

Malaria

Malaria is a Class B Disease and must be reported to the state within one business day.

Malaria is caused by a protozoan parasite that is transmitted by Anopheles mosquitoes. There are five species of infectious agents that cause malaria: *Plasmodium falciparum*, *vivax*, *ovale*, *malariae*, and *knowlesi*. The fifth species, *Plasmodium knowlesi*, a simian malaria parasite, has recently been observed transmitting malaria to humans in Southeast Asia. It was discovered in Malaysia and several human cases have also been reported in Thailand, Myanmar, and the Philippines.

Background

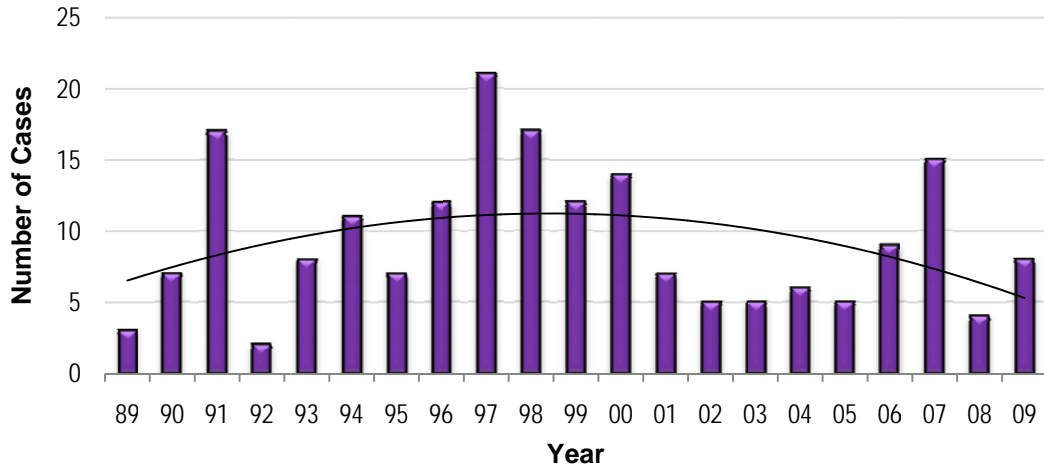
In the late 19th Century approximately half of the United States was endemic with malaria. At the turn of the 20th Century, when the prevalence of malaria was approximately 350 cases per 100,000, the U.S. Public Health Service established better protocols to control and reduce the spread of malaria. In 1933, The U.S. Tennessee Valley Authority bill was signed to improve and develop the land and waterways. Since 30% of the population in that region was affected by malaria, the USPHS was able to strengthen their research and control methods, which included insecticide application. In 1939, Dichloro-diphenyl-trichloroethane (DDT) was discovered and by the end of WWII, was being used for malaria control. In 1942, the Malaria Control in War Areas (MCWA) was established to control malaria around military bases in the southern U.S. and its territories. In 1947 the National Malaria Eradication Program (NMER) was created. Malaria was eradicated in the U.S. in 1951.

In the 1940s, Louisiana had a peak case rate of 57 cases per 100,000, (reported in 1944). In 1947, after the initiation of the NMER, the case rate reduced to eight cases per 100,000, and was further reduced to 0.2 cases per 100,000 four years later. In the early 1950s, there was another peak of malaria cases secondary to the Korean War, with 18 cases per 100,000 (reported in 1952). With the exception of small rises in cases during times of war (Vietnam - 1967-71; Gulf War – 1980), Louisiana maintains strict malarial control. Almost all of the cases of malaria that have been reported since its eradication were imported from overseas travel or immigrants.

