Arkansas Department of Health

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West Nile Virus

And other

Mosquito-borne Diseases

2015 End of Year Summary

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Tables and Figures

Provisional Data

This activity summary includes provisional data reported to the Arkansas Department of Health (ADH), and subsequently to the Centers for Disease Control and Prevention's (CDC) ArboNET for nationally notifiable arboviral diseases. Provisional data are provided to help track recent arboviral disease activity. However, these data may change substantially before they are finalized.

Data Limitations

The data collected on arboviral diseases is from a passive surveillance system. The data is dependent on clinicians considering the diagnosis of an arboviral or mosquito-borne disease, obtaining the appropriate diagnostic test, and reporting of laboratory confirmed cases to ADH. Diagnosis and reporting are incomplete, and the incidence of arboviral diseases is underestimated.

Reported neuroinvasive disease cases are considered the most accurate indicator of arboviral activity in humans because of the substantial associated morbidity. In contrast, reported cases of non-neuroinvasive arboviral disease are more likely to be affected by disease awareness and healthcare-seeking behavior in different communities and by the availability and specificity of laboratory tests performed. Surveillance data for non-neuroinvasive disease should be interpreted with caution.

Executive Summary

ADH received 39 reports of mosquito-borne disease in 2015, which met criteria to warrant an investigation. Of the 39 reports, 32 were determined to be cases. Investigations for domestically acquired human arboviral disease were conducted in 14 counties; of those, cases were documented in all 12 counties, which represent all five public health regions. Onset of illness for reported human arboviral or mosquito-borne disease was from May to November, peaking in August. There were 18 cases of West Nile Virus (WNV) documented, including 16 cases of neuroinvasive (e.g., meningitis, encephalitis) disease with two associated deaths, and two cases of non-neuroinvasive disease.

For reported cases of WNV in 2015, the incidence rate was 0.62 per 100,000 population. There was a 71 percent decrease in reported cases from 2012 (which had the highest case count of any year since WNV has been reported in Arkansas), and six percent increase from the 14 year median case count. Of the reported WNV cases, 56 percent were women, and 89 percent were white and 100 percent of the cases were non-Hispanic. Ages ranged from 30 to 87 (median 61), with 44 percent of the cases over age 65. Geographic distribution, by public health region was; Central 19 percent, Northeast 16 percent, Northwest 34 percent, Southeast 22 percent, and Southwest nine percent. All reportable clinical outcomes for WNV cases can be found in Table 4.

ArboNET
ArboNET is a national arboviral surveillance system managed by CDC and state health departments. In addition to human disease, ArboNET maintains data on arboviral infections among presumptive viremic blood donors (PVBDs), veterinary disease cases, mosquitoes, dead birds, and sentinel animals.

Imported Mosquito-borne Disease

Chikungunya
ADH investigated five reports of imported chikungunya virus (CHIKV) with four being determined to be cases. In 2014, CHIKV was not a nationally notifiable disease in the United States. It was added as a nationally notifiable disease in 2015. CHIKV is transmitted to people through mosquito bites. Mosquitoes become infected when they feed on a person already infected with the virus. Infected mosquitoes can then spread the virus to other people through bites. CHIKV is most often spread to people by *Aedes aegypti* and *Aedes albopictus* mosquitoes. These same mosquitoes transmit dengue, yellow fever, and Zika virus. They bite mostly during the daytime. The most common symptoms of chikungunya virus infection are fever and joint pain. Other symptoms may include headache, muscle pain, joint swelling, or rash. There is a risk that the virus will be imported to new areas by infected travelers. There is no vaccine to prevent or specific medicine to treat chikungunya virus infection. (CDC DVBD, 2015).

Nationally in 2015, 679 CHIKV disease cases were reported to ArboNET from U.S. states. All cases occurred in travelers returning from affected areas in the Americas, Asia, or the Pacific Islands. No locally-transmitted cases were reported from U.S. states (CDC, 2016).

