

19 | Suriname

Overview of the malaria situation

Suriname is one of the countries of the region that have reported a large reduction in malaria transmission in recent years. Malaria in Suriname has been historically an issue of prime importance in public health, being one of the countries which had the highest incidence rates in the Americas and the highest proportion of *Plasmodium falciparum* malaria. In the past five years a significant reduction in transmission has been seen; from 14,403 cases in the year 2003 to 1477 cases in 2008. Suriname has less than half a million inhabitants with the majority living in the coastal areas. The hinterland has areas populated by Amerindians, nonindigenous “maroons” populations of African descent and a population of mixed origins (including Brazilian migrants) involved with mining activities. There is no malaria transmission along the northern coast of Suriname, where the majority of the population lives. Malaria risk is greatest along the Marowijne River, which borders French Guiana, as well as in areas close to Brokopondo Lake in the northerncentral region where *Anopheles darlingi* is present. Three main factors can be attributed to the change in the situation of malaria- the introduction of ACTs, a monitoring campaign funded by the Global Fund to intensify prevention and early diagnostic activities, and environmental factors (torrential rainstorms with exceptional floods in 2006) that led to changes in the density of vector.

Despite the marked improvement in the epidemiological situation, malaria continues to affect the unstable population of migrants involved in mining activities; the burden of disease in these groups is not completely known. Malaria control in this situation, where migrants act as reservoirs and disseminators of the disease across the country, is the main challenge for the control program now.

Morbidity and mortality trends

During the 80’s there was an increase in the number of malaria cases consequent to an internal armed conflict. In the early 1990s, the increase was caused by the intensification of gold mining and logging activities. The outbreaks in 2003 occurred in the south of the country near the Brazilian border as well as in the eastern Marowijne region, which were associated with increased movement of people into gold-mining areas. These activities continue to be the main determinant of transmission due to displacement of populations in risk areas and the difficulty in ensuring access to health services.

The reduction in transmission in recent years has been particularly marked for *P. falciparum* malaria. For the year 2008, the reduction of malaria by this species, with respect to 2000, was 92% and for *P. vivax* was 62%. The number of severe malaria cases has been reduced from 377 people hospitalised in 2003 to only 50 in

2008. Equally consistent has been the reduction in mortality such that in 2008 no malaria attributed deaths were reported.

Geographical distribution

The transmission is particularly localised around the Maroijne River along the border with French Guiana, however the number of cases is very low. Lagatabiki, with 53 cases, was the district that reported the maximum number of cases in 2008 corresponding to 17% of cases in the country. Fifty percent of the cases were from only four districts, all from Maroijne region. The population density is low in Suriname, so despite having very low number of cases API continues to be high with respect to other countries. API has reduced significantly compared to levels in the 1990s. In 2008 Suriname reported an API five times higher than that of neighboring countries, Guyana and French Guiana and closer to that of bigger countries like Peru and Colombia, which have a different epidemiological profile and population patterns. Kawemhakam district in Maroijne, had the highest API in 2008, nearly 150 cases per 1,000 inhabitants at risk, but in general API in most districts with the largest number of cases was lower, close to 15 cases per 1,000 inhabitants at risk. The main foci of transmission are related to mining activity. The mining communities have high mobility, moving within the country and to neighboring countries and spreading malaria to other communities. The living and working conditions in mining areas are conducive to the proliferation of vectors and an increased exposure of humans to vectors.

Malaria in specific populations

In Suriname all rural malaria transmission and major outbreaks are related to transmission in

gold miners. No information was available about malaria cases by age-group, pregnancy status, or ethnicity in 2008. The maroon and Brazilian immigrants working in gold mines are among the population group most affected by malaria, but the disease burden is not adequately captured by the health system.

Diagnosis and treatment

In 2008 28,137 blood slide examinations were done in Suriname, with a slide positivity rate of 5.3%, which is one of the lowest among the countries of the Amazon region. The proportion of positive slides decreased significantly over the decade, which is compatible with efforts that have been made to improve early detection of cases. Active case detection is one strategy that has been intensified to improve the timeliness of treatment. There are mobile units that provide early diagnosis and initiate the antimalarial treatment. In recent years RDT is another tool that has been effectively used, as it allows treatment to be initiated earlier than usual in remote areas of the country.

