May 2002 volume 18 number 05

Georgia Epidemiology Report

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The ***Georgia Epidemiology Report*** is a publication of the Epidemiology Branch, Division of Public Health, Georgia Department of Human Resources

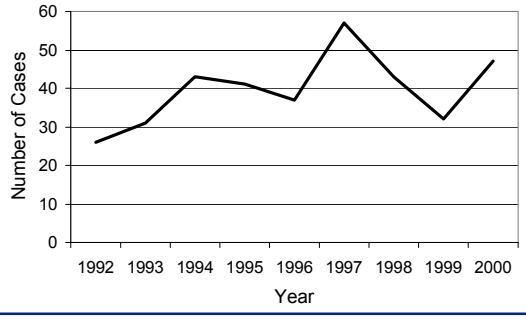
EPIDEMIOLOGY OF MALARIA IN GEORGIA

While most cases of malaria reported in the U.S. occur among immigrants from and travelers to malaria-endemic areas of the world, some cases are acquired in the U.S. Probable autochthonous malaria transmission (local transmission without travel) has been documented in the past two decades in California, New York, New Jersey, Michigan, Texas, Florida, and Georgia.

- Two episodes of probable autochthonous malaria occurred in South Georgia within 20 miles of each other during 1996 and 1999. Both patients were diagnosed with *P. vivax* malaria, neither had a history of recent travel to a malaria-endemic area, and neither reported risk factors for induced malaria such as blood transfusion or injection drug use. Factors that potentially contributed to these locally-acquired cases were: the existence of ideal breeding habitats for *Anopheles* mosquitoes, the presence of migrant farm laborers, some from Mexico and Central America, who might have been parasitemic (or infected) reservoirs of *P. vivax* infection for mosquitoes, and climatic conditions favorable to the completion of the reproductive cycle of the parasite in the mosquito.

In addition to these rare autochthonous cases, immigrants and travelers may carry malaria from endemic countries, resulting in illness diagnosed in Georgia. Malaria is a notifiable

Figure 1: Malaria Cases Reported to the Georgia Division of Public Health, 1992-2000.



disease in Georgia. From January 1, 1993 to December 31, 2000, 331 cases of malaria were reported to the GDPH. The number of cases reported per year ranged from 31 in 1993 to 57 in 1997 (Figure 1). It is likely that malaria is under-diagnosed and under-reported in Georgia. The increase in reported cases from 1993 to 1997 is probably due to better surveillance, increased travel to malarious regions, and increased immigration to Georgia from malarious regions.

Table 2 shows the demographic characteristics of the 331 malaria cases that were reported in Georgia from 1993-2000. It is not always possible to distinguish between travelers and immigrants based on information provided on case report forms. Complete follow-up with cases is often difficult or impossible for reasons that include language barriers.

The majority of reported malaria cases in Georgia (61.6%) reside in metro-Atlanta. Blacks of all ages are diagnosed with malaria in Georgia, but only 2.7% of Whites with malaria are under the age of 20 (Table 3). This may reflect the occurrence of malaria among Black immigrants of all ages, and among travelers who are often White adults.

MALARIA FACTS

Agent: A parasite. Human disease is caused by four species of the genus *Plasmodium*: *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, *and Plasmodium malariae*. Mixed infections may occur.

Reservoir and Mode of Transmission: Humans are the only important reservoir of human malaria; there is no known zoonotic reservoir. Malaria is most often transmitted by the bite of an infected female *Anopheles* mosquito. Rarely, transmission may occur by blood transfusion, use of contaminated needles or syringes (as by injecting drug users), or congenitally from mother to fetus.

Occurrence: Malaria is endemic to many tropical and subtropical areas including countries of Asia, Africa, South America, and Central America. Endemic malaria no longer occurs in many temperate-zone countries (such as the United States) or in some areas of subtropical countries. An estimated 300-500 million new cases and more than 1 million deaths due to malaria occur each year. Malaria incidence is increasing due to limited mosquito control measures, mosquito resistance to insecticides, and parasite resistance to chloroquine. The Centers for Disease Control and Prevention (CDC) receives approximately 1200 reports of malaria diagnosed in the U.S. each year.

