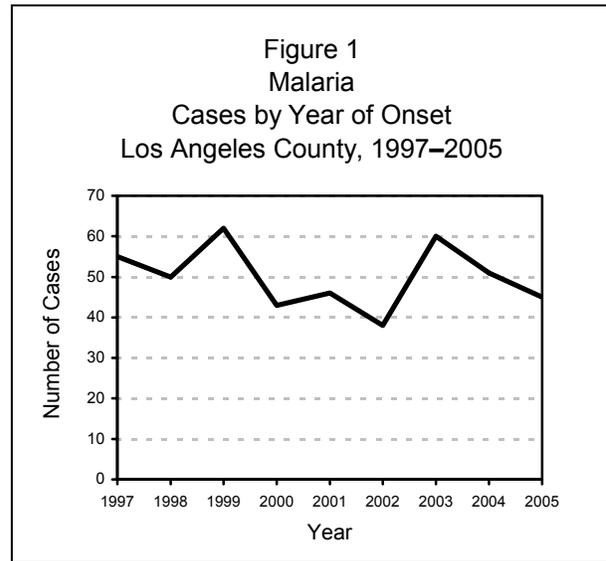




MALARIA

CRUDE DATA	
Number of Cases	45
Age at Onset	
Mean	34
Median	32
Age Range	5–93 years
Case Fatality	
LA County	2.2%
United States	<1% ^a

^a Calculated from 2004 US malaria surveillance in the 2006 Surveillance Summary issue of MMWR (SS-4:23-37).



DESCRIPTION

Human malaria is an acute or subacute febrile illness caused by one or more protozoan parasites that infect humans: *P. vivax*, *P. falciparum*, *P. malariae*, and *P. ovale*. The disease is transmitted by the bite of an infected *Anopheles sp.* mosquito and is characterized by episodes of chills and fever every 2–3 days. *P. falciparum* is found primarily in tropical regions and poses the greatest risk of death because it invades red blood cells of all stages and is often drug-resistant. The more severe symptoms of *P. falciparum* include jaundice, shock, renal failure, and coma. Each case of malaria requires the demonstration of parasites in thick or thin blood smears, regardless of whether the person experienced previous episodes of malaria while outside the country.

Malaria is a disease usually acquired outside the continental US through travel and immigration and is rarely transmitted within the US. Although there is no recent documentation of malaria being transmitted locally, a particular mosquito, *A. hermsi*, exists here and is capable of transmitting the parasite. In 1988–89, the last autochthonous cases occurred in San Diego, California, among 30 migrant workers infected with *P. vivax*. Since then, local transmission has not occurred in Southern California due to an inadequate number of people infected with the malaria parasite to sustain disease transmission. Additionally, the mosquito capable of transmitting malaria is very rare.

DISEASE ABSTRACT

- A cluster of three malaria cases occurred in late 2005 among members of a missionary group that traveled to Africa. The cases, two from LAC and one from outside the county were not infected by the same *Plasmodium sp.*
- The number of malaria cases in LAC has continued to decrease since its peak in 2003.
- One fatality occurred in a non-resident of LAC with *P. falciparum* infection who traveled to the US from the Philippines.
- The percentage of US travelers who took some form of antimalarial chemoprophylaxis during travel to a malaria-endemic region remains similar to 2004 (21%). Only one case reported compliance with the prophylactic regimen.



STRATIFIED DATA

Trends: There was a 25% decline in cases in 2005 with 45 reported cases compared to peak year 2003, 60 cases (Figure 1). A larger proportion of cases were infected with *P. falciparum* (n=29, 65%) in 2005 compared to 2004 (n=29, 46%) (Figure 2).

Seasonality: Seasonality for malaria was not determined. Malaria is acquired abroad and is independent of LAC weather or seasonal patterns.

Age: The mean age of infection has decreased in 2005 to 34 (range: 5–93 years); the median age was 32. The largest number of cases (n=12, 27%) occurred in a younger age group (15–24 years), whereas, in 2004 the largest number occurred in the 25–34 year age group (Figure 3).

