

Overview of the situation

Figures 1-5

A total of 42,214 cases of malaria were reported in Peru in 2008, continuing a steady downward trend in morbidity that began in 2005. *Plasmodium falciparum* cases made up 10.6% of the total number of cases in the same year, the lowest percentage in a decade. The Department of Loreto, in the Amazon region, reported 55% of the country's cases in 2008. It was followed by the Departments of Madre de Dios, Piura, Tumbes and Junin, which together constitute a second tier regarding burden of disease.

Transmission of *P. falciparum* malaria was practically confined to the Department of Loreto, where 99% of the country's cases *P. falciparum* cases were reported. Despite the highly focal transmission in Loreto, and the somewhat less intense transmission in the other aforementioned departments, this form of malaria is still widely scattered, and many departments reported cases in 2008. There are essentially two types of transmission areas: the tropical areas of the Amazon departments, and the desert area in the north along the Pacific. Inter-Andean valleys make up a third, less important area.

The principal vector of malaria in the Amazon region is the mosquito *Anopheles darlingi*. In this area, expansion of the agricultural frontier, unplanned growth of human settlements and

poor conditions of rural dwellings are the most important determinants of malaria transmission. Both the expansion of roads into the Amazon region and trade with the region contribute to the risk of malaria dissemination.

Along the northern coast, the vector species is *A. albimanus*. In recent years, transmission has been associated with the expansion of rice growing areas. Vector proliferation in marginal urban areas has also been a determinant of transmission in this region.

Morbidity and mortality trends

Figures 4 – 9

Malaria transmission in Peru saw a significant increase at the end of the 1990s, and reached a high of 247,229 reported cases in 1998. In 1999 and 2000, the number of cases fell substantially, but in the following decade it rose gradually to stabilize at approximately 85,000 cases per year. In the last decade cases by *P. vivax* were more predominant than at the end of the 1990s; in 1998, 34% of cases were by *P. falciparum*. As observed in other Amazon countries, between 2005 and 2008 malaria transmission declined again, as did the proportion of cases by *P. falciparum*. The latter decreased from 17% in 2005 to 10.6% in 2008. Between 2000 and 2008, the number of cases of *P. falciparum* malaria decreased by 78%, and of *P. vivax* malaria, by 21%. There has been

a consistent downward trend since 2000 and no malaria deaths have been reported in Peru since 2004.

Geographical distribution

Figures 1, 12-19

While malaria is focalized in some provinces, such as Maynas in the Department of Loreto, transmission is scattered to a large degree. In 2008, 42 districts in 18 provinces reported more than 250 cases of malaria. *P. falciparum* transmission is even less focalized, such that, in 2008, only eight provinces reported more than 10 cases, and 14 districts reported more than 100 cases of that type of malaria. Four districts reported more than 250 cases of *P. falciparum* malaria, two of them in the Province of Maynas.

Maynas, one of Loreto's seven provinces in the Peruvian Amazon region, reported 30% of the country's cases in 2008. This large province borders Colombia to the north and Ecuador to the west. The districts of Iquitos, Fernando Lore, San Juan Bautista and Mazan constitute an important *P. falciparum* and *P. vivax* malaria focus in the vicinity of the city of Iquitos, where malaria transmission is associated with river travel between rural localities. The Province of Maynas, together with those of Manu and Sullana, in the Departments of Madre de Dios and Piura, respectively, accounted for 50% of the country's cases. The District of Napo, also in the Province of Maynas, is an important focus of malaria transmission, and ranks second among districts reporting cases. As in other Amazon areas, deforestation and land use patterns are among the principal determinants of malaria transmission.

On the country's border with Ecuador, environmental and social factors associated with

the Zarumilla international channel have been among the determinants of transmission in both countries.

Along with Maynas, the Province of Alto Amazonas, also in the Department of Loreto, is an important focus of transmission. The Balsapuerto District in Alto Amazonas has a population of 14,130 inhabitants, and reported 657 cases, the highest number of *P. falciparum* malaria cases in the country.

In 2008, the highest API of malaria was reported in Manu Province, Department of Madre de Dios, where the API was 202 cases per 1,000 inhabitants. In this province, the District of Madre de Dios reported an API of 437 cases per 1,000 at risk, and a total of 2,810 cases in 2008. That same year, a total of 19 districts had APIs of over 50 per 1,000 inhabitants.

Malaria in specific populations

Figures 25-28

In 2008, 17% of the in the country were reported as urban cases. Urban or periurban malaria can be found in several of the main foci of transmission in the provinces of Maynas, Sullana and Zarumilla. In Sullana, malaria is concentrated in the District of Bellavista, which had third highest in number of cases (1,841 cases) in 2008. Vector proliferation in a channel adjacent to urban and periurban areas is closely associated with the perpetuation of transmission in this malaria-endemic area.