Symptoms: Malaria typically presents with fever, malaise, headache, shaking chills, sweats, and nausea. Fevers may be persistent or come and go depending on the species that causes the infection, but the classically described alternate-day or other periodic fevers are not always present. *P. falciparum* infections may also present with cough, diarrhea, and respiratory distress; severe cases may progress to jaundice, coagulation defects, shock, renal failure, liver failure, pulmonary edema, acute encephalopathy, coma, and death. Clinical presentation may be atypical for patients taking prophylactic treatment or those who are partially immune.

Diagnosis: Preliminary diagnosis may be based on symptoms and travel history, but should be confirmed by demonstration of malaria parasites in blood films. Diagnosis may require repeated examination of blood smears. Identification of the infecting species is clinically valuable because recommended treatment varies by species, as does likelihood of severe disease and drug-resistance (See Table 1).

Reporting: Malaria is a notifiable disease in Georgia and cases should be reported using a Georgia Notifiable Disease Report Form (form 3095) and a CDC Case Report Form. Both forms may be downloaded from the Georgia Division of Public Health (GDPH) website at http://health.state.ga.us. It is important to provide as much clinical and travel information as possible with case reports. If a case of autochthonous malaria occurs in Georgia, local healthcare providers will be alerted, public education will be intensified, and other control measures will be instituted as appropriate.

Prevention: Appropriate measures should be taken to avoid mosquito bites. Chloroquine or other antimalarial drugs should be administered 1 to 2 weeks before travel to a malarious area and continued for 4 weeks after returning. Current treatment and prophylaxis information may be obtained from the Centers for Disease Control and Prevention (CDC) via the Internet or fax (See Malaria Resources). Potential vaccines are being developed and tested.

Treatment: Prompt treatment, especially of *P. falciparum* infections, is important. Case fatality rates for untreated children and non-immune adults infected with *P. falciparum* can be 10-40% or higher. Furthermore, untreated or insufficiently treated patients with malaria may be a source of mosquito infection for 3 years or more with *P. malariae*, for 1 to 2 years with *P. vivax*, and for as long as 1 year with *P. falciparum*. Obtain current treatment and prophylaxis information from the CDC via Internet or fax (See Malaria Resources).

Table 1: Epidemiologic and clinical characteristics of *Plasmodium* species causing human malaria.

Plasmodium *species*	Geographic Distribution	Approximate Incubation[1]	Onset[2]/Fever Pattern	Persistence/Relapse
P. falciparum	Eastern Hemisphere: common in sub-Saharan Africa, SE Asia, India Western Hemisphere: Haiti, Amazon region	7-14 days	Acute, highly dangerous disease for persons without immunity Infects and damages mature and immature blood cells Tertian fever (48 hour periodicity) Often drug-resistant	One attack with recurring fevers. No dormant liver stage--no relapses once treated. Reoccurrence of symptoms indicates inadequate treatment or infection with a drug-resistant strain.
P. vivax	Eastern Hemisphere: common in Indian subcontinent, Papua New Guinea, Indonesia, Solomon Islands, Central Asia Western Hemisphere: common in Central and South America	8-14 days[3]	Typically subacute Infects only young blood cells Tertian fever (48 hour periodicity)	Relapse of infection may occur 6-10 months or more after initial infection, as a result of dormant phase in liver.
P. malariae	Eastern Hemisphere: low frequency in many areas: Tropical Africa, Papua New Guinea, South and Southeast Asia, Mediterranean region Western Hemisphere: low frequency in tropical and subtropical Americas	7-30 days	Typically mild Quartan fever (72 hour periodicity)	No dormant liver phase—no relapses. Parasites may persist in blood for 30 years or more. Reappearance of symptoms indicates inadequate treatment or infection with a drug-resistant strain.
P. ovale	Eastern Hemisphere: Small foci in sub-Saharan Africa and Papua New Guinea Western Hemisphere: Not endemic	8-14 days	Typically subacute Infects only young blood cells Tertian fever (48 hour periodicity)	Relapses may occur 6-10 months or more after initial infection, as a result of dormant phase in liver.

[1]When infected by blood transfusion the incubation period may depend upon the number of parasites infused. The incubation is usually short, but may range up to 2 months. Incomplete or inadequate drug prophylaxis or treatment may also result in a prolonged incubation period.