In 2004, Suriname introduced the use of AT+LUM as first line of treatment for *P. falciparum* malaria and this policy change has partly led to the dramatic impact on the transmission of *P. falciparum* malaria. Since 2001, Suriname has implemented a strategy for monitoring drug resistance as part of the activities of RAVREDA, coordinated by PAHO with funding from USAID through the AMI project. In terms of treatment, a major difficulty for the control program is to control the use of non-recommended antimalarials and self-medication by the mining population. This practice contributes to the spread of resistance and the perpetuation of transmission.

Prevention and vector control

Currently, LLINs are the primary prevention strategy in Suriname. In recent years the program distributed over 70,000 mosquito nets. It is believed that virtually the entire population in the endemic areas has access to bed nets. IRS complements ITN use but no data is available about IRS use in recent years.

Since the beginning of the decade Suriname has been making progress in implementing the use of ITNs by promoting community participation in sales and uptake of ITN use. The development of LLINs and Global Fund financing has enabled application of this strategy on a large scale. Handling and washing of the ITNs by the population are other aspects of nets that have required specific information, education and communication interventions. Recently the country has also strengthened the capacity for monitoring the residual effect of insecticides.

Financing of malaria control

In the past 4 years most of the funding for malaria control has been through the support of the Global Fund. In 2004 the country signed the first draft in the 4th round of proposals in GFR and in 2007 another project was accepted for further actions with emphasis on the mining population that contributes significantly to the perpetuation and maintenance of disease endemicity. USAID, through the AMI project coordinated by PAHO since 2002, has supported technical cooperation in various aspects of the monitoring program with enhancements that were included in Global Fund projects. Data for Government sources of funding for malaria control was not available for the past 3 years at the time of production of this report.

Figure 1. Number of cases by localities and species, 2008

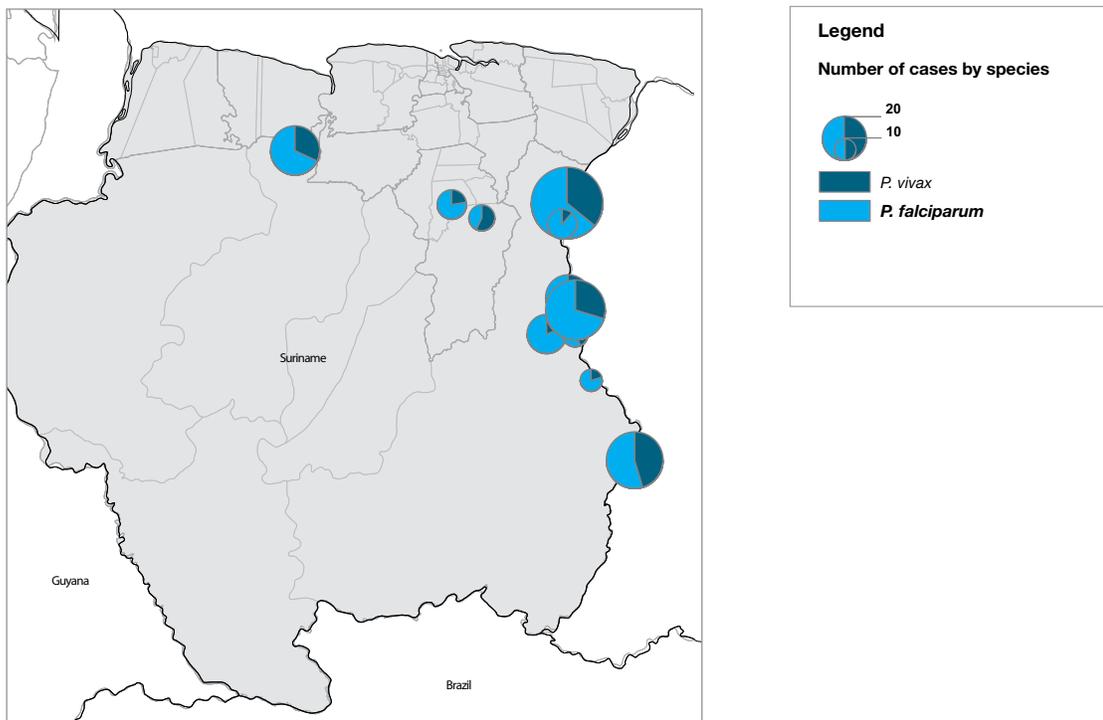
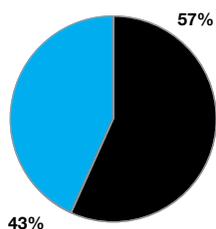