In 2008, 28% of malaria cases in Peru occurred among children under the age of 15 years. This proportion is lower than that in most other countries in the Region. The proportion of cases among indigenous populations was similar to that of other Amazon countries, such as Brazil and Colombia.

Diagnosis and treatment

Figures 20-24, 29-30

The SPR in 2008 was 5.3%, similar to that of recent years. In 2008, 64,953 rapid diagnostic tests were performed, or one per 12 slides examined. Training in diagnosis and treatment was intensified in 2008; 1,292 health promoters in 31 districts, and 293 microscopists (156 of them new) received training.

In 2001, the use of artemisinin-based combination therapies for treatment of uncomplicated *P. falciparum* malaria was introduced and has achieved a gradual drop in the proportion of cases of falciparum malaria. The regimen used in the Amazon region is artesunate + mefloquine. Along the Pacific coast, where parasites are still sensitive to sulfadoxine + pyrimethamine (SP), the regimen is artesunate.

Because access to services can be limited in scattered areas, like the Amazon region, it is sometimes necessary to begin treatment in clinically presumptive cases. For that reason, more treatments were distributed in 2008 than number of cases confirmed.

Prevention and vector control

Figures 31-33

IRS continues to be one of Peru's main vector control strategies. In 2008, this intervention reached 235,615 people, a number similar to that of 2005 and 2006, when there was a higher number of cases. The ratio between the number of persons protected and the number of cases was higher than in neighboring countries, such as Brazil and Colombia.

Peru has started introducing the use of LLINs as a vector control strategy. Although no

nets were distributed in 2008, 28,400 LLIN were distributed in selected localities in 2007.

In areas where rice fields are determinants of the proliferation of the *A. albimanus* mosquito, intermittent irrigation has become an important vector control strategy. The technique consists of replacing current floodwater management by alternating dry periods during the vegetative season. As a result, water use is reduced, productivity is increased, soil protection has a positive impact on the environment, and malaria vectors are controlled. The importance of this type of strategy is made evident by the decline in *A. albimanus* susceptibility to pyrethroids in this region.

Financing of malaria control

Figure 34

Until 2003, malaria control activities were conducted within the framework of the National Control Program. As of 2004, these activities have become a part of the National Strategy for the Prevention and Control of Metaxenic Diseases, and are financed largely through national funds. Since 2001, USAID in coordination with the PAHO, has supported actions to improve decision-making at different levels. The Global Fund has contributed resources for malaria control through the Malaria Control Project in the Cross-Border Areas of the Andean Region (PAMAFRO Project).

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

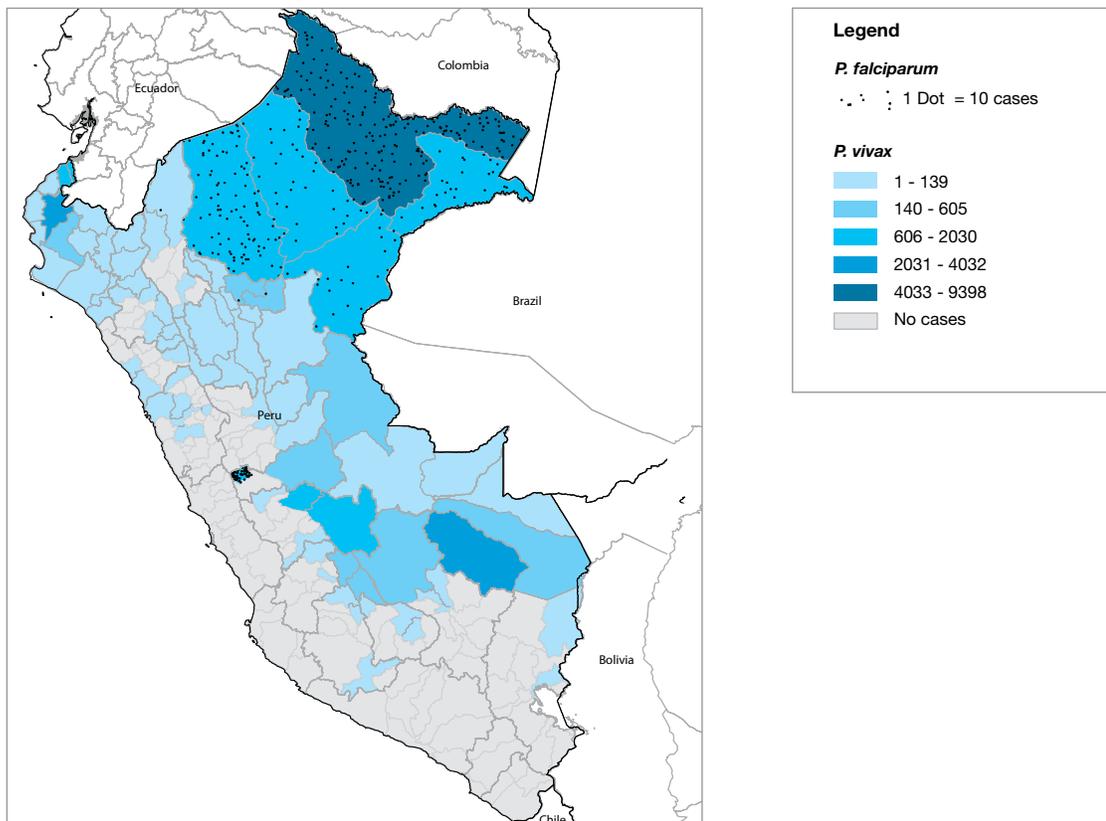
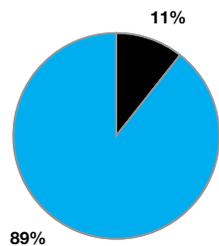