Dengue
ADH investigated four reports of imported dengue (DENV) with one determined to be a case. More than one-third of the world's population lives in areas at risk for infection; dengue virus is a leading cause of illness and death in the tropics and subtropics. As many as 400 million people are infected yearly. The principal symptoms of dengue virus are high fever, severe headache, severe pain behind the eyes, joint pain, muscle and bone pain, rash, and mild bleeding (e.g., nose or gums bleed, easy bruising). Generally, younger children and those with their first dengue infection have a milder illness than older children and adults. Dengue is transmitted between people by the mosquitoes *Aedes aegypti* and *Aedes albopictus*, which are found throughout the world, including Arkansas (CDC Dengue, 2015).

Clinicians in the United States should be aware that competent DENV vectors are present in most states, including Arkansas, and importation of DENV via travelers has resulted in recent dengue outbreaks in Florida, Hawaii, and Texas. All suspected dengue cases should be reported to state and local health departments.

Malaria

ADH investigated ten reports of imported malaria, with nine determined to be cases. About 1,500 cases of malaria are diagnosed in the United States each year, but the numbers are increasing. The vast majority of cases in the United States are in travelers and immigrants returning from countries where malaria transmission occurs, many from sub-Saharan Africa and South Asia. Of the species of mosquitoes found in the United States, the three species that were responsible for malaria transmission prior to elimination are still widely prevalent; thus, there is a constant risk that malaria could be reintroduced in the United States. All febrile patients should have a travel history taken. The symptoms are non-specific and diagnosis can only be made with laboratory testing.

Veterinary Arboviral Disease

The Arkansas Department of Health partners with Arkansas Livestock and Poultry Commission to learn about arboviral diseases in animals that have been tested by their laboratory. There were three reported cases of WNV found in horses in Arkansas in 2015. All three cases were identified in August and they were located in Craighead, Fulton and Union counties.

National West Nile Virus Data, 2015

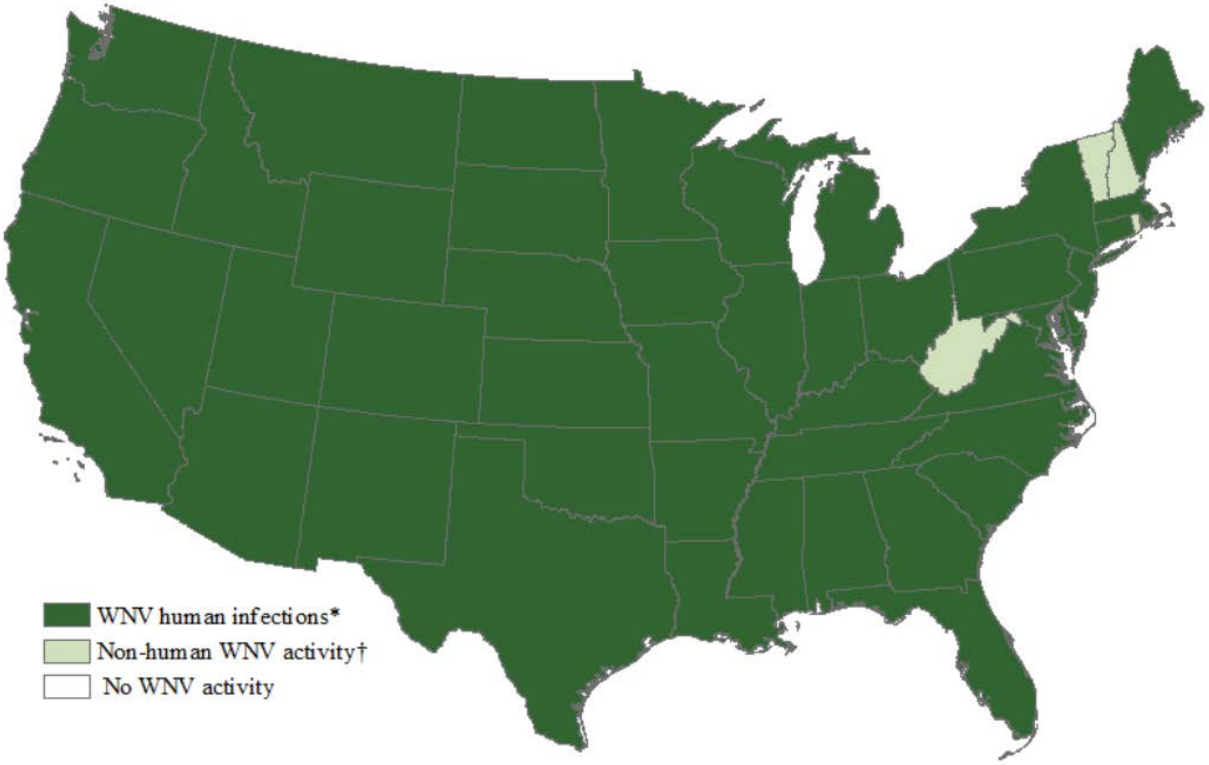
According to the West Nile Virus and Other Arboviral Activity Report prepared by the CDC Division of Vectorborne Disease; 48 states and the District of Columbia reported WNV activity to ArboNET in 2015. (CDC, 2016).

