



**TEXAS**  
Health and Human  
Services

Texas Department of State  
Health Services

# **Arbovirus Activity in Texas 2016 Surveillance Report**

**October 2017**

**Texas Department of State Health Services  
Infectious Disease Control Unit  
Zoonosis Control Branch**

## **Overview**

Viruses transmitted by mosquitoes are referred to as **arthropod-borne** viruses or arboviruses. Arboviruses reported in Texas may include California serogroup viruses (CAL), chikungunya virus (CHIKV), dengue virus (DENV), eastern equine encephalitis virus (EEEV), Saint Louis encephalitis virus (SLEV), western equine encephalitis virus (WEEV), West Nile virus (WNV), and Zika virus (ZIKV), many of which are endemic or enzootic in the state. In 2016, reported human arboviral disease cases were attributed to WNV (49%), ZIKV (42%), DENV (6%), and CHIKV (3%) (Table 1). Animal infections or disease caused by CAL, EEEV, SLEV, and WNV were also reported during 2016.

**Table 1. Year-End Arbovirus Activity Summary, Texas, 2016**

Disease	Positive Mosquito Pools	Avian	Equine	Sentinel Chicken	Human							TOTAL
					Fever	Neuroinvasive	Other	Severe	TOTAL (HUMAN)	Deaths	Presumptive Viremic Donors <sup>‡</sup>	
CAL	2				0	0		0	0	0		2
CHIKV	0				20	0			20	0		20
DENV	0				43	0		2	45	0		45
EEEV	0	0	7	25	0	0			0	0		32
SLEV	1	0		2	0	0			0	0		3
WNV	1775	5	139	17	118	252			370	18	47	2306
ZIKV	0				228	0	87		315	0	4	315
<b>TOTAL</b>	<b>1778</b>	<b>5</b>	<b>146</b>	<b>44</b>	<b>409</b>	<b>252</b>	<b>87</b>	<b>2</b>	<b>750</b>	<b>18</b>	<b>51</b>	<b>2723</b>

CAL - California serogroup includes California encephalitis, Jamestown Canyon, Keystone, La Crosse, Snowshoe hare and Trivittatus viruses

CHIKV - Chikungunya Virus

DENV - Dengue Virus

EEEV - Eastern Equine Encephalitis Virus

SLEV - Saint Louis Encephalitis Virus

WNV - West Nile Virus

ZIKV - Zika Virus

<sup>‡</sup>PVD - Presumptive viremic blood donors 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 WNV and ZIKV. Unless they meet the case reporting criteria, they are not counted as a case for official reporting purposes and are not included in the "total reports" column.

## **California Serogroup Viruses**

CAL serogroup viruses are bunyaviruses and include California encephalitis virus (CE), Jamestown Canyon virus, Keystone virus, La Crosse virus (LACV), Snowshoe hare virus, and Trivittatus virus. These viruses are maintained in a cycle between *Aedes triseriatus* and vertebrate hosts in forest habitats. In the United States (U.S.), approximately 80-100 reported cases of human neuroinvasive disease are caused by LACV each year (CDC), mostly in mid-Atlantic and southeastern states. From 2002-2015, Texas reported a total of 5 cases of human CAL neuroinvasive disease (range: 0-3 cases/year): 1 case of CE neuroinvasive disease and 4 cases of LACV neuroinvasive disease. In 2016, no human cases of CAL disease were reported and 2 CE-positive mosquito pools were identified in Denton County.

