ECUADOR

Ecuador has made significant progress in the reduction of malaria, surpassing the WHA58.2 target for MDG6C and reducing malaria by 99.8% since the year 2000 (Figures 1 and 2). Deaths due to malaria have followed a similar trend and in 2014 only one death was reported. However, the number of deaths reported to the malaria unit at PAHO/WHO are significantly less than those reported to the PAHO Regional Health Observatory (CHA/HA) during 2000–2014.

Figure 1. Malaria by Annual Parasite Index (API) by canton level (ADM2), Ecuador 2013

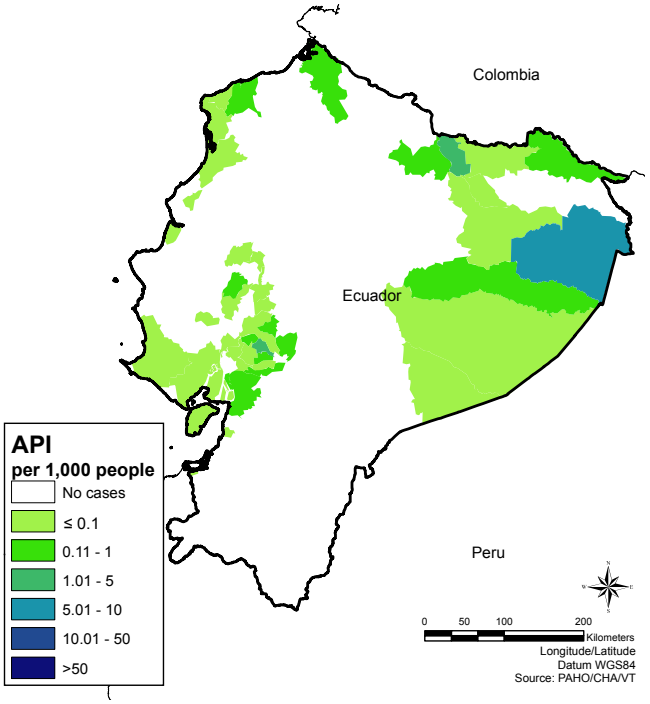
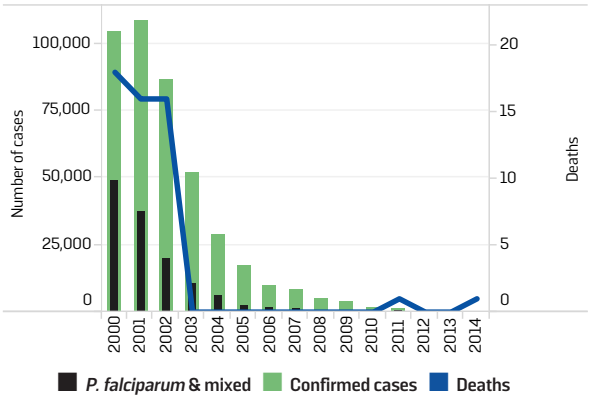
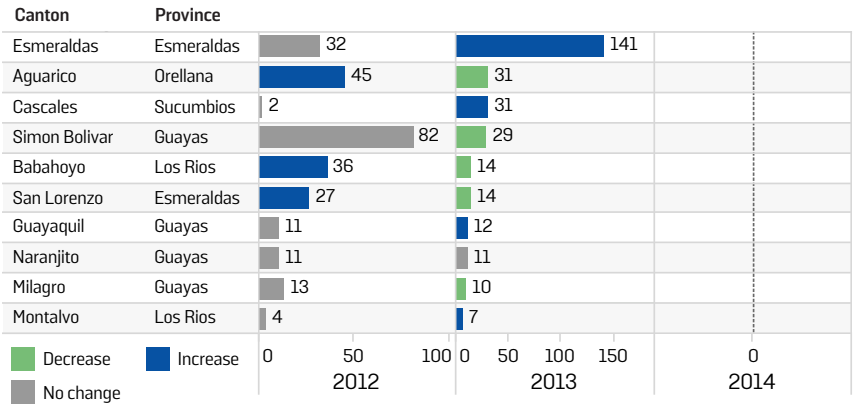


