

# **Human West Nile Virus in California**

## **2012 Surveillance Report**

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# Human West Nile Virus Infections, California, 2012

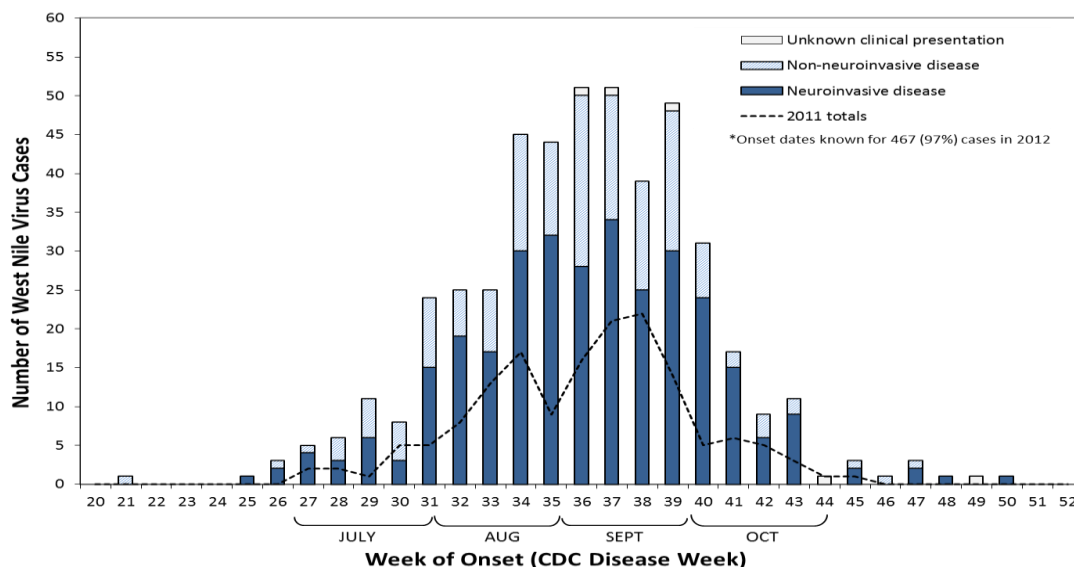
## Background

West Nile virus (WNV) was first detected in the United States in 1999 in the New York City area, and quickly spread westward across the nation. The first human cases of WNV infection in California were detected in 2003. Since then, a total of 3,625 cases have been reported in California, including 130 fatalities. WNV is endemic in California and circulates every year, with most human cases occurring between July and September. Local health departments investigate all patients that test positive for WNV to determine whether they meet the clinical and laboratory criteria for a case of confirmed or probable acute WNV illness (Appendix A). Cases are further classified as neuroinvasive or non-neuroinvasive based on information obtained from available medical records and patient interviews.

## Human Disease Surveillance Data

In 2012, a total of 479 human cases of WNV illness were reported statewide in 33 local health jurisdictions (Table 1). Of the 479 case-patients, 313 (65%) had neuroinvasive illness, 158 (33%) had non-neuroinvasive illness, and 8 (2%) had an unspecified or unknown clinical presentation. Twenty (4%) patients died. The median age of the 479 individuals was 55 years (range: 1–94 years); 280 (59%) were male. The median age of neuroinvasive disease cases was 58 years (range: 2–93 years), compared to 52 years (range: 1–94 years) for non-neuroinvasive disease cases. Dates of symptom onset for all patients ranged from May 23 to December 9, 2012 (Figure 1). Of the 378 case-patients with complete race/ethnicity data reported, 249 (66%) were non-Hispanic white, 110 (29%) were Hispanic, 13 (3%) were Asian or Pacific Islander, 5 (1%) were non-Hispanic black, and 1 (0.3%) was American Indian or Alaskan Native.