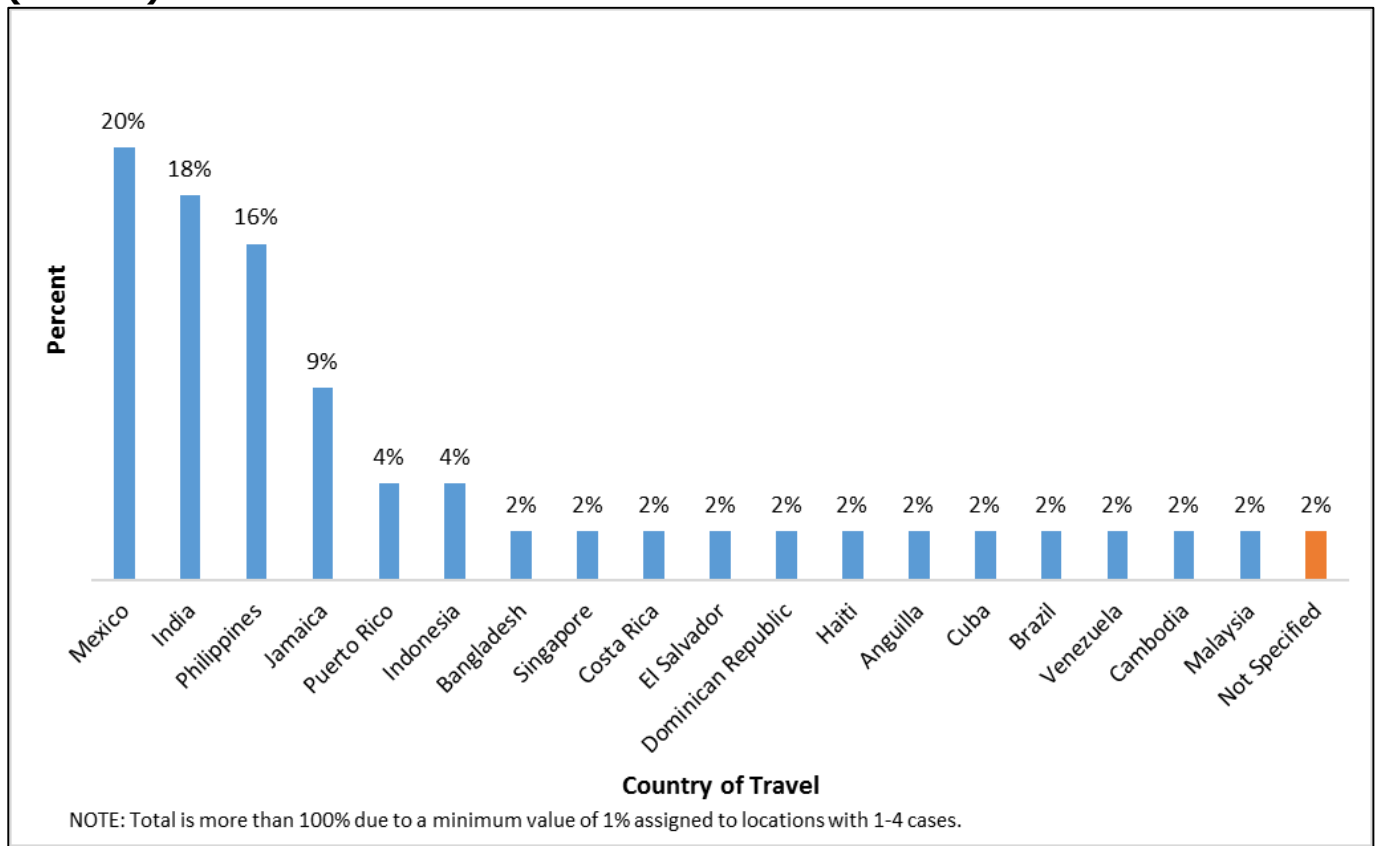
### **Chikungunya Virus**

CHIKV is an alphavirus that is maintained in a cycle between *Aedes aegypti* or *Ae. albopictus* mosquitoes and human hosts. Since 2004, several extensive outbreaks have been reported from countries in Africa, Asia, Europe, and the Indian and Pacific Oceans. In late 2013, the first local transmission of CHIKV in the Americas was reported in the Caribbean (CDC). Since then, locally acquired cases of chikungunya disease (CHIK) have been reported throughout the region, including the U.S. Prior to the emergence of CHIKV in the Americas in 2013, Texas reported fewer than 5 travel-associated CHIK cases. In contrast, in 2014, Texas reported 114 travel-associated cases. In 2015, Texas reported 54 travel-associated cases statewide and one locally acquired case from Cameron County. In 2016, Texas reported 20 travel-associated cases and no locally acquired cases of CHIK. Reported cases traveled to the following countries: India (40%), Mexico (20%), Brazil (10%), Philippines (10%), Dominican Republic (5%), Indonesia (5%), Puerto Rico (5%), and Uganda (5%).

### **Dengue Virus**

DENV is a flavivirus that is maintained in a cycle between *Ae. aegypti* or *Ae. albopictus* mosquitoes and human hosts. It is re-emerging throughout the tropical and subtropical Americas, including northern Mexico. Human cases are most often imported into the U.S. as a result of travel to a dengue-endemic country, but locally-acquired cases have been reported in Florida, Hawaii, and Texas (CDC). From 2003-2015, Texas reported a total of 315 cases of dengue (annual median = 19 cases, range: 1-95 cases/year). During this time period, 27 cases of locally-acquired dengue were reported from the Lower Rio Grande Valley region of Texas: 24 in Cameron County, 2 in Hidalgo County, and 1 in Willacy County. In 2016, Texas reported 45 travel-associated cases of dengue: 42 dengue fever, 2 severe dengue, and 1 dengue-like illness. The majority of cases reported travel to the following countries: Mexico (20%), India (18%), Philippines (16%), Jamaica (9%), Indonesia (4%), and Puerto Rico (4%) (Figure 1). The specific country could not be determined for one travel-associated dengue case who reported travel to South America.