Figure 2. Proportion of cases by species, 2008



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

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

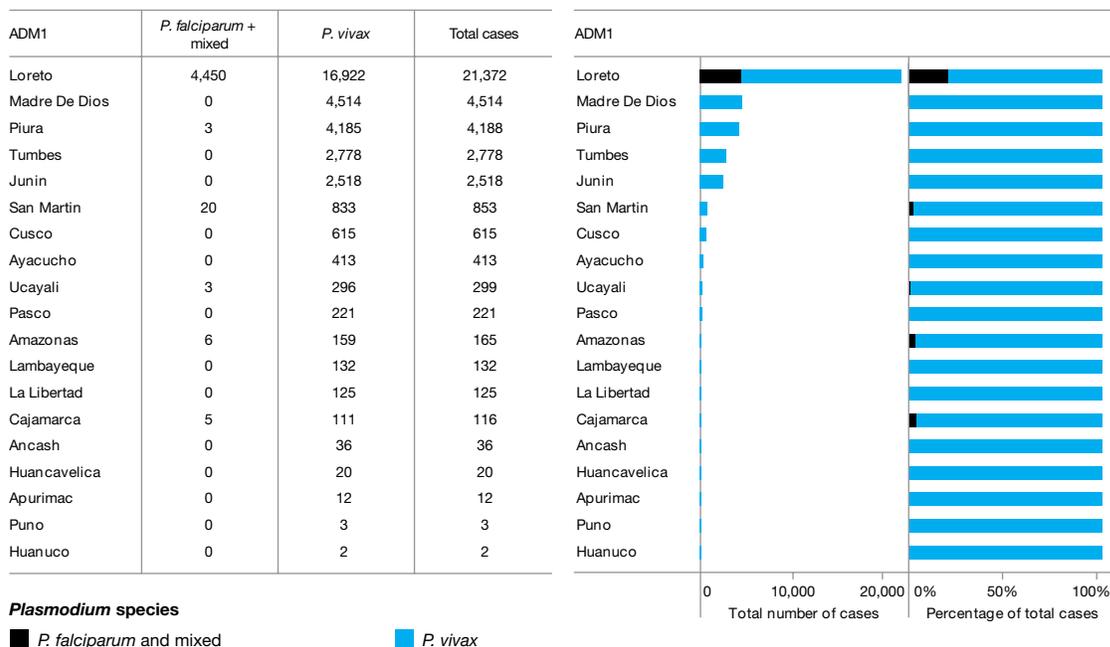


Figure 4. Number of cases by species, 2000 - 2008

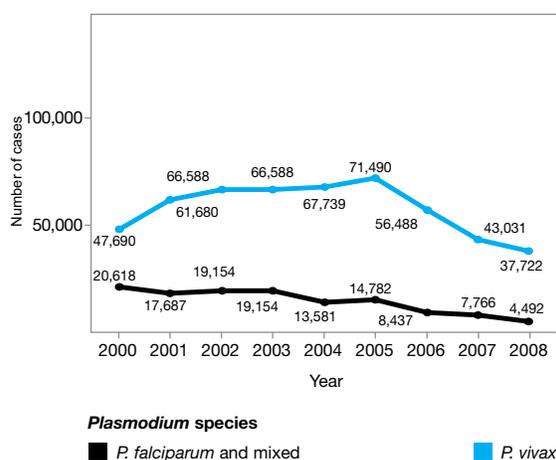


Figure 5. Number of malaria cases, 2000 - 2008

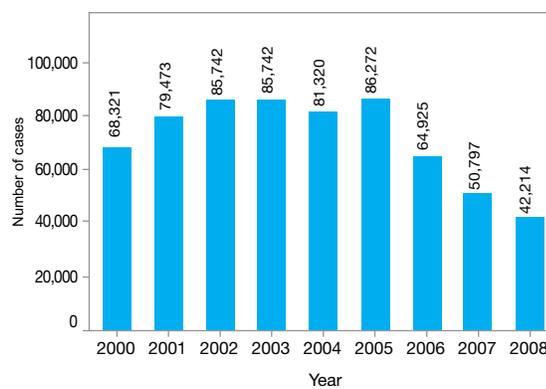


Figure 6. Number of malaria deaths, 2000-2008

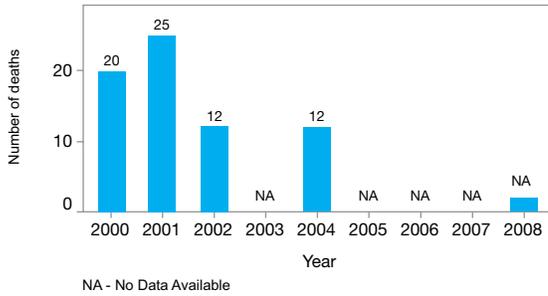