Nationally in 2015, 2,060 human cases of WNV disease were reported. Of all WNV disease cases reported, 1,360 (66 percent) were classified as neuroinvasive disease (e.g., meningitis, encephalitis, acute flaccid paralysis) and 700 (34 percent) as non-neuroinvasive disease (CDC, 2016)

Estimated National West Nile Virus Disease Cases

Based on previous studies, for every reported case of WNV neuroinvasive disease, there are an estimated 30 to 70 non-neuroinvasive disease cases. Extrapolating from the 1,360 WNV neuroinvasive disease cases reported; an estimated 40,800 to 95,200 non-neuroinvasive disease cases might have occurred in 2015. However, only 1,360 were diagnosed and reported.

Figure 1. West Nile virus (WNV) activity reported to ArboNET, by state — United States, 2016 (CDC, 2016)



*WNV human disease cases or presumptive viremic blood donors. Presumptive viremic blood donors have a positive screening test, which has not necessarily been confirmed.

†WNV veterinary disease cases, or infections in mosquitoes, birds, or sentinel animals

Presumptive Viremic Blood Donors - National

To date, 332 WNV presumptive viremic blood donors[1] were reported from 38 states.

West Nile Virus Activity in Arkansas

ADH received 39 reports of mosquito-borne disease in 2015 which met criteria to warrant an investigation. Of the 39 reports, 32 were determined to be cases. Of the 32 cases, there were 18 cases of WNV documented (Table 1), including 16 cases of neuroinvasive (e.g., meningitis, encephalitis) disease with two associated deaths, and two cases of non-neuroinvasive disease. Investigations for WNV were conducted in 14 counties and cases were documented in 12 counties (Figure 4), which represent all five public health regions. Onset of illness for WNV was from June to September, peaking in July and August (Figure 2). Additional demographic and clinical characteristics of reported cases are provided in Tables 3 and 4.

For reported cases of WNV in 2015, the incidence rate was 0.62 (per 100,000 populations). There was a similar distribution of gender among the cases with ten female and eight male, race distribution was 89 percent White and 11 percent Black, and ethnicity was entirely Non-

[1] Presumptive viremic blood donors have a positive screening test, which has not necessarily been confirmed.

Hispanic or Latino. Ages ranged from 30 to 87 (median 61), with six percent of the cases less than age 50, and 44 percent over age 65. Geographic distribution, by public health region was; Central 6 percent, Northeast 22 percent, Northwest 22 percent, Southeast 39 percent, and Southwest 11 percent (Figure 5).