Incidence in Louisiana

In 2009, there were eight cases of malaria reported in Louisiana, which is comparable with the average incidence of malaria cases over the past twenty years, nine (+/-3) cases per year. (Figure 1)

Figure 1: Malaria Cases - Louisiana, 1989-2009

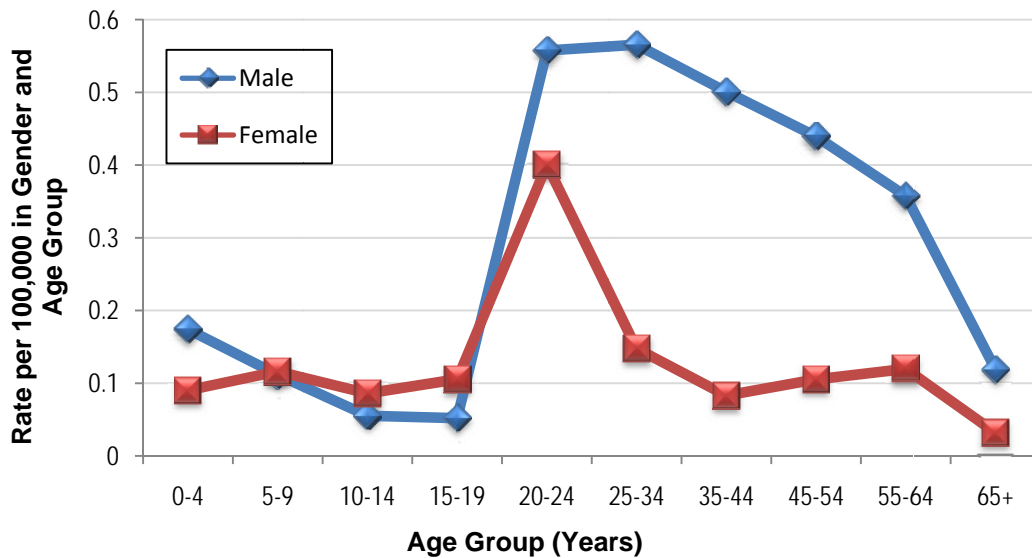


Incidence Rates by Sex and Age

The average annual incidence rates of malaria by sex and age are based on population rates per 100,000. The majority of the malaria cases are adult males (range 20-54 years). Among the females, the majority of the cases are young adults aged 20 to 24 years.

In 2009, the distribution of the sexes was slightly skewed from the 20 year average incident rates. The majority of the cases were not male, but were equally distributed (4:4). Among the males, (n=2) age range 20 to 24 years, (n=1), and age range 34 to 54 years (n=1). Among the females, (n=3) age range 20 to 24 years and (n=1) age range 35 to 44 years. (Figure 2)

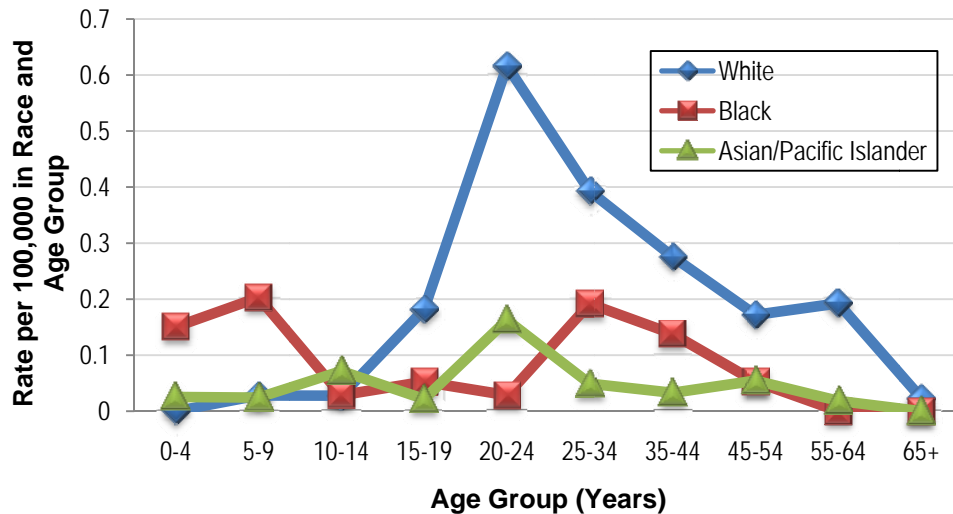
Figure 2: Malaria Average Annual Incidence Rates by Sex and Age - Louisiana, 1989-2009



Incidence Rates by Race and Age

The average majority annual incidence rates for malaria between the years 1989 to 2009, categorized by race and age, are white and young adults. In 2009, the cases were: White (n=2); Black (n=3); Asian/Pacific (n=1). The age ranges were: 20 to 24 years (n=2) both White; 25 to 34 years (n=2) both Black; 35 to 44 years (n=1) Asian/Pacific; 45 to 54 years (n=1) Black. (Figure 3)