**Figure 1. Human West Nile virus cases by onset date and clinical presentation, California, 2012\***



**Table 1. Human West Nile virus cases by local health jurisdiction, California, 2012\***

Health Jurisdiction	Total Number of Cases	Neuroinvasive Disease	Non-neuroinvasive Disease	Other or Unknown Clinical Syndrome	Total Number of Deaths
Alameda	2	2	0	0	0
Alpine	0	0	0	0	0
Amador	0	0	0	0	0
Butte	10	4	6	0	0
Calaveras	0	0	0	0	0
Colusa	3	2	0	1	0
Contra Costa	4	3	1	0	0
Del Norte	0	0	0	0	0
El Dorado	0	0	0	0	0
Fresno	24	15	9	0	2
Glenn	7	2	5	0	1
Humboldt	0	0	0	0	0
Imperial	1	1	0	0	0
Inyo	0	0	0	0	0
Kern	25	13	12	0	2
Kings	3	0	3	0	0
Lake	1	0	1	0	0
Lassen	0	0	0	0	0
Los Angeles*	163	119	43	1	6
Madera	3	2	0	1	0
Marin	0	0	0	0	0
Mariposa	0	0	0	0	0
Mendocino	0	0	0	0	0
Merced	13	8	5	0	1
Modoc	0	0	0	0	0
Mono	0	0	0	0	0
Monterey	1	1	0	0	0
Napa	0	0	0	0	0
Nevada	0	0	0	0	0
Orange	42	26	16	0	2
Placer	12	10	2	0	1
Plumas	0	0	0	0	0
Riverside	19	14	4	1	0
Sacramento	29	19	8	2	3
San Benito	0	0	0	0	0
San Bernardino	33	21	12	0	1
San Diego	1	0	1	0	0
San Francisco	1	1	0	0	0
San Joaquin	13	6	7	0	0
San Luis Obispo	0	0	0	0	0
San Mateo	0	0	0	0	0
Santa Barbara	0	0	0	0	0
Santa Clara	0	0	0	0	0
Santa Cruz	0	0	0	0	0
Shasta	1	1	0	0	0
Sierra	0	0	0	0	0
Siskiyou	0	0	0	0	0
Solano	2	1	1	0	0
Sonoma	0	0	0	0	0
Stanislaus	26	16	10	0	0
Sutter	8	4	3	1	1
Tehama	4	1	3	0	0
Trinity	0	0	0	0	0
Tulare	7	6	1	0	0
Tuolumne	0	0	0	0	0
Ventura	7	5	2	0	0
Yolo	10	6	3	1	0
Yuba	4	4	0	0	0
<b>State Total</b>	<b>479</b>	<b>313</b>	<b>158</b>	<b>8</b>	<b>20</b>

\* Includes 6 cases reported from Long Beach City (1 neuroinvasive) and Pasadena City (4 non-neuroinvasive; 1 other or unknown clinical syndrome) health departments

Of the 313 cases of neuroinvasive illness, 122 (39%) had encephalitis or meningoenkephalitis, 168 (54%) had meningitis, 8 (3%) had acute flaccid paralysis, and 15 (5%) had an unspecified neuroinvasive illness (Table 2). In addition to the 8 patients that presented with acute flaccid paralysis only, 19 patients had acute flaccid paralysis in conjunction with encephalitis (13) or meningitis (6). Among the cases local health departments classified as neuroinvasive disease, the most common symptoms reported were fever (85%), headache (70%), nausea or vomiting (65%), and altered mental status (54%). The most common symptoms reported for non-neuroinvasive disease cases included headache (75%), fever (73%), myalgia (53%), and nausea or vomiting (51%).