Figure 2. Number of cases and deaths due to malaria in Ecuador, 2000–2014



The number of confirmed cases, blood slides examined, number of cases by species type, and amount received for malaria from external sources were the only data available for the year 2014. All other analyses used data available until 2013. The National Service for Control of Arthropod Vector-borne diseases (SNEM, acronym in Spanish) is currently being integrated with the general health services of the Ministry of Health. In 2013, the incidence rate (API) was highest in the sparsely-populated cantons of the Amazon area; however, the highest number of cases was recorded in the densely-populated Esmeraldas canton of the Esmeraldas province located on the northwestern coast of the country (Figure 3). The principal malaria vectors in the Amazon area are

Figure 3. Cantons with the highest malaria cases in Ecuador, 2012–2014



*Data unavailable for 2014.

Table 1. Elimination profile of Ecuador, 2010-2014

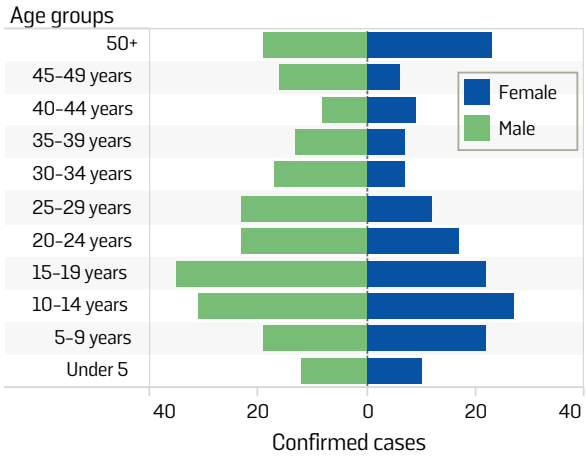
	2010	2011	2012	2013	2014
Total Cases	1,888	1,232	558	378	241
P. falciparum Cases	258	296	80	161	49
P. vivax Cases	1,630	936	478	217	199
Cases Investigated	17	96	204	100	...
Autochthonous Cases	1,871	1,219	544	368	...
Autochthonous- P.f.	245	288	68	160	...
Autochthonous- P.v.	1,626	931	476	208	...
Imported Cases	17	14	14	10	...
Imported- P.f.	13	8	12	1	...
Imported- P.v.	4	6	2	9	...
Active Foci	...	...	14	3	...

**P. f- Plasmodium falciparum, P. v. - Plasmodium vivax*
"..." indicates unavailable data.

An. albimanus and *An. neivai*, while *An. albimanus*, *An. pseudopunctipennis*, and *An. punctimacula* are principal vectors on the Pacific coast. Most cases were due to *Plasmodium vivax* in 2014; however, *P. falciparum* accounted for 19.8% of confirmed cases in 2014 and 43.0% of cases in 2013.

As the country reorients from control to elimination, surveillance has continued to improve. The proportion of cases being investigated and classified has steadily increased between 2010 and 2013 from 1% to 25% of confirmed cases (Table 1). The number of imported cases has not been higher than 20 in any of those years, with most cases being imported from neighboring countries of Peru and Colombia.

Figure 4. Malaria cases by age and sex in Ecuador, 2013



Men were more at risk for malaria, accounting for 57.1% of cases in 2013 (Figure 4). Adolescents between the ages of 15-19 years were the most affected.

Diagnosis and Treatment

Microscopy remains the primary method of diagnosis. However, RDTs were introduced in 2008 (Figure 5) and are used in remote areas and after work hours for malaria diagnosis in health centers. HRP-2 gene deletion has been reported from *P. falciparum* parasite isolates detected in several neighboring countries such as Brazil(27), Peru(28), and Colombia(29). RDTs based on HRP-2 could probably be of little use, and the country should study the presence of HRP2 gene deletion prevalence and meanwhile ensure use of alternative

Figure 5. Blood slides examined, RDTs examined, and SPR in Ecuador, 2000-2014

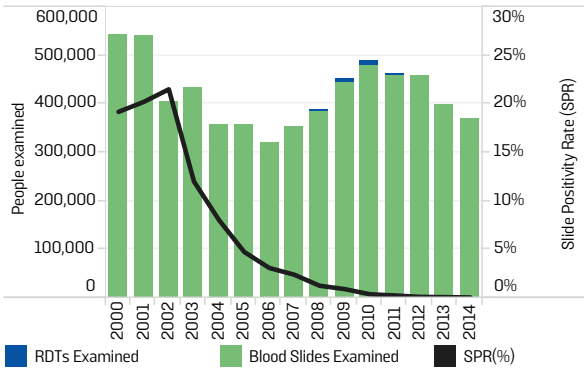


Figure 6. Number of malaria cases and those treated with first-line treatment Ecuador, 2000-2014