Figure 2. Proportion of cases by species, 2008

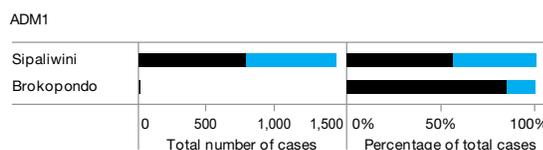


Plasmodium species

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

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

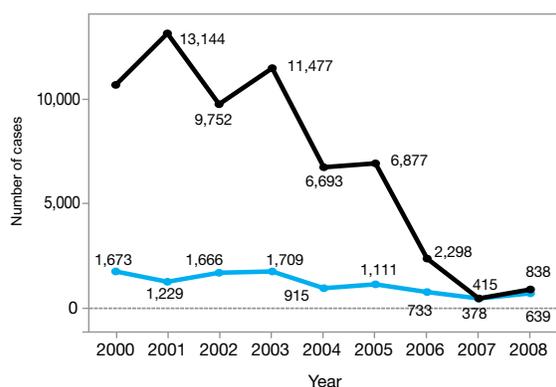
ADM1	<i>P. falciparum</i> + mixed	<i>P. vivax</i>	Total cases
Sipaliwini	800	633	1,450
Brokopondo	32	6	38



Plasmodium species

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

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



Plasmodium species

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

Figure 5. Number of malaria cases, 2000 - 2008