**Table 2. Characteristics of reported West Nile virus disease cases, California, 2012\***

	Neuroinvasive (N=313) No. (%)	Non-neuroinvasive (N=158) No. (%)
Male	188 (60)	87 (55)
Median age, in years [range]	58 [2-93]	52 [1-94]
Age		
0 to 19	12 (4)	12 (8)
20 to 39	42 (13)	27 (17)
40 to 59	114 (36)	63 (40)
≥ 60	145 (46)	56 (35)
Race/Ethnicity		
Non-Hispanic White	158 (50)	87 (55)
Hispanic	80 (26)	29 (18)
Asian/ Pacific Islander	11 (4)	2 (1)
Black	4 (1)	1 (1)
American Indian/ Alaskan Native	1 (1)	0 (0)
Other	6 (2)	4 (3)
Unknown	53 (17)	35 (22)
Clinical syndrome		
Non-neuroinvasive illness	0 (0)	158 (100)
Meningitis	168 (54)	0 (0)
Encephalitis	122 (39)	0 (0)
Acute flaccid paralysis <sup>†</sup>	27 (9)	0 (0)
Unspecified neuroinvasive illness	15 (5)	0 (0)
Symptoms		
Fever <sup>^</sup>	266 (85)	115 (73)
Headache	218 (70)	119 (75)
Rash	59 (19)	61 (39)
Nausea or vomiting	203 (65)	81 (51)
Diarrhea	78 (25)	45 (28)
Myalgia	135 (43)	83 (53)
Arthralgia or arthritis	63 (20)	44 (28)
Paresis or paralysis	68 (22)	8 (5)
Stiff neck	121 (39)	33 (21)
Altered mental status	169 (54)	19 (12)
Seizures	16 (5)	1 (1)
Clinical course		
Hospitalized	302 (96)	46 (29)
Admitted to intensive care unit	78/302 (26)	2/46 (4)
Median time from onset to admit, in days [range]	4 [0-62]	5 [0-70]
Median length of hospitalization, in days [range]	6 [1-126]	5 [1-16]
Death	19 (6)	1 (1)

\*Excludes 8 cases with unknown clinical presentation.

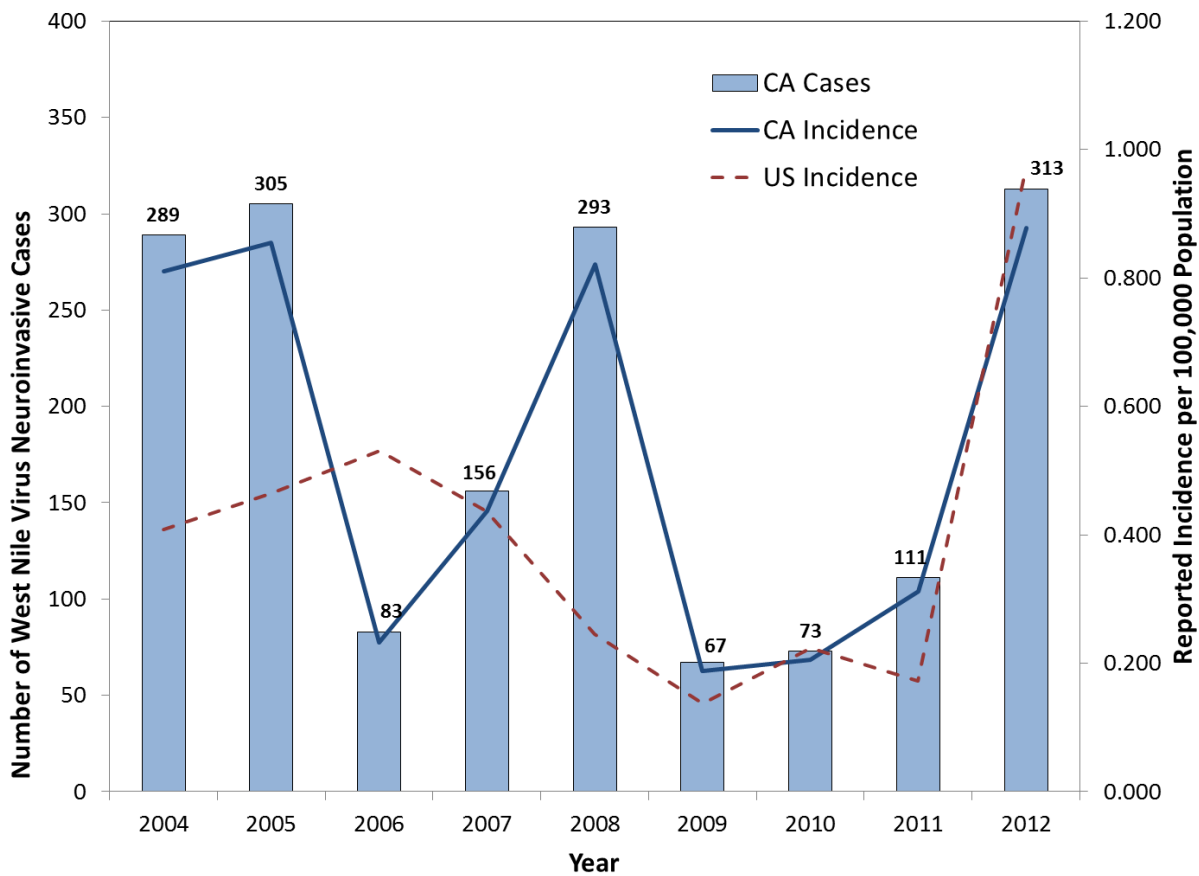
<sup>^</sup>Patients who did not have documented fever but otherwise met the clinical and laboratory criteria for confirmed or probable West Nile virus disease were included.