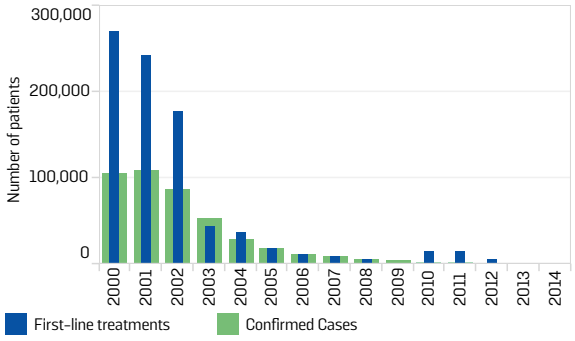
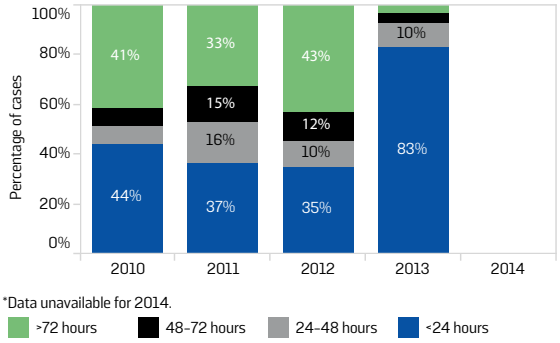


Figure 7. Time between first symptom and initiation of treatment in Ecuador, 2010-2014



RDTs in all places. As of 2013, time between the onset of symptoms and treatment improved significantly (Figure 7); 83.1% of all patients were diagnosed and treated in less than 24 hours of onset of symptoms.

The combination drug artemether-lumefantrine is the first-line of treatment for *P. falciparum*, while chloroquine with primaquine (0.50 mg/kg for 7 days) is the first-line treatment for *P. vivax*. Information about the number of people treated with first-line treatment has not been reported since 2012. However, during 2010-2012 there were more people treated than actual confirmed cases (Figure 6). The number of people treated is estimated based on the actual consumption of drugs, which is usually higher on account of administrative losses and medicines expiring before their use. This is especially the case when malaria transmission becomes very low, as is the case in Ecuador.

Vector Control

Ecuador began distributing conventional ITNs in 2004 and switched to LLINs from 2007 onwards. The last distribution of nets was reportedly in 2012 providing high coverage for a few years, but the amount of people who were protected by LLINs in 2014 may only be about 12,000 people (Figure 8). Indoor residual spraying is another method of vector control used; however, data on the amount of people protected in 2014 are unavailable. Resistance to deltamethrin insecticide (a pyrethroid used in LLINs and for IRS) has been detected in *An. albimanus* in Guayas and Los Rios provinces in 2011.

Funding

Government funding for malaria has decreased since 2010, though the amount for 2014 is not available. These funds do not include funding by the canton and province governments for malaria and funding provided for patient care in government hospitals and clinics. The AMI/RAVREDA initiative provided US$98,000 in 2014 (Figure 9). The Global Fund provided US$980,000; the largest amount they have contributed to Ecuador since 2006.

Figure 8. People protected by IRS and by ITNs in Ecuador, 2000-2014

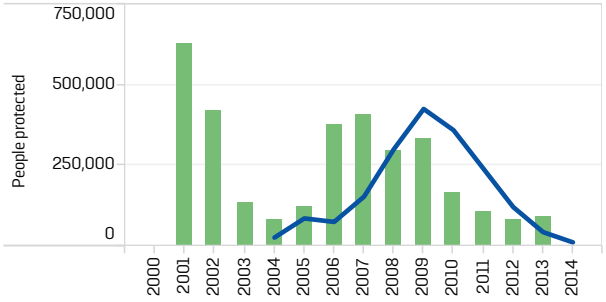


Figure 9. Funding for malaria in Ecuador, 2000-2014