[2]Cyclic fevers are characteristic of malaria. Fevers occur near the time of red blood cell lysis as schizonts rupture to release new infectious merozoites. Although the parasite cycle is 48 hours in *P. falciparum*, continuous fevers with intermittent irregular spikes are more characteristic of *P. falciparum* infection than a regular 48-hour cycle, especially in patients with no immunity.

[3]Some strains, particularly from temperate areas, may have a protracted incubation of 8-10 months.

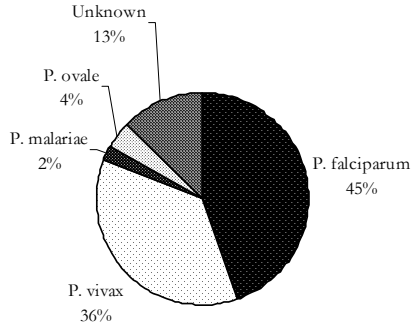
Table 2: Demographic characteristics of malaria cases reported in Georgia from 1993-2000 (n=331).

Demographics	n	(%)
SEX		
Male	211	(63.7)
Female	101	(30.5)
Unknown	19	(5.7)
HEALTH DISTRICT		
Total Metro-Atlanta	204	(61.6)
Marietta (3-1)	36	(10.9)
Atlanta (3-2)	66	(19.9)
Forest Park (3-3)	10	(3.0)
Lawrenceville (3-4)	24	(7.3)
Decatur (3-5)	68	(20.5)
Total outside Metro-Atlanta	63	(19.0)
Unknown Location	64	(19.3)
RACE		
Black	93	(28.1)
White	36	(10.9)
Asian/Pacific Islander	14	(4.2)
Other/Unknown	188	(56.8)

Table 3: Age distribution of malaria cases reported in Georgia by Race (Black or White), 1993-2000.

RACE BY AGE	< 20 years old	> 20 years old
Black (n=93)	41 (44%)	52 (55%)
White (n=36)	1 (2.7%)	35 (97%)

Figure 2: Malaria Cases by *Plasmodium* species: Georgia, 2000. Most malaria reported to GDPH during 2000 (n=47) was caused by *P. falciparum* (45%), followed by *P. vivax* (36%), *P. ovale* (4%) and *P. malariae* (2%).



RECOMMENDATIONS FOR PREVENTION AND CONTROL OF MALARIA IN GEORGIA AND FOR TRAVELERS:

- Malaria should be considered when evaluating febrile patients with a history of travel to a malaria-endemic region. In addition, Georgia health care providers should be aware that local malaria transmission can occur in Georgia. Several factors enhance the possibility of malaria transmission to humans in Georgia: (1) *Anopheles* mosquitoes are present in Georgia and in some areas are abundant, (2) the climate in Georgia is conducive to malaria transmission because it allows female *Anopheles* mosquitoes to live long enough for the reproductive cycle of *Plasmodium* to be completed in the mosquito mid-gut, and for transmission to humans from the mosquito salivary gland, and (3) parasitemic (or infected) travelers or immigrants who are not promptly or properly treated can be a source of infection for mosquito vectors. Access to primary care services for immigrant and migrant worker populations in Georgia should be improved. Culturally appropriate health education messages should be developed to increase awareness of malaria and to enhance use of local medical services.
- No anti-malarial prophylactic regimen provides complete protection. Prevention of mosquito bites should still be the first line of defense against malaria and other mosquito-transmitted diseases. Travelers to malarious areas should use personal mosquito repellent when mosquitoes are active and should use a pyrethroid-containing flying-insect spray in living and sleeping areas during evening and nighttime hours, unless rooms are well-screened. If there are mosquitoes in the room, travelers should sleep under mosquito netting; bed nets sprayed with permethrin are more effective than untreated bed nets.
- Even when not traveling, Georgia residents should be educated about mosquito bite prevention and ways to reduce mosquito-breeding habitats around their homes (dump out standing water). The importance of having screens on windows and doors of homes should be emphasized
- Travelers to malarious areas may require malaria chemoprophylaxis starting 1 to 2 weeks before travel and continued for 4 weeks after return to the U.S. For details, please consult CDC recommendations (See Malaria Resources). Travelers should know the signs and symptoms of malaria and should seek immediate medical care if they become ill. Travelers might be advised to administer self-treatment if they become ill and medical care will not be available to them within 24 hours.

