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West Nile Virus

And other

Mosquito-borne Diseases

Provisional Information

2014 End of Year Summary

Public Release

5/04/2015

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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 45 reports of mosquito-borne disease in 2014, which met criteria to warrant an investigation. Of the 45 reports, 27 were determined to be cases. Investigations for domestically acquired human arboviral disease were conducted in 13 counties; of those, cases were documented in ten counties, which represent all five public health regions. Onset of illness for reported human arboviral or mosquito-borne disease was from July to November, peaking in November. There were 11 cases of West Nile Virus (WNV) documented, including nine cases of neuroinvasive (e.g., meningitis, encephalitis) disease with one associated death, and two cases of non-neuroinvasive disease.

For reported cases of WNV in 2014, the incidence rate was 0.37 per 100,000 population. There was an 83 percent decrease in reported cases from 2012 (which had the highest case count of any year since WNV has been reported in Arkansas), and 45 percent decrease from the 13 year median case count. Of the reported WNV cases, 64 percent were women, and 82 percent were white and 100 percent of the cases were non-Hispanic. Ages ranged from 41 to 84 (median 59), with 45 percent of the cases over age 65. Geographic distribution, by public health region was; Central 18 percent, Northeast 37 percent, Northwest 18 percent, Southeast nine percent, and Southwest 18 percent. All reportable clinical outcomes for WNV cases can be found in Table 5.

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 nine reports of imported chikungunya virus (CHIKV) with six being determined to be cases. In 2014, CHIKV was not a nationally notifiable disease in the United States. It has been added as a nationally notifiable disease in 2015. However, chikungunya cases could be reported to ArboNET, the national surveillance system for arthropod-borne diseases. 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 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 2014, 2,344 CHIKV disease cases were reported to ArboNET from U.S. states. Eleven locally transmitted cases were reported from Florida. All other cases occurred in travelers returning from affected areas in the Americas, Asia, or the Pacific Islands (CDC, 2015).

Dengue
ADH investigated six reports of imported dengue (DENV) with four were determined to be cases. 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 eight reports of imported malaria, with six 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 was one reported case of veterinary WNV found in a horse in Sebastian County in October of 2014. There also was one case of a horse with Eastern Equine Encephalitis (EEE) in Hot Spring County, September 2014.

National West Nile Virus Data, 2014

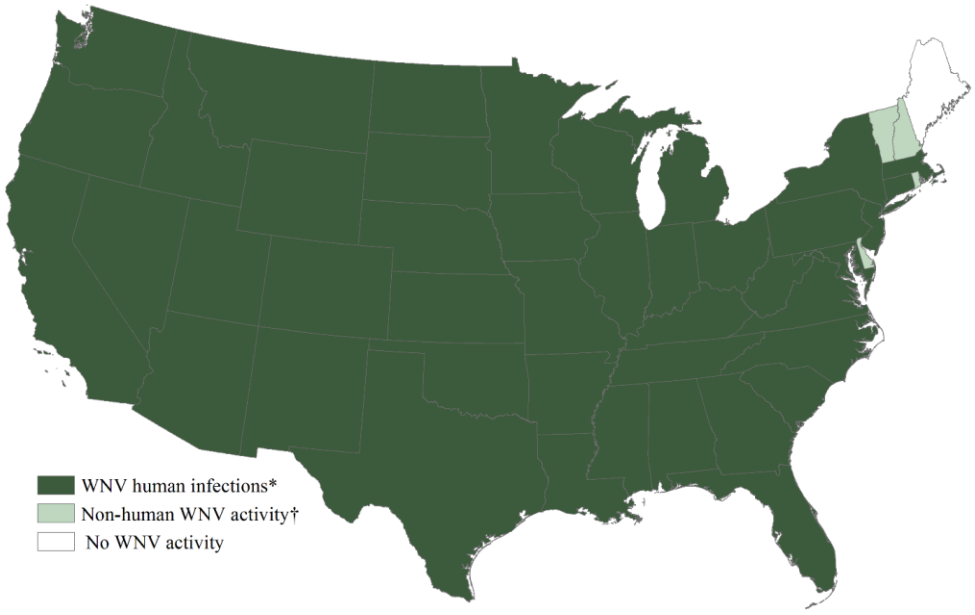
According to the West Nile Virus and Other Arboviral Activity Report prepared by the CDC Division of Vectorborne Disease; 916 counties from 47 states and the District of Columbia reported WNV activity to ArboNET in 2014. This included 43 states and the District of Columbia with reporting WNV human infections. Four additional states reported WNV activity in non-human species only (CDC, 2015).