Table 1. West Nile Virus Disease Cases*, and Presumptive Viremic Blood Donors (PVBD) in Surrounding States, 2015 - Provisional Data**

State	2015 Neuro-invasive‡‡	2015 Non neuro-invasive	2015 Total WNV, 2014	Deaths	2015 PVBD**
Arkansas	16	2	18	2	0
Louisiana	36	7	43	4	15
Mississippi	26	13	39	1	3
Missouri	18	11	29	4	15
Oklahoma	47	40	87	7	18
Tennessee	5	1	6	0	3
Texas	181	71	252	11	31
Totals	**329**	**145**	**474**	**29**	**85**

* Includes confirmed and probable cases

** Presumptive viremic blood donors (PVBD) are people who had no symptoms at the time of donating blood through a blood collection agency, but whose blood tested positive when screened for the presence of West Nile virus. Some PVBDs develop symptoms after donation.

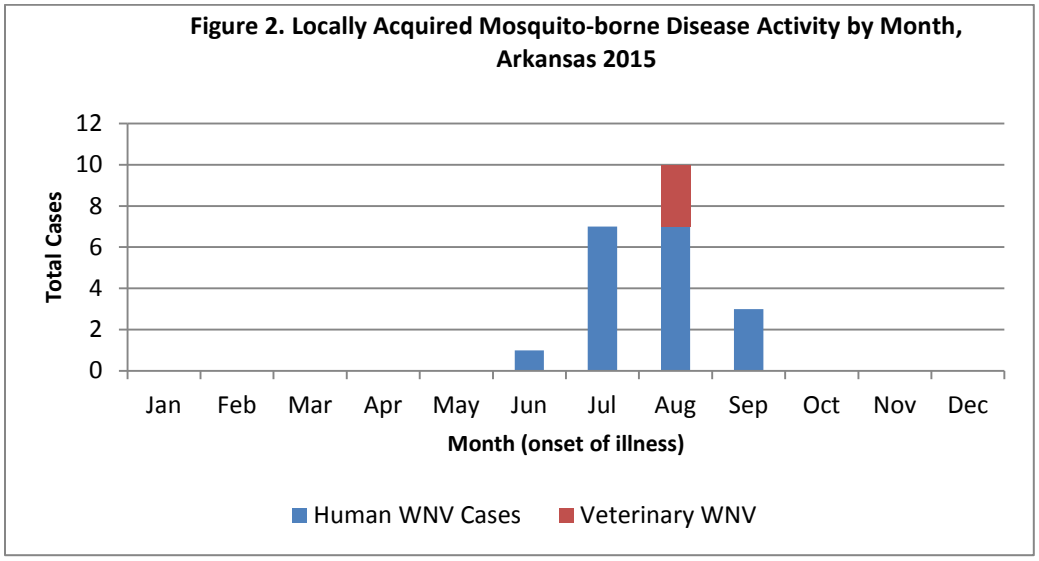
‡‡ Includes cases reported as meningitis, encephalitis, or acute flaccid paralysis.

Presumptive Viremic Blood Donors (PVBD) in Arkansas

There were no WNV PVBD reported in Arkansas in 2015. Positive presumptive viremic blood does not enter the blood supply.