Malaria Resources:

For assistance in determining risk for malaria and for information about preventing and treating malaria, the Centers for Disease Control and Prevention (CDC) has two sources of information for healthcare providers:

The Travelers' Health website: http://www.cdc.gov/travel, OR
Toll-Free Fax Information Service: call 1-888-232-3299 and listen to the instructions

REFERENCES:

1. American Public Health Association. *Malaria.* In: Chin, J, ed. *Control of Communicable Diseases Manual.* 17th ed. United Book Press, MD; 2000: 310-323.
2. Centers for Disease Control and Prevention. Probable locally acquired mosquito-transmitted *Plasmodium vivax* infection—Georgia, 1996. MMWR 1997; 46: 264-267.
3. Centers for Disease Control and Prevention Division of Parasitic Disease website; http://www.cdc.gov/ncidod/dpd/parasites/malaria/default.htm.
4. Krogstad, Donald J. *Plasmodium Species (Malaria).* In: Mandell GL, Bennett JE, and Dolin R, eds. *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases*, 5th ed. Churchill Livingston, PA; 2000: 2817-2831.
5. Zucker, JR. Changing patterns of autochthonous malaria transmission in the United States: A review of recent outbreaks. Emerging Infect Dis 1996; 2: 37-43.

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May 2002 **Volume 18 Number 05**

Reported Cases of Selected Notifiable Diseases in Georgia Profile* for February 2002

Selected Notifiable Diseases	Total Reported for Feb 2002	Previous 3 Months Total Ending in Feb			Previous 12 Months Total Ending in Feb		
	2002	2000	2001	2002	2000	2001	2002
Campylobacteriosis	23	98	105	87	665	622	616
Chlamydia trachomatis	2711	6320	7772	8056	30218	30254	32738
Cryptosporidiosis	7	44	34	27	164	182	154
E. coli O157:H7	2	8	5	6	43	45	48
Giardiasis	40	296	242	138	1345	1170	902
Gonorrhea	1245	4122	4356	4377	20974	19435	18169
Haemophilus influenzae (invasive)	6	24	32	37	83	86	111
Hepatitis A (acute)	50	58	145	140	432	438	924
Hepatitis B (acute)	15	57	116	73	242	390	399
Legionellosis	0	1	2	1	6	11	10
Lyme Disease	0	0	0	0	0	0	0
Meningococcal Disease (invasive)	1	28	21	11	76	52	45
Mumps	0	1	2	0	5	3	7
Pertussis	2	20	5	2	63	39	23
Rubella	0	0	0	0	0	1	0
Salmonellosis	37	279	252	246	1934	1694	1701
Shigellosis	36	67	75	326	283	331	855
Syphilis - Primary	4	31	24	18	143	119	85
Syphilis - Secondary	15	76	60	43	282	277	273
Syphilis - Early Latent	36	141	131	149	615	540	635
Syphilis - Other**	30	176	192	119	752	744	750
Syphilis - Congenital	0	5	6	0	19	21	15
Tuberculosis	19	168	192	148	650	690	531

* The cumulative numbers in the above table reflect the date the disease was first diagnosed rather than the date the report was received at the state office, and therefore are subject to change over time due to late reporting. The 3 month delay in the disease profile for a given month is designed to minimize any changes that may occur. This method of summarizing data is expected to provide a better overall measure of disease trends and patterns in Georgia.

** Other syphilis includes latent (unknown duration), late latent, late with symptomatic manifestations, and neurosyphilis.

AIDS Profile Update

Report Period	Total Cases Reported*			Percent	Risk Group Distribution (%)						Race Distribution (%)		
	<13yrs	>=13yrs	Total	Female	MSM	IDU	MSM&IDU	HS	Blood	Unknown	White	Black	Other
Latest 12 Months:													
04/01-03/02	2	1970	1972	24.3	36.6	8.5	2.6	12.3	2.0	38.0	19.4	75.7	4.9
Five Years Ago:													
03/97-02/98	4	1505	1509	21.3	40.7	20.1	4.5	19.7	1.2	13.8	22.8	74.5	2.7
Cumulative:													
07/81-03/02	210	24554	24764	17.4	47.9	17.7	5.5	13.3	1.9	13.7	34.5	63.2	2.4

MSM - Men having sex with men **IDU - Injection drug users** **HS - Heterosexual**

* Case totals are accumulated by date of report to the Epidemiology Section