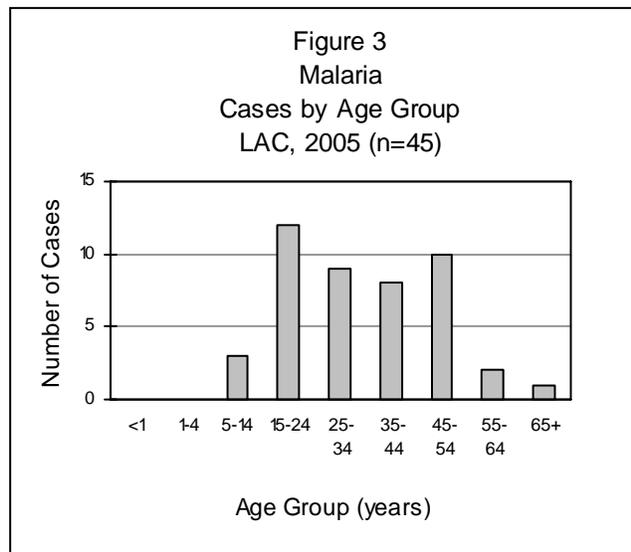
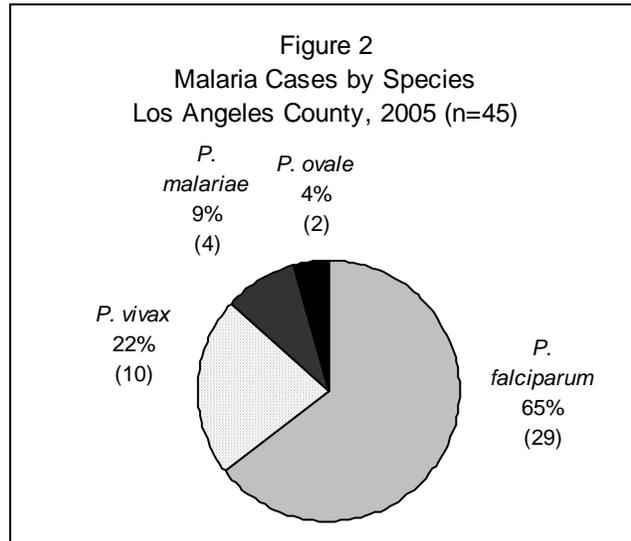
Sex: The ratio of male-to-female cases was three to one (3:1).

Race/Ethnicity: Over half of the reported malaria cases occurred among Blacks, which included African-Americans and African immigrants (n=22, 51%), followed by Latinos (n=7, 16%) and Asian/Pacific Islanders (n=7, 16%). Since the early 1990s, Blacks have had the highest proportion of reported malaria cases, with the exception of year 2003, where Whites outnumbered Blacks. Race and ethnicity were known for 96% of the cases.

Disease Severity: There was one death due to malaria. A 32-year old non-resident male acquired *P. falciparum* malaria while in a rural area of the Philippines and continued to experience symptoms during his visit to the US. He suffered multiple complications including cerebral malaria, renal failure, and acute respiratory distress syndrome (ARDS). His onset of symptoms began before his arrival into the US; the interval between onset and death was 22 days. One additional case was known to have severe complications, a 44-year old male visiting Senegal who also acquired *P. falciparum* malaria. His onset occurred before arrival to the US; he experienced renal failure during the course of hospitalization. He did not take any chemoprophylaxis.

Transmission and Risk Factors: All cases reported recent travel to a foreign country, with Africa continuing to be the most common region visited. Most of the reported malaria cases (n=30, 67%) were among individuals who were traveling to or coming from African countries. The most frequently reported country of travel was Nigeria (n=9) (Table 1).

Traveling for work included individuals that traveled as part of the military or a missionary group among others. Tourism and visiting friends and family were classified as traveling for pleasure. Among the 35 cases that claimed to be a resident of the US prior to their most recent travel, information on anti-malarial prophylaxis usage was available for 28 (80%). Six individuals (21%) took prophylaxis, which was the same rate of usage as in 2004. Of the six who took prophylaxis, four did not take the medication correctly





as prescribed; dosage information was known for five of the six cases. When stratified by purpose of travel, the proportion of prophylaxis usage among cases was much higher in those who traveled for work than for pleasure (60% vs. 12%) (Table 2). A single case that took the appropriate prophylaxis, acquired *P. falciparum* malaria while traveling to Uganda for work purposes.