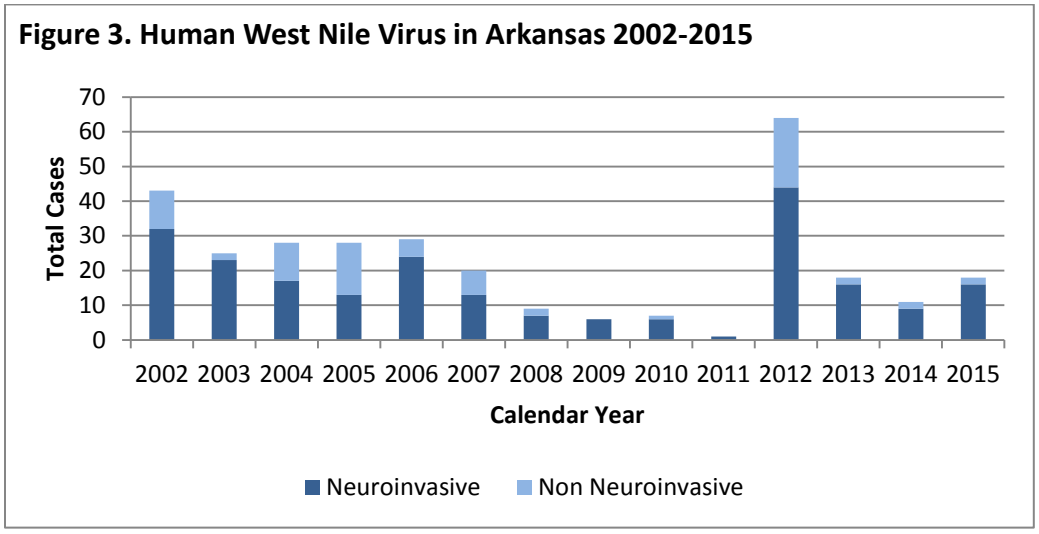
West Nile Virus Related Pregnancies, or Breast Feeding

There was no indication of females positive for West Nile Virus (WNV) being pregnant or breastfeeding during this timeframe.



Comparison to Previous Years

From 2002–2014, an average of 22 cases of human WNV disease (range: 1- 64) was reported through the calendar year, this included an average of 16 neuroinvasive disease cases, six non-neuroinvasive disease cases (Figure 3), and two deaths per year. For reported cases of WNV in 2015, the incidence rate was 0.62 per 100,000 population. There was a 73 percent increase in reported cases from 2014 and a 70 percent decrease in reported cases from 2012 (which had the highest case count of any year since WNV has been reported in Arkansas). 2015 showed a five percent decrease from the 13 year median case count.