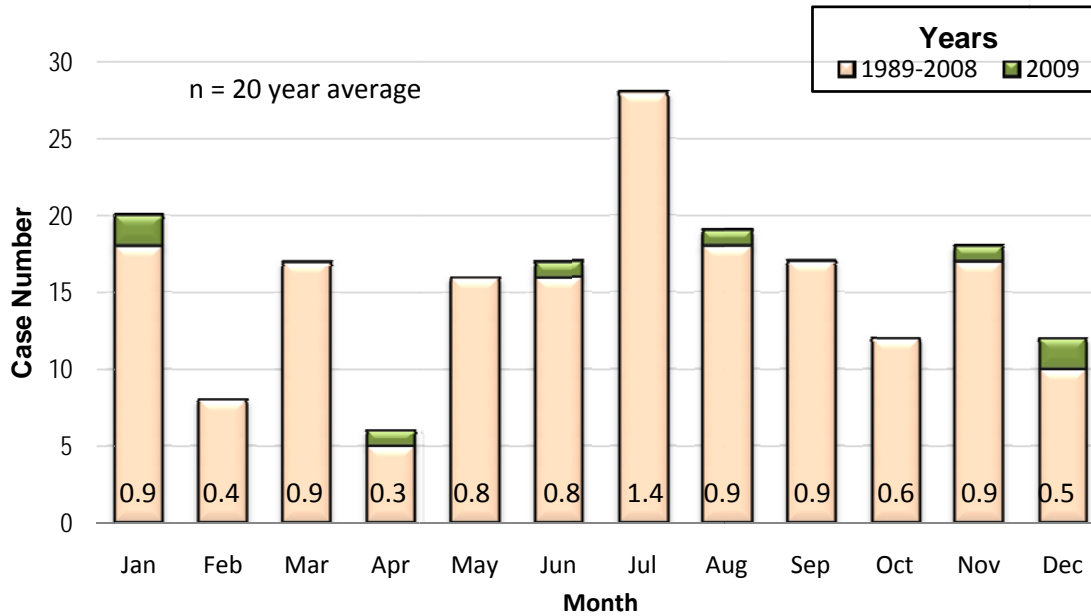
Figure 3: Malaria Average Annual Incidence Rates by Race and Age - Louisiana, 1989-2009



Malaria Cases by Month

The seasonal distribution of malaria over the past twenty years reveals approximately one case of malaria per month throughout the year with a peak in July and the fewest cases in February, April and December. In 2009, two cases were reported in both months January and December, and one case was reported in each month of April, June, and November. (Figure 4)

Figure 4: Total Malaria Cases by Month - Louisiana, 1989-2009



Malaria Cases by Parish

The geographical distribution of malaria by parish over the past twenty years shows a small number of cases in both urban and rural parishes. Overall, there were improvements in malaria control across the state for the years 1988 to 1998 and 1999 to 2008, specifically noting Caddo, East Baton Rouge, and Orleans parishes. There were two parishes that had an increase in cases – St. Tammany and Vernon. In 2009, three of the cases came from parishes that typically report approximately one case per year, three cases were reported from parishes who rarely report malaria cases, and two cases were unknown. (Table 1)

Table 1: Malaria Cases by Parish - Louisiana, 1988-2009
Average Number of Cases in 1999-2008 and 1999-2008 Compared to the Total Number of Cases in 2009

Parish	1988-1998 Average	1999-2008 Average	2009 Total Cases
Bossier	0.1	.01	0
Caddo	0.8	0	0
Calcasieu	0.5	0.4	0
East Baton Rouge	2.1	0.7	1
Jefferson	0.9	0.9	1
Lafayette	1	0.9	0
Lafourche	0.2	0.2	0
Lincoln	0.2	0.2	0
Natchitoches	0.2	0.0	1
Orleans	2.6	1.3	1
Rapides	0.2	0.2	0
St. Charles	0	0	1
St. Mary	0.2	0.1	0
St. Tammany	0	0.5	0
Terrebonne	0.3	0.2	0
Vernon	0.4	1	0
West Carroll	0.1	0	1
Other/Unknown	3.4	1.9	2
Total	14.1	9.4	8

Travel Locations

All cases of malaria were acquired outside of the United States. The following table lists locations where cases reported traveling to, prior to becoming ill - comparing cases reported in 2009 to the average number of cases over the past ten years. In 2009, with the exception of Nigeria, - which typically has approximately one case of malaria reported a year, almost all of the cases came from countries that typically have low to no cases reported.