Table 1. Malaria Cases by Country of Acquisition and *Plasmodium* Species— LAC, 2005

Country of Acquisition	<i>P. falciparum</i>	<i>P. vivax</i>	<i>P. malariae</i>	<i>P. ovale</i>	Total
Africa	25	2	2	1	30
- Benin	1	0	0	0	1
- Cameroon	2	0	0	0	2
- Ethiopia	0	1	0	0	1
- Ghana	3	0	0	0	3
- Kenya	2	0	0	0	2
- Liberia	0	1	0	0	1
- Nigeria	9	0	0	0	9
- Senegal	2	0	0	0	2
- Sierra Leone	1	0	0	0	1
- South Africa	1	0	0	0	1
- Togo	1	0	0	0	1
- Uganda	2	0	2	1	5
- Africa, unspecified	1	0	0	0	1
Latin America	1	5	2	0	8
- El Salvador	0	3	1	0	4
- Haiti	1	0	0	0	1
- Mexico	0	2	0	0	2
- Peru	0	0	1	0	1
Asia/Oceania	1	2	0	0	3
- India	0	1	0	0	1
- Philippines	1	0	0	0	1
- Thailand	0	1	0	0	1
Unknown	2	1	0	1	4
Overall Total	29	10	4	2	45

Table 2. Prophylaxis Use Among US Travelers with Malaria, 2005

Reason for Travel	Total Cases	Prophylaxis Use	
	(N)	(N)	(%)
Pleasure	21	2	12
Work	6	3	60
Other/Unknown	8	1	17
Total	35	6	21

Prior to the 1990s, refugees and immigrants from Central America and Southeast Asia made up the majority of all malaria cases seen in LAC. In contrast in 2005, refugees and immigrants made up only 19% (n=8) of cases with known travel reasons and arrived from various regions of the world. The most commonly reported reason for travel was visiting friends and relatives (n=23, 53%). Purpose of travel was reported for 96% of cases.



Only 3 of 36 cases (8%) reported a history of infection with malaria in the 12 months prior to their most recent episode. The species of the prior infections was known for only one of the three cases. The case had a previous infection with *P. falciparum* while most recently infected with *P. vivax*. No cases were acquired through blood transfusion or transplantation.

PREVENTION

Prevention of malaria is aimed at preventing infection by avoiding mosquito bites or, once already infected, preventing the development of disease by using antimalarial drugs as prophylaxis. Travelers to countries where malaria is endemic should take precautions by taking the appropriate antimalarial drugs as prescribed; using mosquito repellants, utilizing bednets, and wearing protective clothing; as well as avoiding outdoor activities between dusk and dawn when mosquito activity is at its peak.

COMMENTS

A cluster of cases involving out of county residents occurred in late 2005 among members of a missionary group. The group of 18 members traveled to Ghana during the summer and two began developing symptoms three to four months after their return to the US. One was confirmed with *P. ovale* and the other with *P. malariae*. Both cases took at least half of the prescribed prophylaxis during their travel. A third case, from outside LAC, did not develop symptoms until mid-2006 and was confirmed with an unidentified species of malaria.

The reason for the overall decrease in malaria cases is most likely due to a decrease in overseas travel and incoming refugees from malaria endemic countries. The number of malaria cases overall is far below the number of cases seen throughout the late 1970s through 1986 (an average of 133 malaria cases reported annually from 1979–1986). Cases can be further prevented by the correct usage of prescribed prophylaxis as almost all reported cases either did not take prophylaxis or did not take the complete regimen.

Information on travel and prophylaxis is obtained by interviewing patients. The data is limited by the patients' ability to recall this information. It is also limited by the small size of the case population, particularly when stratified by multiple variables.

ADDITIONAL RESOURCES

Additional information about malaria is available from the CDC at:
www.cdc.gov/ncidod/dpd/parasites/malaria/default.htm

CDC. Malaria Surveillance—United States, 2004. MMWR 2006. SS-4:23-37. Available at:
www.cdc.gov/mmwr/preview/mmwrhtml/ss5504a2.htm?s_cid=ss5504a2_e

CDC. Transmission of *Plasmodium vivax* Malaria—San Diego County, California, 1988 and 1989. MMWR 1990. 39:91-94. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/00001559.htm.