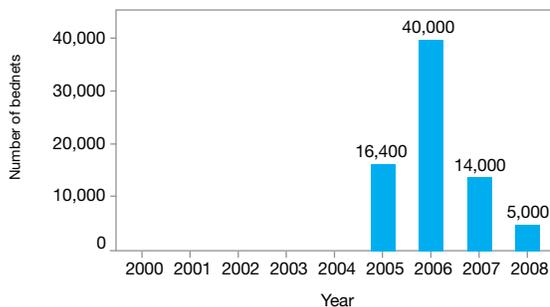
**Figure 30. Number of ACT treatments distributed by year, 2000-08**



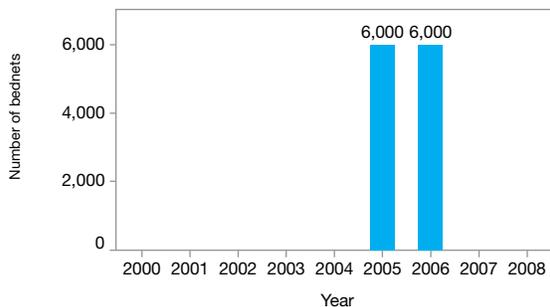
**Figure 31. Indoor residual spraying coverage by year, 2000-08**



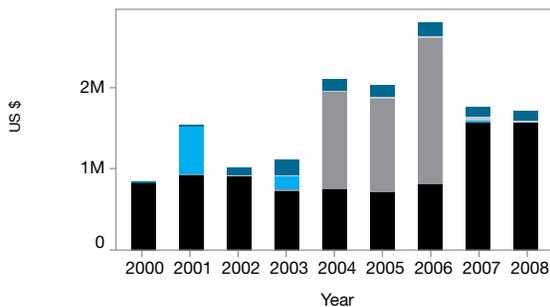
**Figure 32. Number of LLINs distributed by year, 2000 - 2008**



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



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



**Financing sources**

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