Table 2: Travel Locations Prior to Illness - Louisiana,
Average Number of Cases in 1999 (2 to 8) Compared to the Total Number of Cases in 2009

Location	1999-2008 Average	Total Cases 2009
Africa		
Angola	0.3	1
Benin	0	1
Burkina Faso	0.1	0
Cameroon	0.1	2
Congo	0.1	0
Equatorial Guinea	0.2	0
Gambia	0.1	0
Ghana	0.2	0
Guinea	0.1	0
Kenya	0.3	0
Nigeria	1.1	1
Tanzania	0.1	0
Uganda	0.2	0
West Congo	0.1	0
Asia		
Afghanistan	0.8	0
India and Pakistan	0.2	1
Indonesia	0.1	0
Korea	0.2	0
Malasia	0.1	0
Europe		
Russia	0.1	0
North America		
Caribbean Islands	0	1
Guatemala	0.1	0
Haiti	0.3	1
Honduras	0.7	0
Nicaragua	0.2	0
Oceania		
Papua New Guinea	0.1	0
South America		
Brazil	0.1	0

Reason for Travel

The following table lists malaria cases by reason for travel in 2009 compared to the previous ten year average. More people traveled to malarious regions in 2009 to visit relatives and friends or were students or teachers compared to the previous ten years, when most traveled due to occupations that required travel overseas. (Table 3)

Table 3 - Reason for Travel - Louisiana
Average Number of Cases in 1999-2008 Compared to the Total Number of Cases in 2009

Reason for Visit	1999-2008 Average	2009 Total Cases
General Business	1.7	2
Military	1.9	1
Missionary	0.6	1
Peace Corps	0.4	0
Refugee	1	0
Student/Teacher	0.3	1
Tourism	1.1	0
Visit Relatives/Friends	1.8	3
Unknown	2.8	0

Plasmodium Species

From 1999-2008, there were equal distributions of the malaria cases caused by *Plasmodium falciparum* (n = 26) or *Plasmodium vivax* (n = 26), few were caused by *Plasmodium malariae* (n = 4), no cases of *Plasmodium ovale* or *Plasmodium knowlesi*, and the remaining infections had undetermined species (n = 19). In 2009, there was a shift in Plasmodium species, half were caused by *P. falciparum* (n=4), *P. vivax* (n=1), and the rest were undetermined (n=3).

Table 4 - Plasmodium Species - Louisiana
Average Number of Cases in 1999-2008 Compared to the Total Number of Cases in 2009

Species	1999-2008 Average	2009 Total Cases
<i>P. falciparum</i>	2.6	4
<i>P. vivax</i>	2.6	1
<i>P. malariae</i>	0.4	0
<i>P. ovale</i>	0	0
<i>P. knowlesi</i>	0	0
Undetermined	1.9	3

Mortality

There were two deaths reported in Louisiana from 1999 to 2009, one in 1999 and the other in 2003.

Prevention

Due to the resurgence of malaria during the past decade, travelers to malarious areas need to protect themselves against biting mosquitoes. The traveler's risk of acquiring malaria in an area(s) to be visited determines the appropriate chemo-prophylactic regimen. Failure of prophylaxis may occur for numerous reasons. First, travelers may not seek or follow advice or may receive inaccurate advice regarding anti-malarial medication. Second, travelers may forget to use prophylaxis, may not completely understand chemo-prophylactic advice, or may be advised by peers not to use chemoprophylaxis. Third, persons who visit friends or relatives living in areas with endemic malaria often are less likely than other tourists to obtain pre-travel advice to use chemoprophylaxis. Fourth, many physicians infrequently provide pre-travel advice to patients, and may not be aware of the current recommendations. Fifth, travelers may have side effects from the chemoprophylaxis regimen prescribed for them, so they discontinue their regimen while in malarious endemic regions.