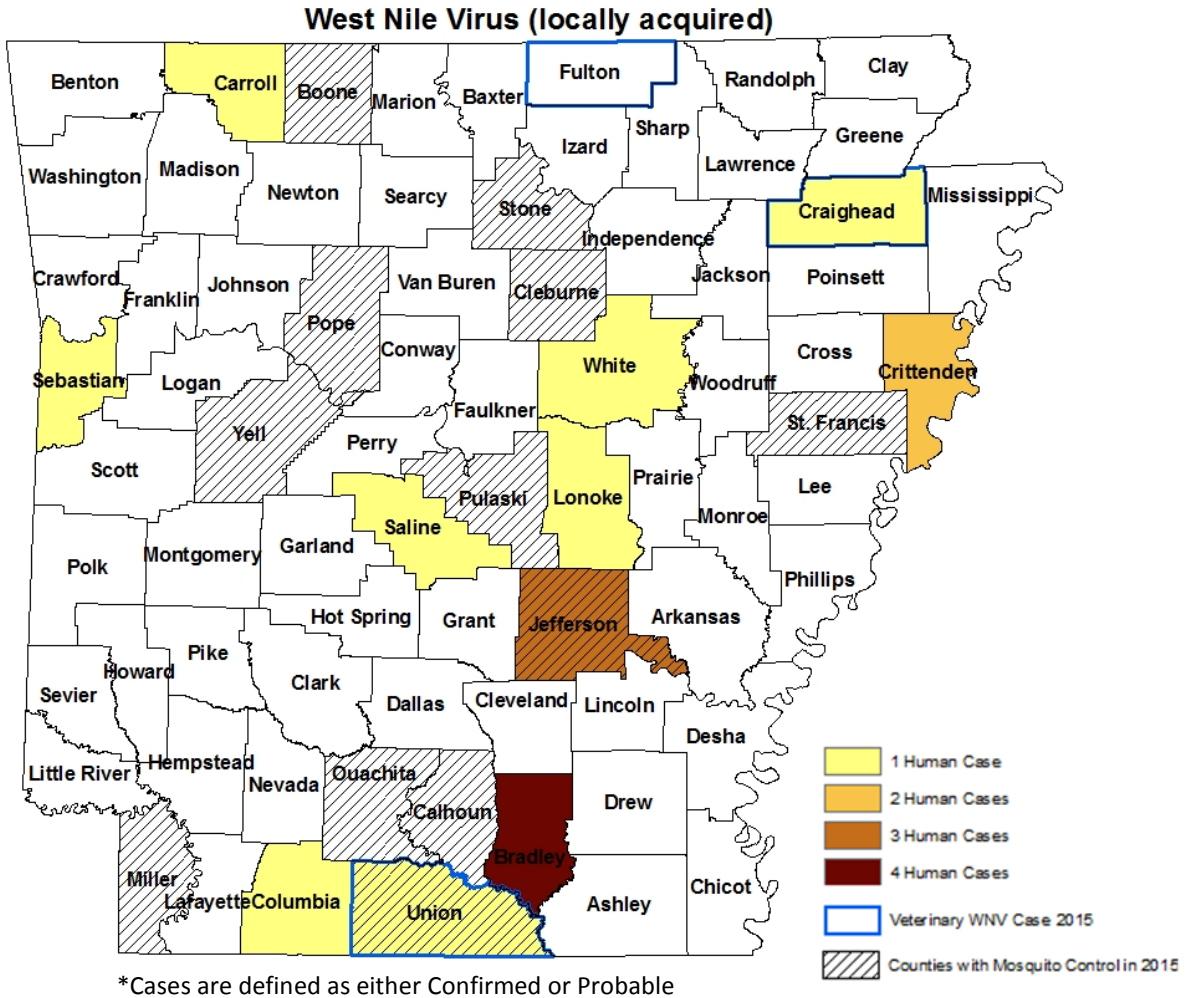
Arboviral Related Deaths in Arkansas

Two human deaths associated with WNV disease occurred in Arkansas in 2015.

Table 2. Mosquito-borne Disease Cases by County, Arkansas 2015								
County	Human Mosquito-borne Disease						Veterinary Arboviral*	County Total
	Domestically Acquired		Imported Mosquito-borne			Unknown		
	WNV neuro-invasive	WNV non Neuro-invasive	Chikun-gunya	Dengue	Malaria	Malaria		
Benton			1	1	1			3
Boone					1			1
Bradley	3	1						4
Carroll	1							1
Columbia	1							2
Craighead		1					1	2
Crawford			1					1
Crittenden	2							2
Garland					2			2
Fulton							1	1
Jefferson	3							3
Lawrence						1		
Lonoke	1							1
Pulaski					1	2		1
Saline			1					1
Scott	1							1
Sebastian	1		1					2
Union	1						1	2
Washington	1					1		
White	1							1
Total	**16**	**2**	**4**	**1**	**5**	**4**	**3**	**35**

*Includes three horses with WNV in Craighead, Fulton and Union counties in August, 2015.