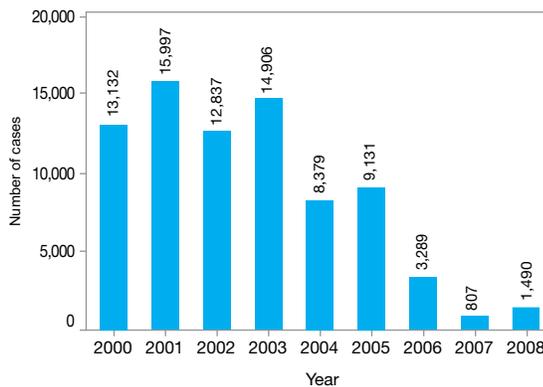


Figure 6. Number of malaria deaths, 2000-2008

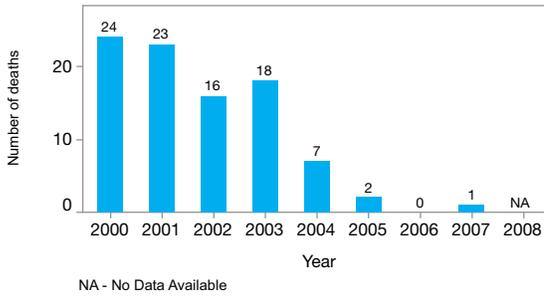


Figure 7. Number of hospitalized malaria cases, 2000 - 2008

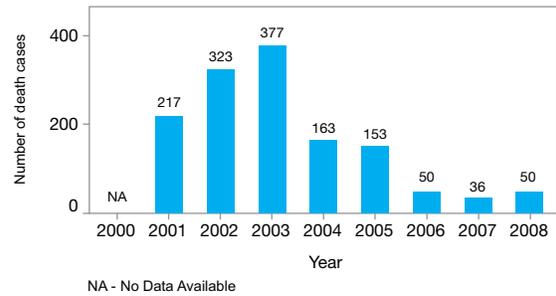
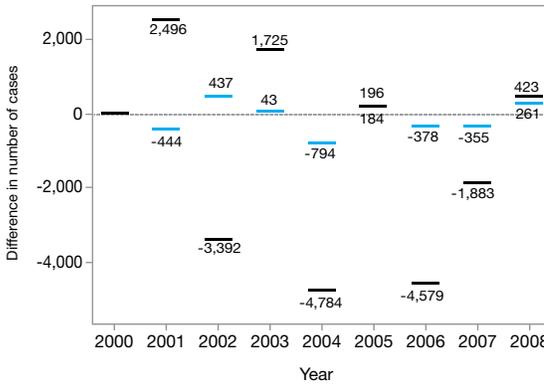
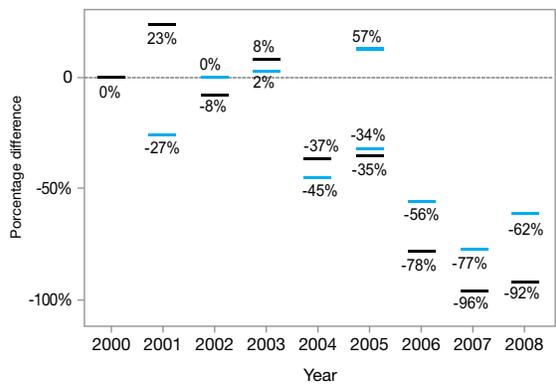


Figure 8. Annual variations in number of cases



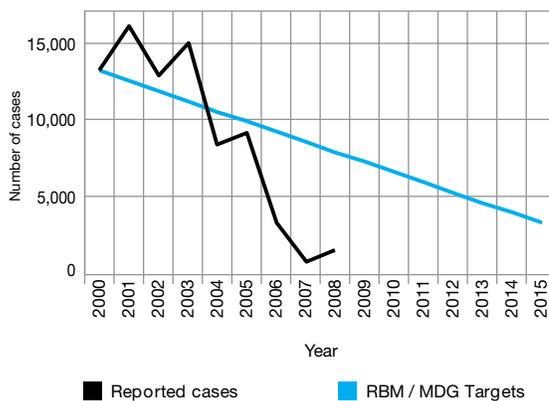
Plasmodium species
 ■ *P. falciparum* and mixed ■ *P. vivax*

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



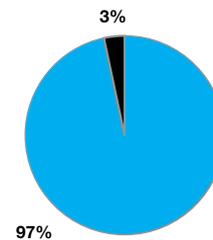
Plasmodium species
 ■ *P. falciparum* and mixed ■ *P. vivax*