Figure 7. Number of hospitalized malaria cases, 2000 - 2008

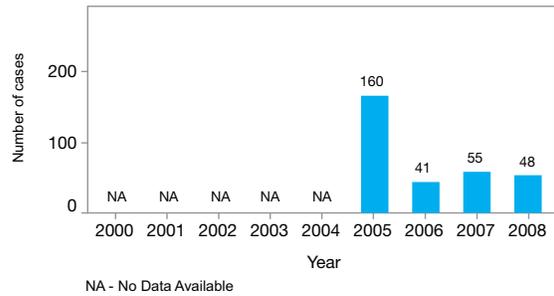


Figure 8. Annual variations in number of cases

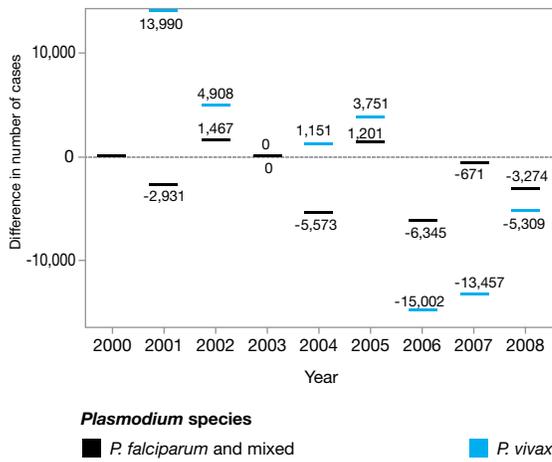


Figure 9. Percentage difference in number of cases compared to 2000

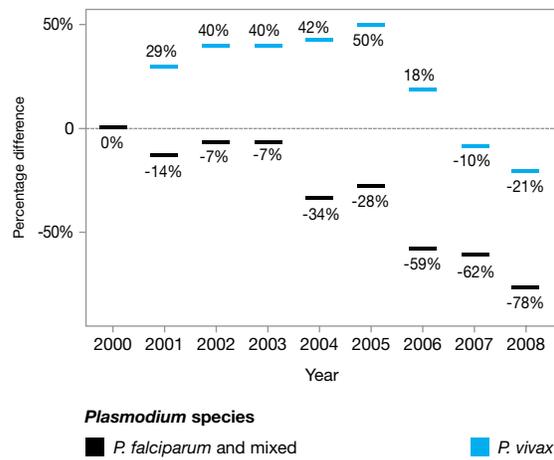


Figure 10. Number of cases and RBM / MDG targets for 2010 and 2015

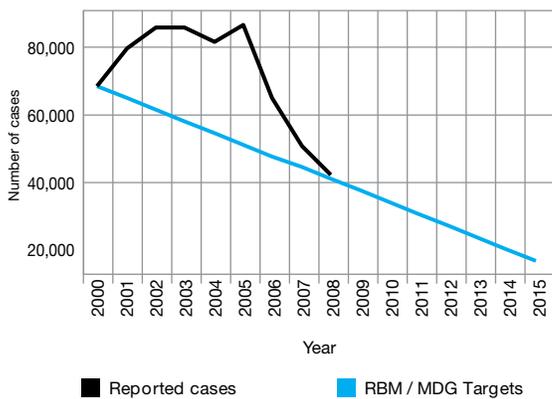


Figure 11. Percentage of hospitalized cases, 2008

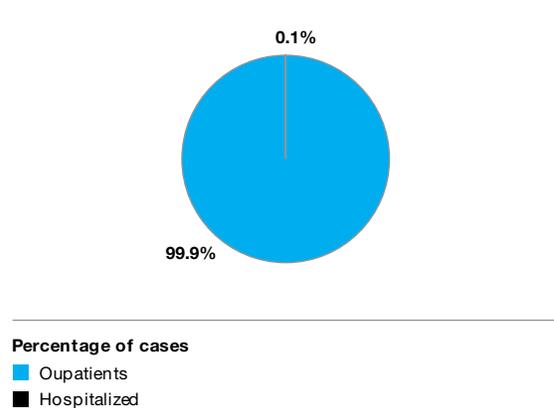