Figure 4. Mosquito-borne Disease Cases* Arkansas 2015



*Cases are defined as either Confirmed or Probable

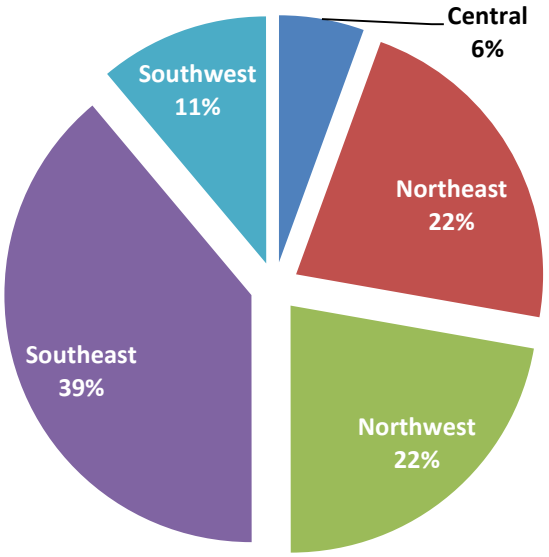
Imported Disease

Chikungunya

Dengue

Malaria

Figure 5. Human WNV Cases by Public Health Region, Arkansas 2015



Mosquito Control Activities in Arkansas

In 2015, the Arkansas State Public Health Veterinarian initiated a survey of counties to determine the level and frequency of mosquito control activities in the State. Twelve of the 75 counties surveyed responded as having some type of mosquito control within their jurisdiction (Figure 4), with the responsibility of mosquito control falling on individual jurisdictions (cities/towns) within the county. Eighty-eight cities/towns responded as having some type of mosquito control program; over half of these are located in the Northeast and Southeast public health regions. The majority of the mosquito control programs responding indicated application insecticide as the primary activity, with only six percent of the jurisdictions conducting any type of mosquito surveillance. Ninety-five percent of the responding municipalities utilize existing staff for mosquito control activities, with less than one quarter of the jurisdictions utilizing external contractors. Findings of the survey determined that there is not a consistent method of mosquito control in Arkansas. The survey results are potentially biased based on the low response from the surveyed jurisdictions. The survey will be repeated in 2016 utilizing additional resources to distribute the survey in an attempt to increase the rate of survey return.

Table 3. Characteristics of Reported West Nile Virus Cases, Arkansas 2015 - Provisional Data.

Case Status	Frequency	Percent
Confirmed	9	50
Probable	9	50
Total	**18**	**100**
Neuroinvasive	16	89
Non-Neuroinvasive	2	11

Age	Frequency	Percent	Male	Female
1 to 4	0	0	0	0
5 to 9	0	0	0	0
10 to 14	0	0	0	0
15 to 19	0	0	0	0
20 to 49	1	6	1	0
50 to 64	9	50	4	5
65 +	8	44	3	5
Total	**18**	**100**	**8**	**10**

Race	Frequency	Percent
Black	2	11
White	16	89
Total	**18**	**100**

Ethnicity	Frequency	Percent
Not Hispanic or Latino	18	100
Total	**18**	**100**

Public Health Region	Frequency	Percent	Deceased	Percent
Central	1	6	0	0
Northeast	4	22	0	0
Northwest	4	22	1	50
Southeast	7	39	1	50
Southwest	2	11	0	0
Total	**18**	**100**	**2**	**100**

Table 4. Clinical Criteria as reported to CDC, via ArboNet*, 2015

Outcome/Clinical Symptoms	Frequency	Incidence
Altered Mental Status	12	0.67
Arthralgia/Arthritis	2	0.11
Blood Donor**	0	0
Blood Product Recipient	0	0
Breast Fed	0	0
Chills/Rigors	7	0.39
Diarrhea	3	0.17
Fatality	2	0.11
Fever (≥ 38C)	18	1.00
Headache	16	0.89
Hospitalized	15	0.83
ID by Blood Donation	0	0
Infected in Utero	0	0
Lab Acquired	0	0
Myalgia	13	0.72
Nausea	6	0.33
Organ Donor	0	0
Organ Transplant Recipient	0	0
Paresis Paralysis	1	0.06
Rash	2	0.11
Seizures	1	0.06
Stiff Neck	8	0.44

*Required reporting, criteria established by CDC.

** Positive presumptive viremic blood does not enter blood supply.

Additional resources

CDC's Division of Vector-Borne Diseases:
http://www.cdc.gov/ncezid/dvbd/index.html
National Notifiable Diseases Surveillance System:
http://www.cdc.gov/osels/ph_surveillance/nndss/phs/infdis2011.htm
U.S. Geological Survey (USGS):
http://diseasemaps.usgs.gov/
AABB (American Association of Blood Banks):
www.aabb.org/programs/biovigilance/Pages/wnv.aspx

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