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



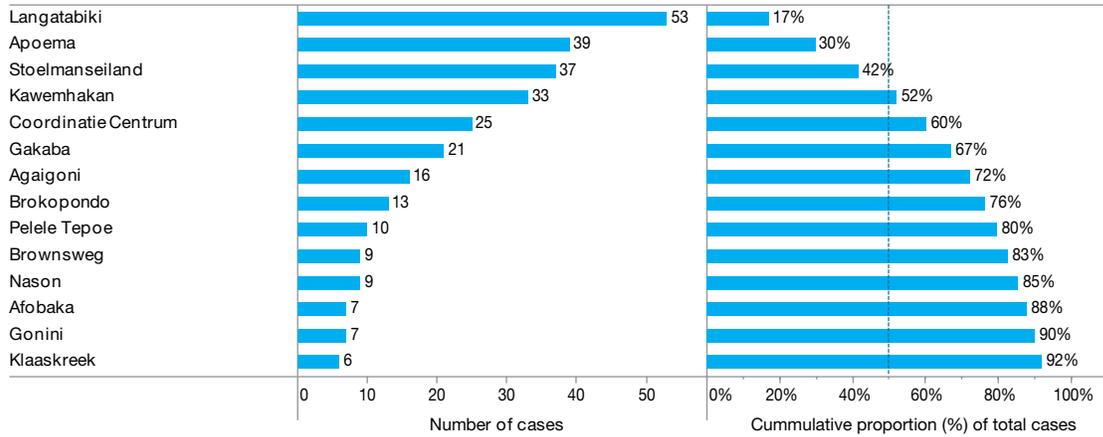
■ Reported cases ■ RBM / MDG Targets

Figure 11. Percentage of hospitalized cases, 2008



Percentage of cases
 ■ Outpatients ■ Hospitalized

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



* See Annex A for a complete list.

Figure 13. Localities by number of malaria cases, 2008

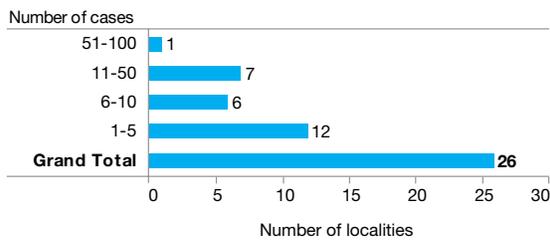


Figure 14. Localities by number of *P. falciparum* cases, 2008

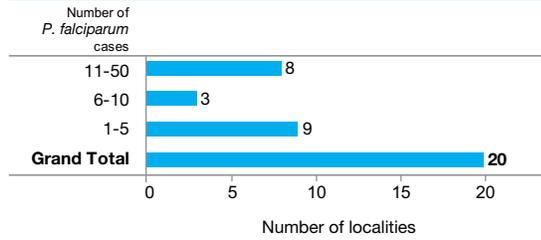
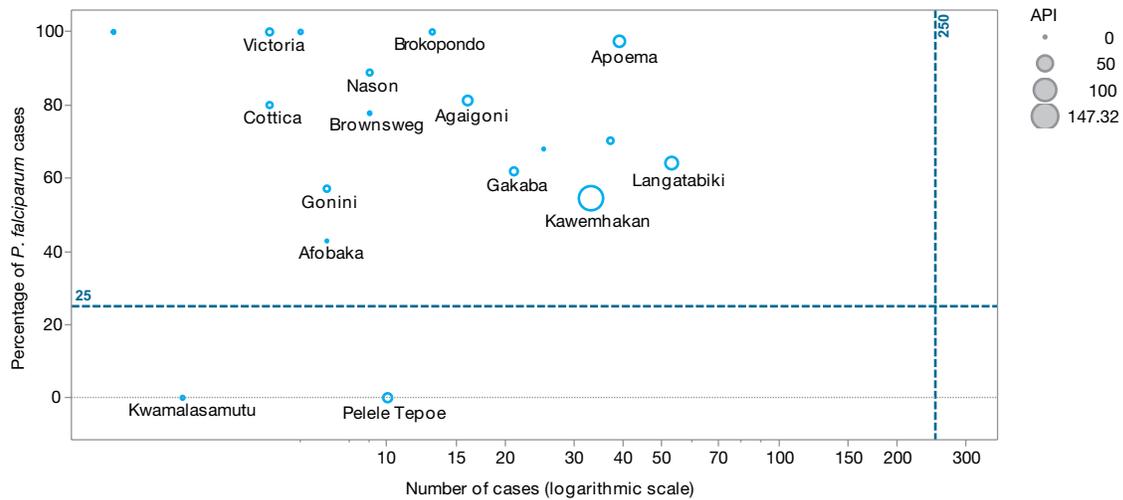


Figure 15. Localities by number of cases, API and percentage of *P. falciparum* cases, 2008