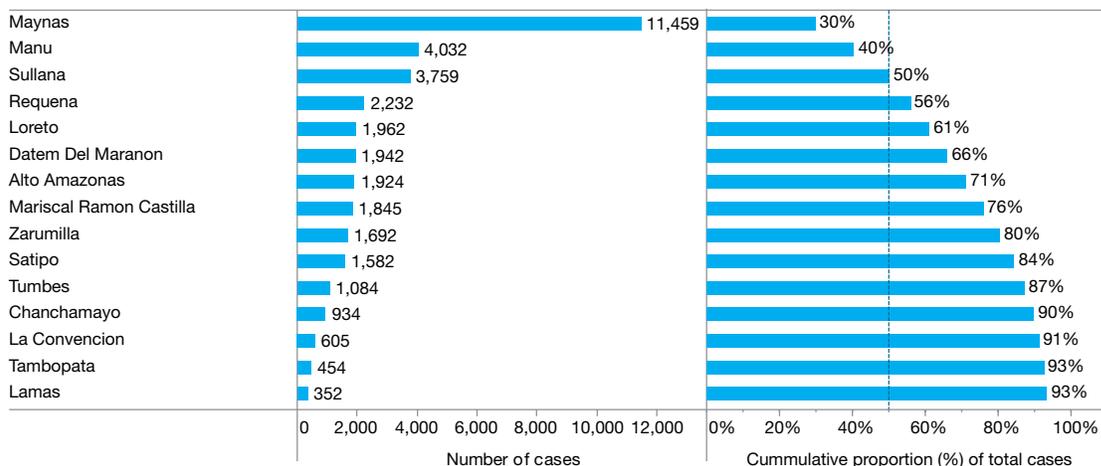


Figure 12. Districts (ADM2) with highest malaria burden and cumulative proportion of total cases in the country, 2008



* See Annex A for a complete list.

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

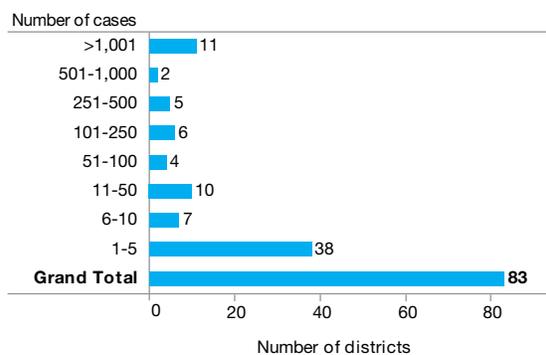


Figure 14. Districts (ADM2) by number of *P. falciparum* cases, 2008

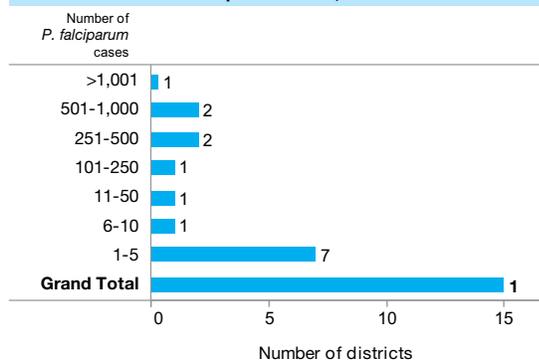


Figure 15. Districts (ADM2) by number of cases, API and percentage of *P. falciparum* cases, 2008