Nationally in 2014, 2,122 human cases of WNV disease were reported from 41 states. Of all WNV disease cases reported, 839 (40 percent) were classified as neuroinvasive disease (e.g., meningitis, encephalitis, acute flaccid paralysis) and 1,283 (60 percent) as non-neuroinvasive disease. Dates of illness onset for disease cases ranged from February to December.

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 2,122 WNV neuroinvasive disease cases reported; an estimated 64,000 to 150,000 non-neuroinvasive disease cases might have occurred in 2014. However, only 2,122 were diagnosed and reported.

Figure 1. West Nile virus (WNV) activity reported to ArboNET, by state — United States, 2014 (CDC, 2015)



*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, 337 WNV presumptive viremic blood donors[1] were reported from 31 states. Of these, 31 (nine percent) developed clinical illness and are included as disease cases.

West Nile Virus Activity in Arkansas

ADH received 45 reports of mosquito-borne disease in 2014 which met criteria to warrant an investigation. Of the 45 reports, 27 were determined to be cases. Of the 27 cases, there were 11 cases of WNV documented (Table 1), including nine cases of neuroinvasive (e.g., meningitis, encephalitis) disease with one associated death, and two cases of non-neuroinvasive disease. Investigations for WNV were conducted in 13 counties and cases were documented in ten counties which represent all five public health regions. Onset of illness for WNV was from July to October, peaking in September (Figure 2). Additional demographic and clinical characteristics of reported cases are provided in Table 3.

For reported cases of WNV in 2014, the incidence rate was 0.37 (per 100,000 populations). There was a nearly equal distribution of gender among the cases with six female and five male, race distribution was 91 percent White and nine percent Asian, and ethnicity was

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

predominately Non-Hispanic or Latino (81 percent). Ages ranged from 41 to 88 (median 59), with 18 percent of the cases less than age 50, and 36 percent over age 70. Geographic distribution, by public health region was; Central 18 percent, Northeast 36 percent, Northwest 18 percent, Southeast 9 percent, and Southwest 18 percent (Figure 4).

Table 1. West Nile Virus Disease Cases*, and Presumptive Viremic Blood Donors (PVBD) in Surrounding States, 2013 to 2014 - Provisional Data**

State	2014 Neuro-invasive‡‡	2014 Non neuro-invasive	2014 Total WNV, 2014	2013 IR/100,000 population	2014 IR/100,000 population	2014 Deaths	2014 PVBD**
Arkansas	9	2	11	0.61	0.37	1	1
Louisiana	57	54	111	1.17	2.39	5	15
Mississippi	26	17	43	1.50	1.44	6	5
Missouri	12	1	13	0.48	0.21	2	8
Oklahoma	9	9	18	2.21	0.46	0	12
Tennessee	11	4	15	0.37	0.23	1	2
Texas	235	118	353	0.65	1.31	4	61
Totals	**359**	**206**	**565**	**0.80**	**1.05**	**19**	**104**

* 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.

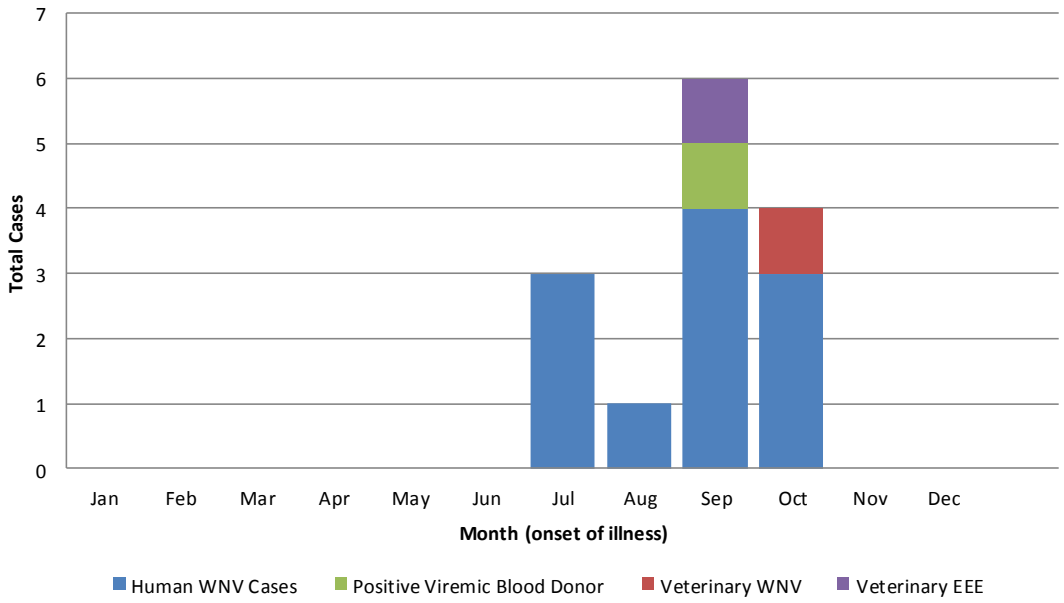
Presumptive Viremic Blood Donors (PVBD) in Arkansas