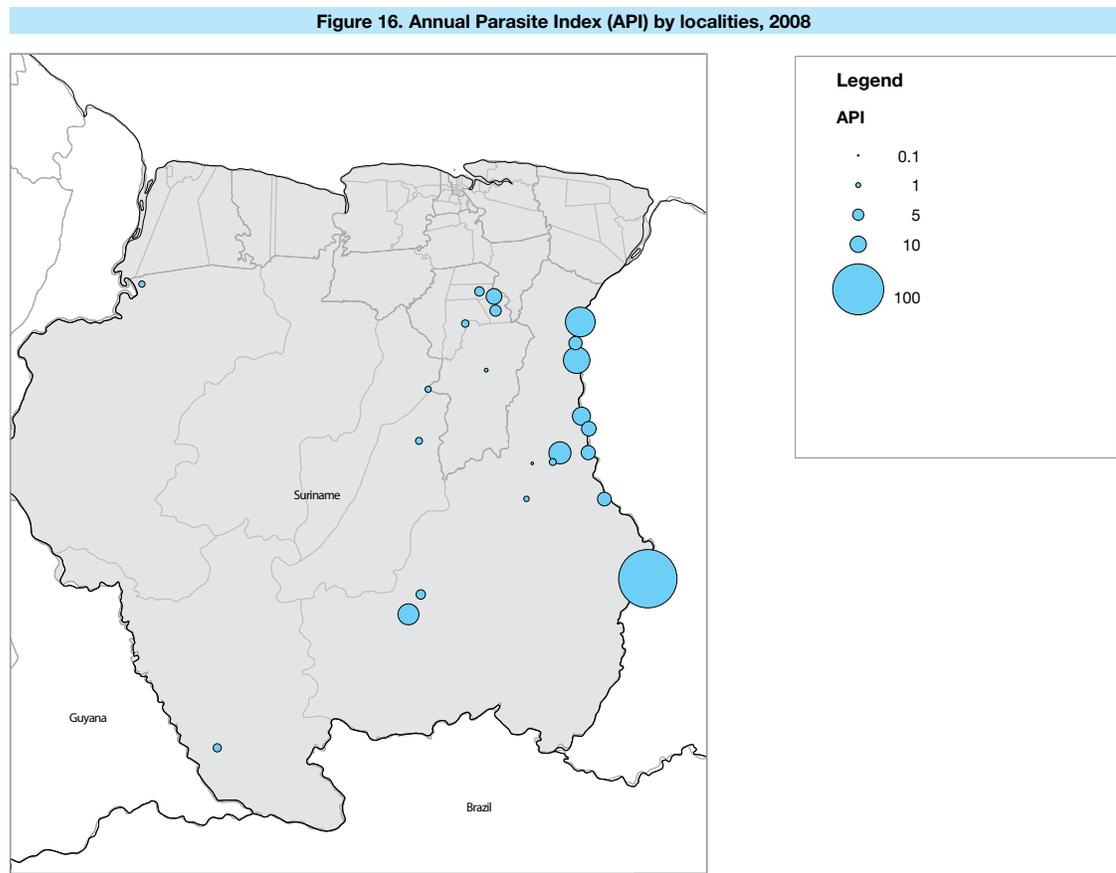


Figure 17. Population by malaria transmission risk, 2008

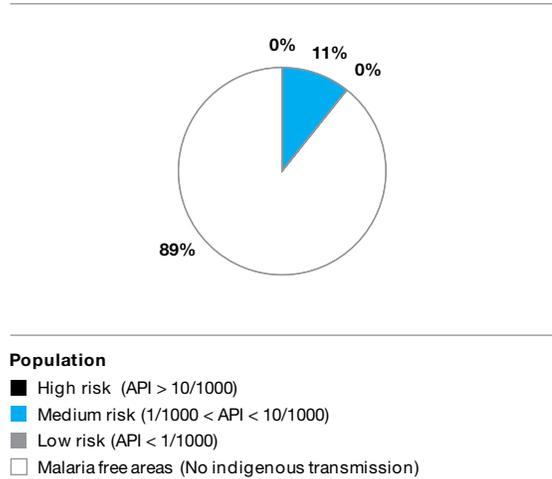
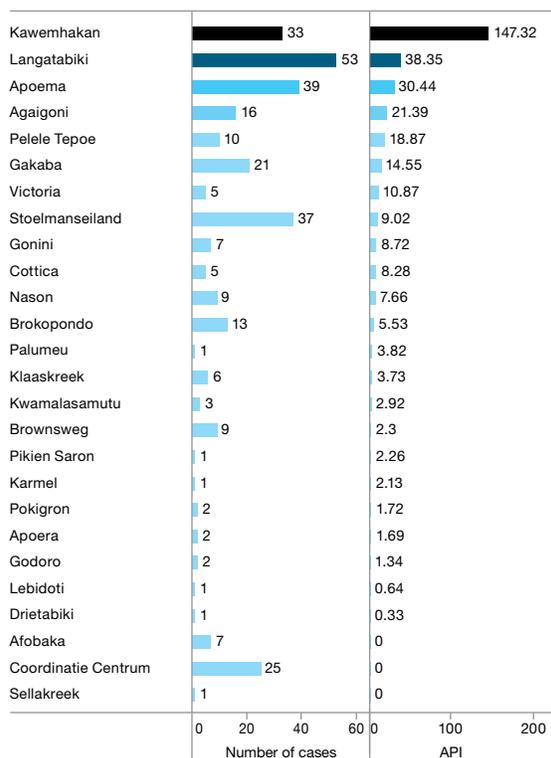


Figure 18. Annual Parasite Index (API) and number of cases by locality, 2008



API (cases/ 1000 people at risk)
 0 147.32

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

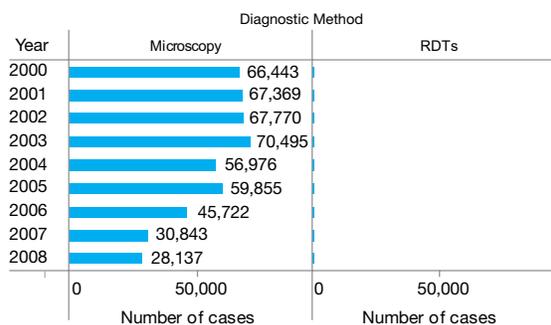


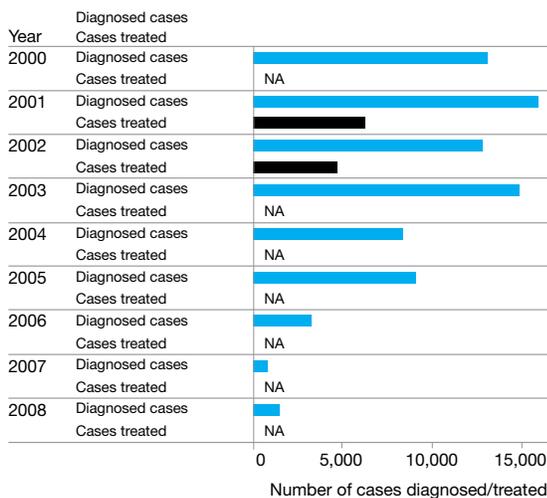
Figure 19. Population by malaria transmission risk, 2000-08

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	19,000	9,000	34,000	355,000
2001	24,000	22,000	2,000	402,000
2002	24,000	22,000	2,000	402,000
2003	51,000	0	2,000	397,000
2004	51,000	0	2,000	397,000
2005	51,000	0	2,000	397,000
2006	46,000	2,000	0	397,000
2007	46,000	2,000	0	400,000
2008	0	48,000	0	400,000

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

Year	Number of slides examined	Number of slides positive	Slide Positivity Rate (%)
2000	66,443	13,132	19.76
2001	67,369	15,997	23.75
2002	67,770	12,837	18.94
2003	70,495	14,906	21.14
2004	56,976	8,379	14.71
2005	59,855	9,131	15.26
2006	45,722	3,289	7.19
2007	30,843	807	2.62
2008	28,137	1,490	5.3

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 (%)
Sipaliwini	25,692	1,450	0
Brokopondo	2,722	38	0