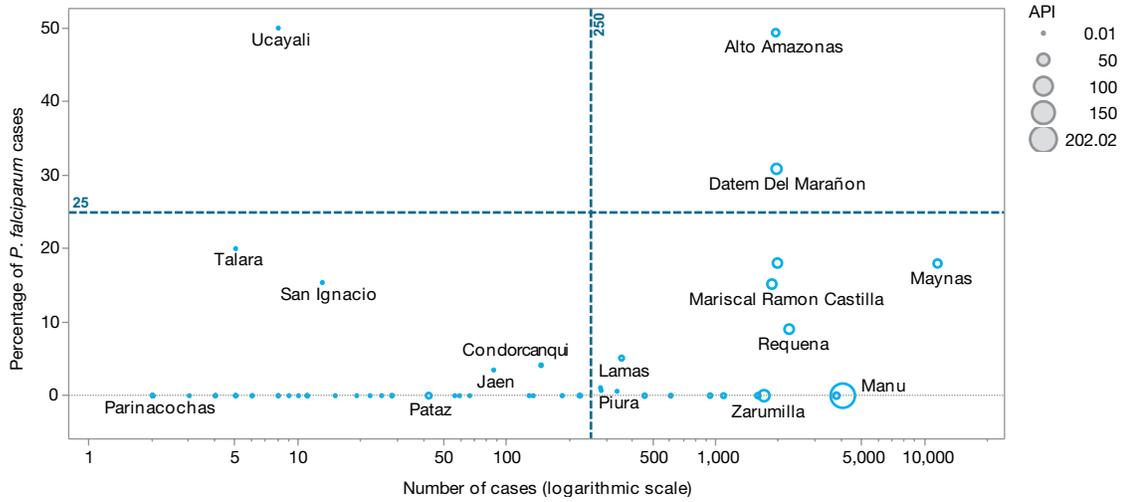


Figure 16. Annual Parasite Index (API) by districts (ADM2), 2008

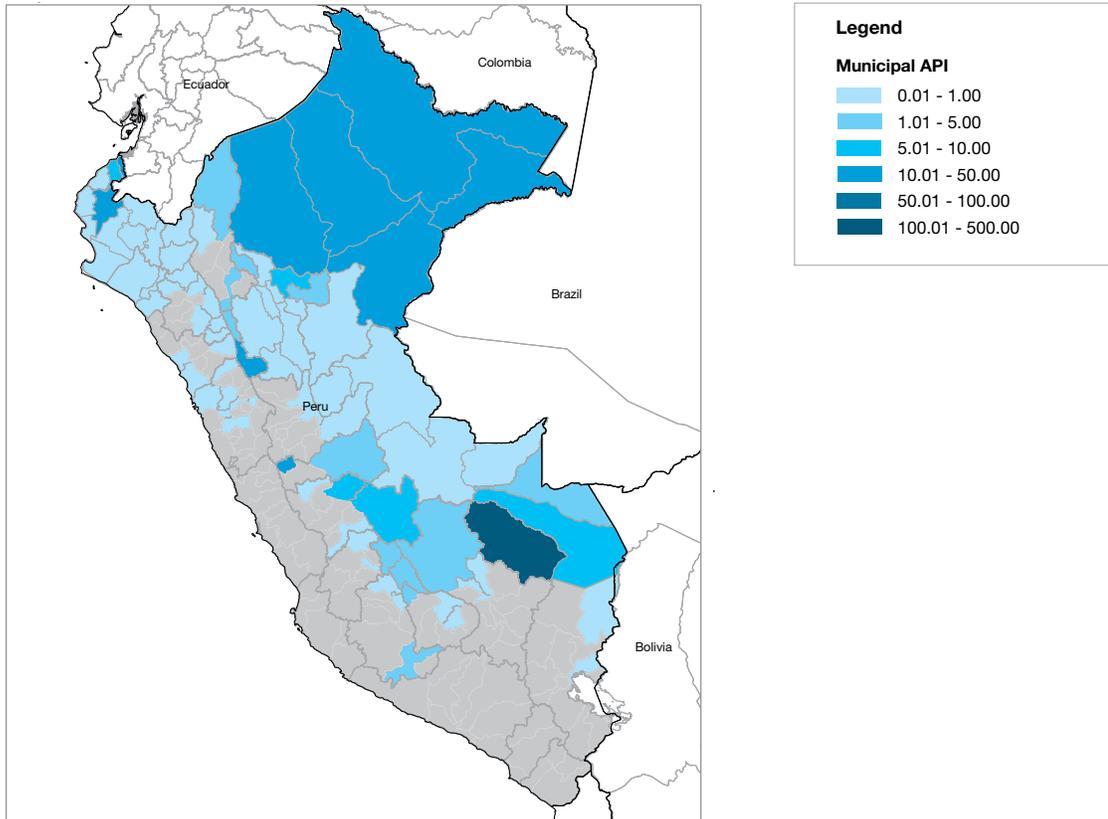
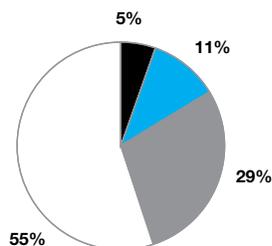


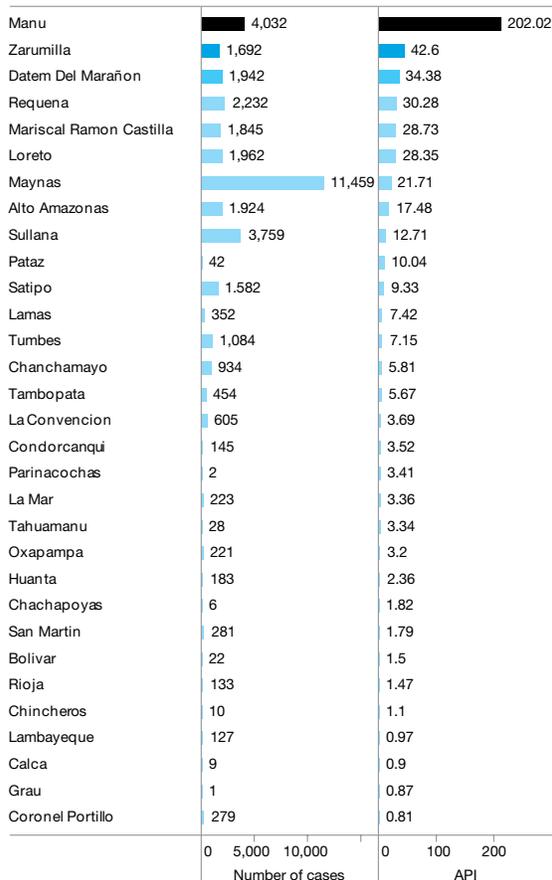
Figure 17. Population by malaria transmission risk, 2008