<sup>†</sup>19 of the patients with acute flaccid paralysis also presented with encephalitis (13), or meningitis (6).

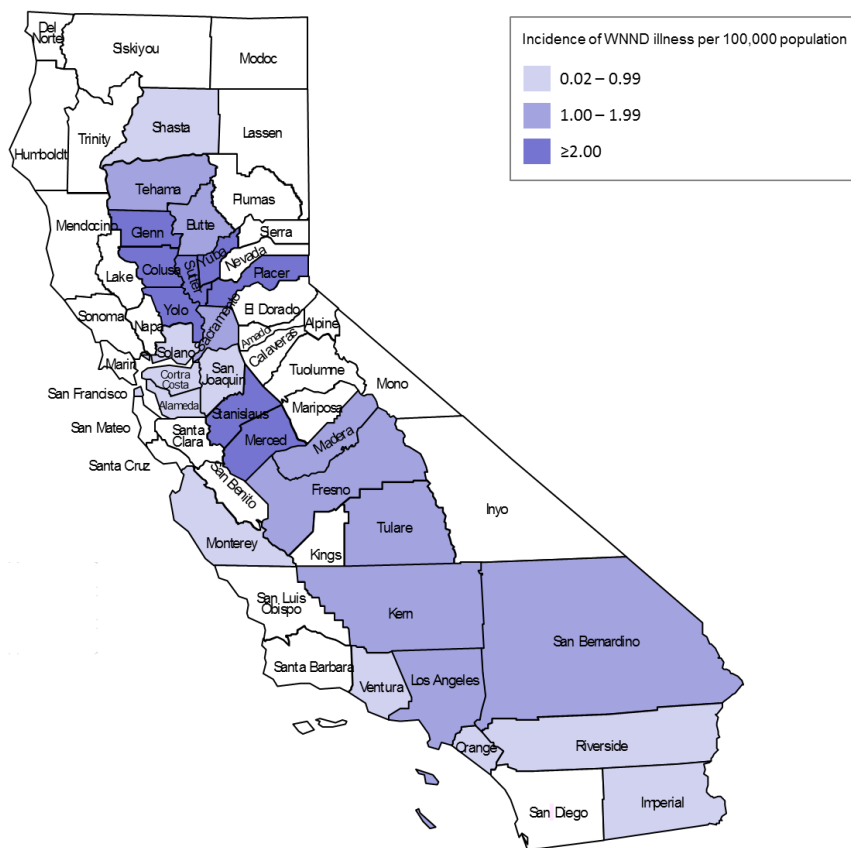
Most (302; 96.5%) neuroinvasive disease cases were hospitalized, compared to 29.1% of non-neuroinvasive disease cases; 78 (25.8%) of the 302 hospitalized neuroinvasive disease cases were admitted to an intensive care unit. The median time from symptom onset to hospitalization was 4 days (range: 0-62 days) for neuroinvasive disease cases, compared to 5 days (range: 0-70 days) for non-neuroinvasive disease cases. The median length of hospitalization was slightly longer for neuroinvasive disease cases (median=6 days, range: 1-126 days) compared to non-neuroinvasive disease cases (median=5 days, range: 1-16 days). Of the 20 patients that died, 19 (95.0%) had neuroinvasive disease and 1 (5.0%) had non-neuroinvasive disease.

The statewide incidence of all WNV-associated illness in 2012 was 1.3 cases per 100,000 population. However, because patients with non-neuroinvasive illness may be less consistently diagnosed or reported, cases of neuroinvasive disease are considered a more reliable indicator of WNV disease activity. The statewide incidence of neuroinvasive disease cases in 2012 was 0.9 cases per 100,000 population. The incidence of reported neuroinvasive disease cases in 2012 was similar to rates reported in 2004 and 2005, when California was considered the epicenter of national WNV activity, and in 2008, when another significant outbreak of WNV activity occurred in California (Figure 2). Cases of WNV neuroinvasive disease were reported in multiple regions throughout the state in 2012 (Figure 3).