There was one WNV PVBD reported Arkansas in September of 2014. 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.

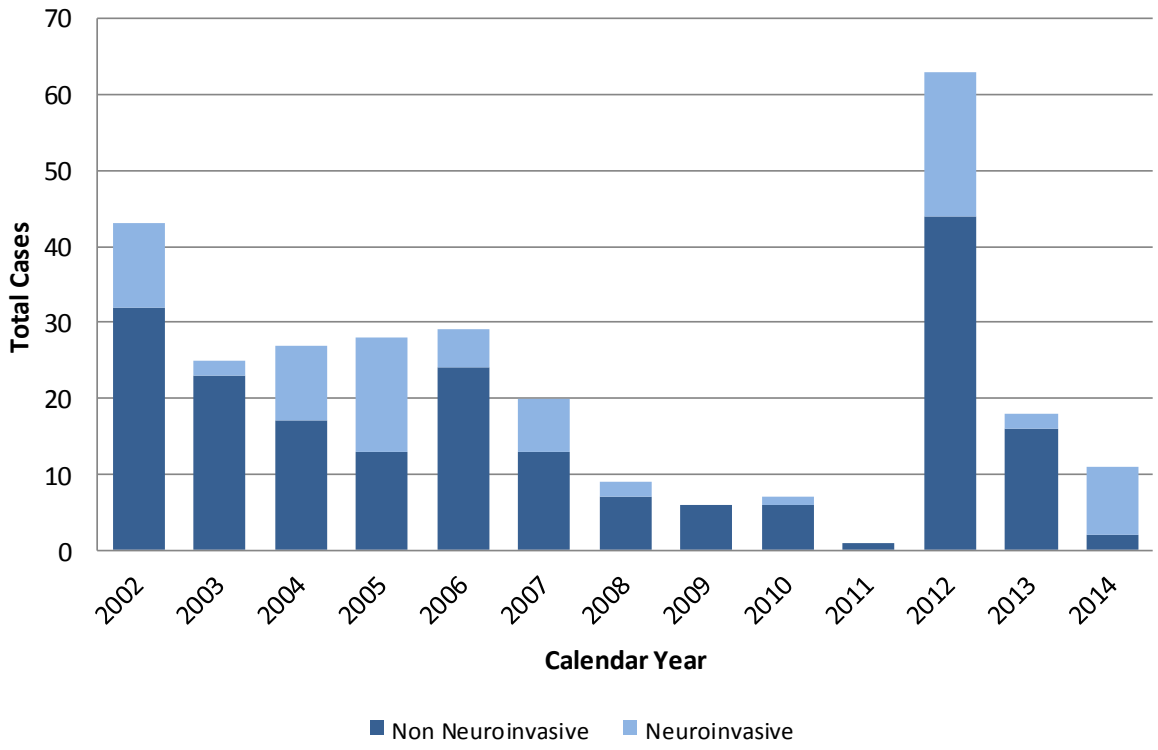
Figure 2. Locally Acquired Mosquito-borne Disease Activity by Month, Arkansas 2014



Comparison to Previous Years

From 2002–2013, 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 2014, the incidence rate was 0.37 per 100,000 population. There was a 39 percent decrease in reported cases from 2013 and a 66 percent decrease in reported cases from 2012 (which had the highest case count of any year since WNV has been reported in Arkansas). 2014 showed a 50 percent decrease from the 13 year median case count.