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

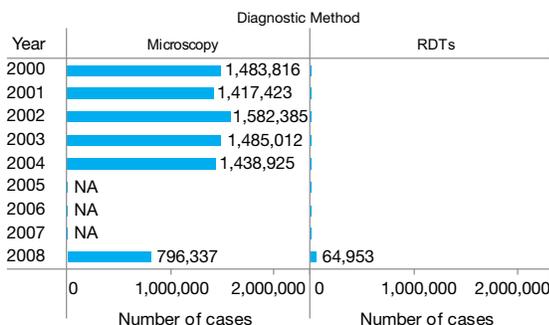
Year	High risk (API > 10/1000)	Medium risk (1/1000 < API < 10/1000)	Low risk (API < 1/1000)	Malaria free areas (No indigenous transmission)
2000	1,751,000	8,921,000	4,052,000	11,200,661
2001	2,749,000	6,207,000	5,341,000	11,792,469
2002	2,240,000	6,439,000	5,832,000	12,008,420
2003	1,973,000	7,729,000	4,892,000	12,355,178
2004	1,537,088	1,370,791	4,880,785	4,866,295
2005	1,474,586	1,389,918	5,459,682	4,866,295
2006	1,232,281	1,146,418	4,068,931	4,866,295
2007	1,129,426	983,222	4,606,779	4,866,295
2008	776,372	1,565,321	4,112,413	7,906,754

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

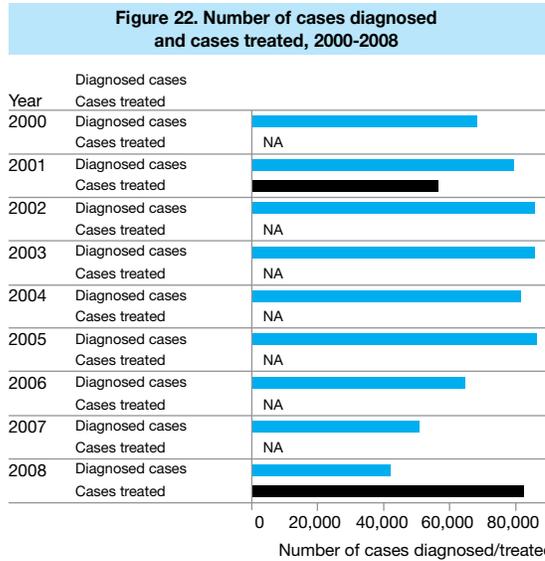
Year	Number of slides examined	Number of slides positive	Slide Positivity Rate (%)
2000	1,483,816	68,321	4.6
2001	1,417,423	79,473	5.61
2002	1,582,385	85,742	5.42
2003	1,485,012	85,742	5.77
2004	1,438,925	81,320	5.65
2005	---	86,272	6
2006	---	64,925	4.51
2007	---	50,797	3.53
2008	796,337	42,214	5.3

--- No Data Available

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



NA- No Data Available



NA- No Data Available

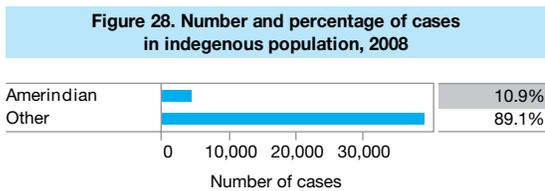
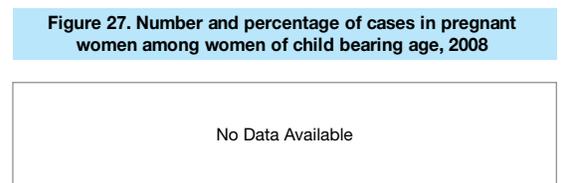
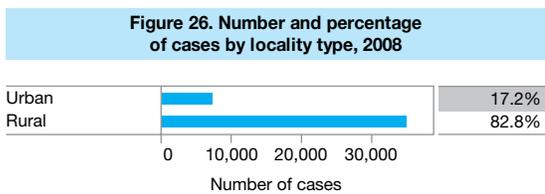
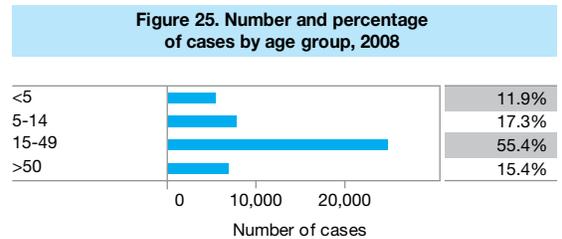
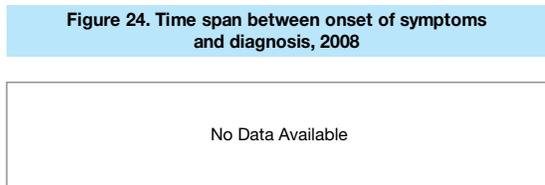
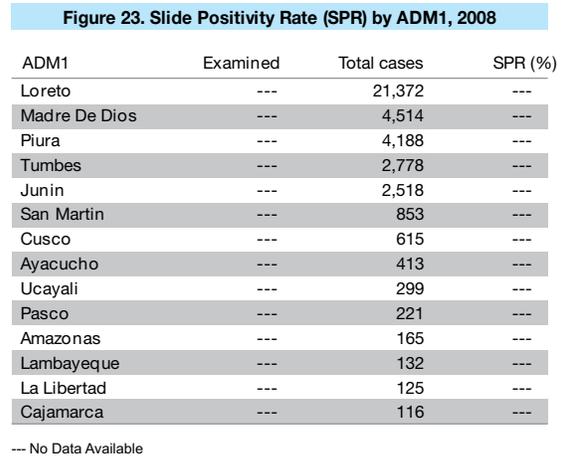