**Figure 2. Incidence of West Nile virus neuroinvasive disease cases, California and U.S., 2004-2012**



**Figure 3. Incidence of West Nile virus neuroinvasive disease cases, by county of residence**



Many of the WNV cases were initially identified at county public health laboratories, which tested 669 specimens for WNV in 2012. Reference laboratories such as Quest Diagnostics or the Kaiser Permanente regional laboratories also reported suspect cases to local health departments. Additionally, the CDPH Viral and Rickettsial Diseases Laboratory performed reference testing on over 450 specimens.

Blood donors are also routinely screened for WNV infection by blood collection agencies. In 2012, a total of 63 WNV-positive blood donors were reported; 18 individuals developed symptoms and were reclassified as cases of WNV illness.

For more information and the latest updates on WNV activity in California, please visit <http://www.westnile.ca.gov>. For information and updates on national WNV activity, please visit <http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>.

## APPENDIX A: Case Definition for West Nile Virus

*NOTE: This definition is for public health surveillance purposes only. It is not intended for use in clinical diagnosis.*

### **Symptomatic Cases (adapted from 2011 CSTE case definition**

**[http://www.cdc.gov/osels/ph\\_surveillance/nndss/casedef/arboviral\\_current.htm](http://www.cdc.gov/osels/ph_surveillance/nndss/casedef/arboviral_current.htm)**

### **Clinical criteria for diagnosis**

#### Neuroinvasive disease

- Fever ( $\geq 100.4^{\circ}\text{F}$  or  $38^{\circ}\text{C}$ ) as reported by the patient or a health-care provider, **AND**
- Meningitis, encephalitis, acute flaccid paralysis, or other acute signs of central or peripheral neurologic dysfunction, as documented by a physician, **AND**
- Absence of a more likely clinical explanation.

#### Non-neuroinvasive disease

- Fever ( $\geq 100.4^{\circ}\text{F}$  or  $38^{\circ}\text{C}$ ) as reported by the patient or a health-care provider, **AND**
- Absence of neuroinvasive disease, **AND**
- Absence of a more likely clinical explanation.

### **Case classification**

Confirmed = A case that meets the above clinical criteria and one or more of the following laboratory criteria for a confirmed case:

- Isolation of virus from, or demonstration of specific viral antigen or nucleic acid in, tissue, blood, CSF, or other body fluid, **OR**
- Four-fold or greater change in virus-specific quantitative antibody titers in paired sera, **OR**
- Virus-specific immunoglobulin M (IgM) antibodies in serum with confirmatory virus-specific neutralizing antibodies in the same or a later specimen, **OR**
- Virus-specific IgM antibodies in CSF and a negative result for other IgM antibodies in CSF for arboviruses endemic to the region where exposure occurred.

Probable = A case that meets the above clinical criteria and the following laboratory criteria:

- Virus-specific IgM antibodies in CSF or serum but with no other testing.\*  
*\*CDPH recommends that virus-specific IgG antibody testing (e.g. EIA or IFA) also be performed. A specimen that is IgM-positive only (i.e. IgG-negative) may be a false positive, while a specimen that is both WNV IgM- and IgG-positive is more likely a true infection.*

### **Presumptive Viremic Donors (Asymptomatic)**

Asymptomatic infection with WNV, which is generally identified in blood donors, is also reportable. Blood donors who test positive for WNV may not necessarily be ill, nor will they initially have positive IgM or IgG antibody test results. Local health departments should report blood donors who meet the following criteria for being a presumptively viremic donor to CDPH:

A presumptively viremic donor (PVD) is a person with a blood donation that meets at least one of the following criteria:

- a) One reactive nucleic acid-amplification (NAT) test with signal-to-cutoff (S/CO)  $\geq 17$
- b) Two reactive NATs

Additional serological testing is not required. Local health departments should follow up with the donor after two weeks of the date of donation to assess if the patient subsequently became ill. If the donor did become ill as a result of WNV infection, the disease incident should be reclassified as “West Nile virus – Non-neuroinvasive” or “West Nile virus – Neuroinvasive,” depending on the individual’s clinical symptoms.