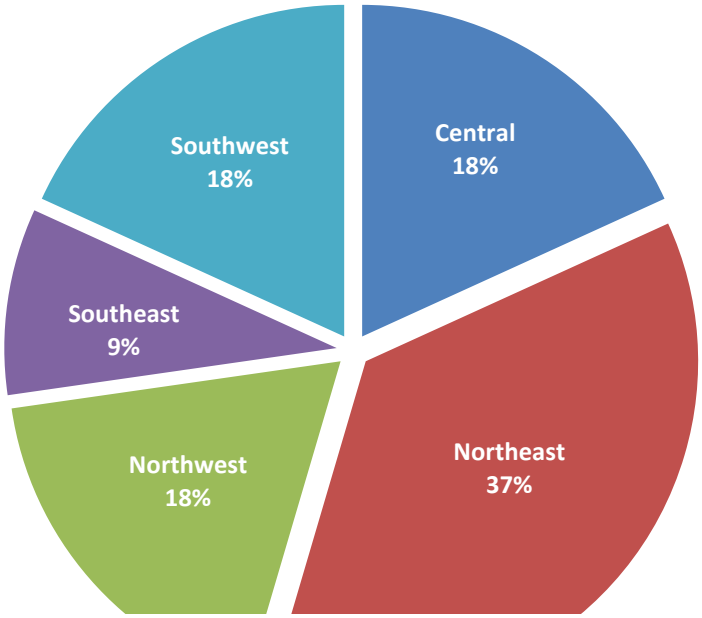
Figure 3. Historical Human West Nile Virus in Arkansas 2002-2014



Arboviral Related Deaths in Arkansas

One human death resulted from WNV disease in Arkansas. The death was classified as neuroinvasive disease.

Figure 4. Human WNV Cases by Public Health Region, Arkansas 2014



Mosquito Control Activities in Arkansas

In June of 2014, the Arkansas State Public Health Veterinarian initiated a survey of counties to determine the level and frequency of mosquito control activities in the State. Eighteen of the 75 counties surveyed responded as having some type of mosquito control within their jurisdiction, with the responsibility of mosquito control falling on individual jurisdictions (cities/towns) within the county. Thirty-two 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 25 percent of the jurisdictions conducting any type of mosquito surveillance. Seventy-eight 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 2015 utilizing additional resources to distribute the survey in an attempt to increase the rate of survey return.

Table 2. Characteristics of Reported West Nile Virus Cases, Arkansas 2014 - Provisional Data.

Case Status	Frequency	Percent
Confirmed	2	18
Probable	9	82
Total	**11**	**100**
Neuroinvasive	9	82
Non-Neuroinvasive	2	18

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	2	18	1	1
50 to 64	4	36	0	4
65 +	5	46	3	2
Total	**11**	**100**	**4**	**7**

Race	Frequency	Percent
Asian	1	9
White	10	91
Total	**11**	**100**

Ethnicity	Frequency	Percent
Hispanic or Latino	1	9
Not Hispanic or Latino	9	82
Unknown or Blank	1	9
Total	**11**	**100**

Public Health Region	Frequency	Percent	Deceased	Percent
Central	2	18	0	0
Northeast	4	37	0	0
Northwest	2	18	0	0
Southeast	1	9	0	0
Southwest	2	18	1	100
Total	**11**	**100**	**1**	**100**

Table 3. Clinical Criteria as reported to CDC, via ArboNet*, 2014

Outcome/Clinical Symptoms	Frequency	Incidence
Acute Flaccid Paralysis	0	0
Altered Mental Status	7	0.64
Arthralgia/Arthritis	5	0.45
Blood Donor**	0	0
Blood Product Recipient	0	0
Breast Fed	0	0
Chills/Rigors	6	0.55
Diarrhea	0	0
Fatality	1	0.09
Fever (≥ 38C)	11	1.00
Headache	8	0.73
Hospitalized	11	1.00
ID by Blood Donation	0	0
Infected in Utero	0	0
Lab Acquired	0	0
Myalgia	7	0.64
Nausea	2	0.36
Organ Donor	0	0
Organ Transplant Recipient	0	0
Paresis Paralysis	1	0.09
Rash	2	0.18
Seizures	1	0.09
Stiff Neck	4	0.36

*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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