Figure 29. Proportion of *P. falciparum* cases, 2000-2008

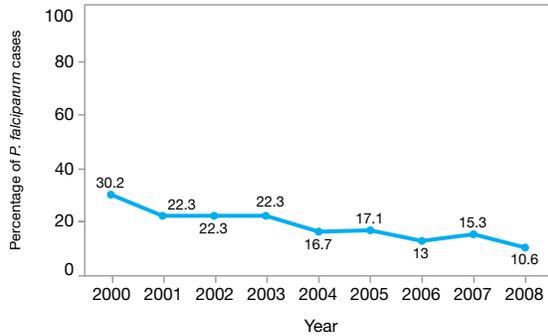


Figure 30. Number of ACT treatments distributed by year, 2000-08

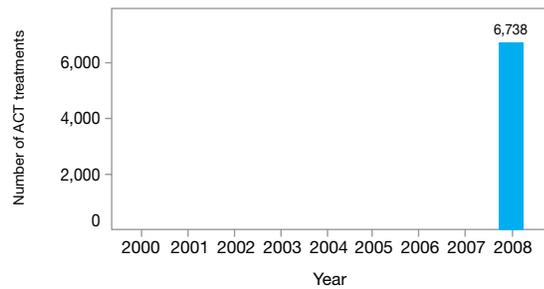


Figure 31. Indoor residual spraying coverage by year, 2000-08

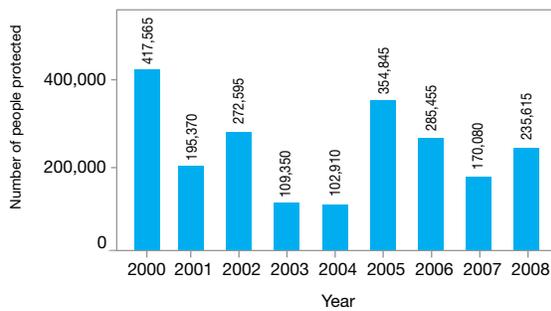


Figure 32. Number of LLINs distributed by year, 2000-08

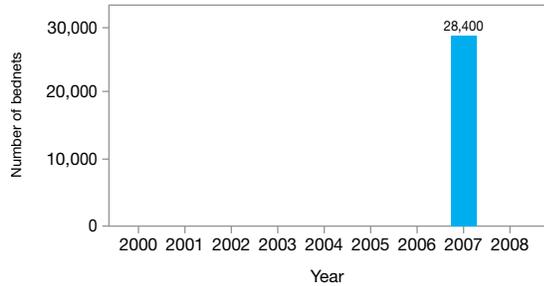


Figure 33. Number of ITNs distributed by year, 2000-08

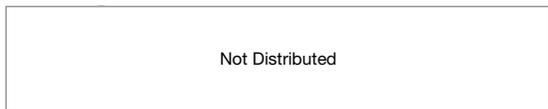
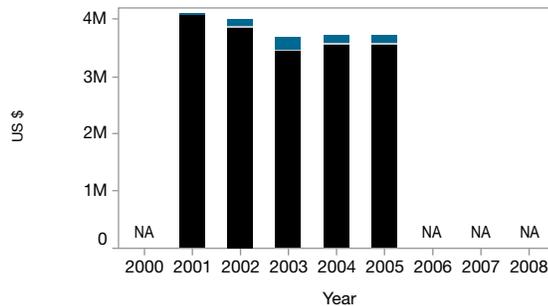


Figure 34. Sources for malaria control funds by year, 2000-08



Financing sources

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

NA - Data not available