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

No Data Available

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

No Data Available

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

No Data Available

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

No Data Available

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

No Data Available

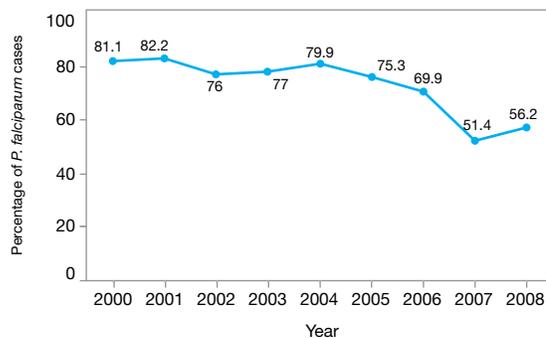
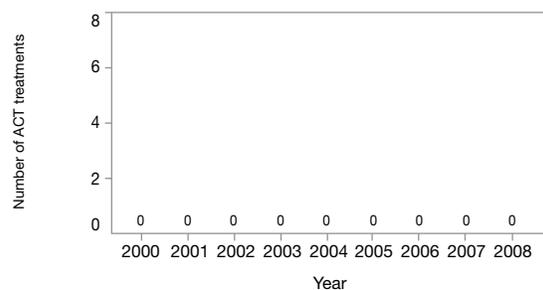
Figure 29. Proportion of *P. falciparum* cases, 2000-2008**Figure 30. Number of ACT treatments distributed by year, 2000-08**

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

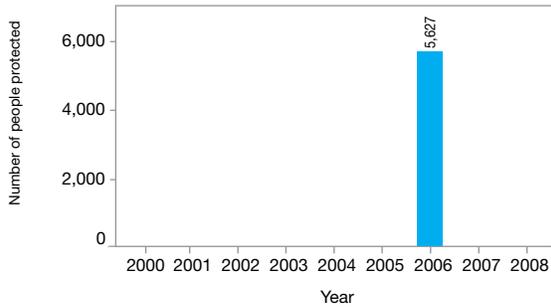


Figure 32. Number of LLINs distributed by year, 2000-08

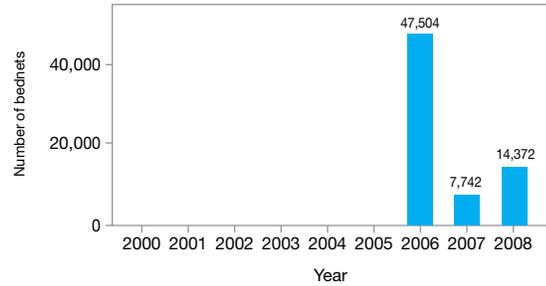


Figure 33. Number of ITNs distributed by year, 2000-08

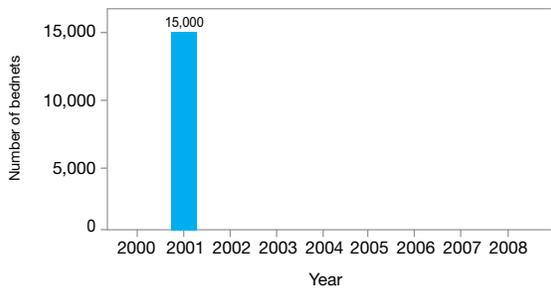
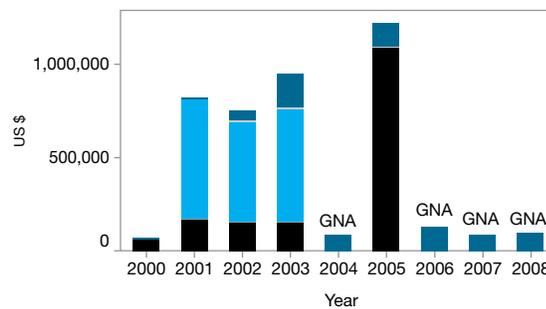


Figure 34. Sources for malaria control funds by year, 2000-08



Financing sources

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

* Global Fund data was not available for any year
 GNA - Data for Government funding not available