**Figure 1. Reported Cases of Dengue by Country of Travel, Texas, 2016 (N = 45)**



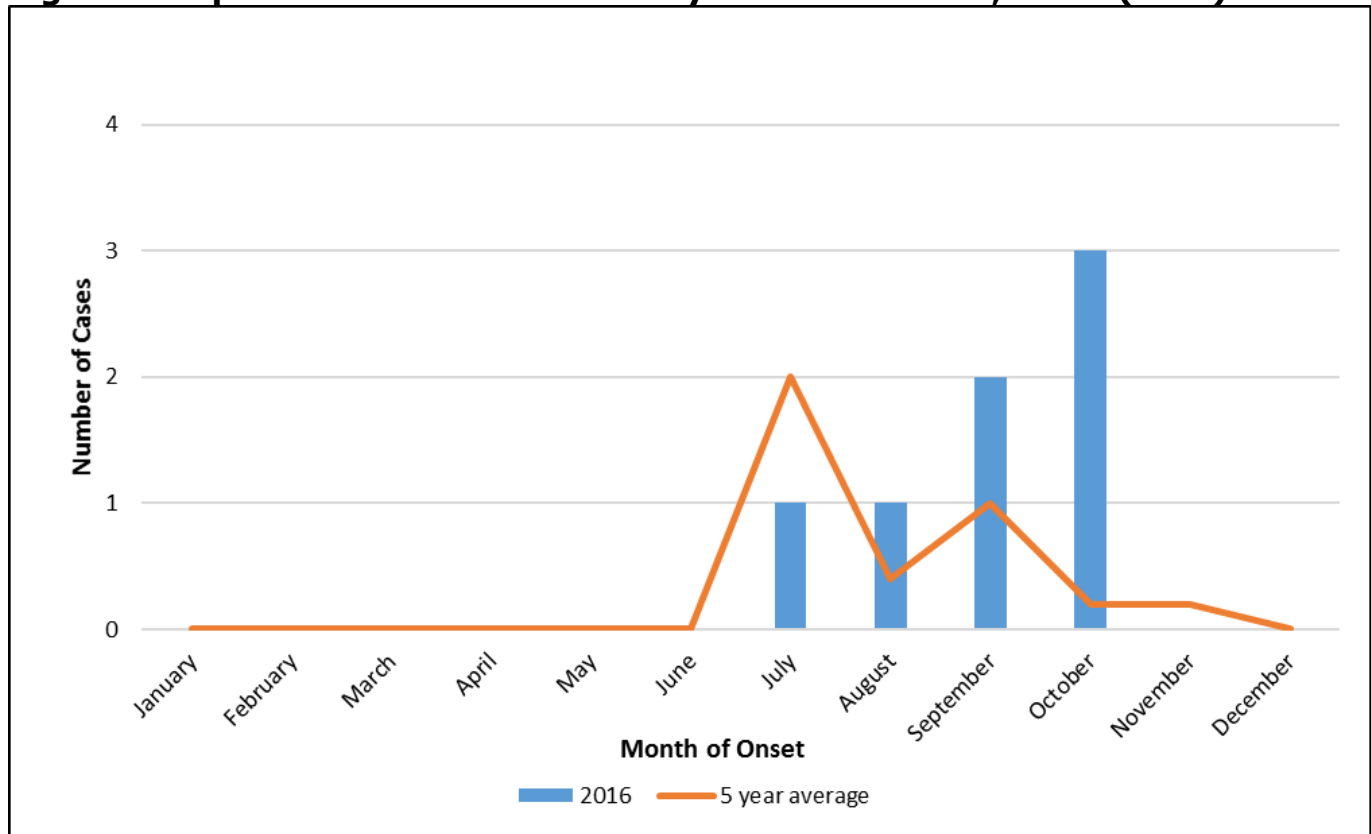
**Eastern Equine Encephalitis Virus**

EEEV is an alphavirus maintained in a cycle between *Culiseta melanura* mosquitoes and avian hosts in freshwater swamps. *Cs. melanura* is not considered to be an important vector of EEEV to humans because it feeds almost exclusively on birds. Transmission to humans requires mosquito species capable of creating a “bridge” between infected birds and uninfected mammals, such as some *Aedes*, *Coquillettidia*, and *Culex* species. Eastern equine encephalitis (EEE) is a rare illness in humans and only a few cases are reported in the U.S. each year. Most cases of EEE have been reported from Florida, Georgia, Massachusetts, and New Jersey (CDC). Portions of northeast Texas, bordering Louisiana, contain habitat suitable for EEEV transmission and EEEV-infected horses have been reported from this part of the state. From 2003-2015, Texas reported 62 equine cases of EEE (annual median = 3 cases, range: 0-29 cases/year). No EEEV-infected humans or mosquitoes were reported during this time.

In 2016, 7 EEEV-infected horses were reported from Anderson, Cass, Orange, Smith, and Tyler counties. The onset dates for all 7 equine EEE cases were between July and October (Figure 2). In addition, Galveston County reported 25 EEEV antibody-positive sentinel chickens (Note: Galveston County is the only Texas

county currently testing sentinel chickens for EEEV antibodies). No EEEV-infected humans or mosquitoes were reported in 2016.

**Figure 2. Equine EEE Cases in Texas by Month of Onset, 2016 (N=7)**



**Saint Louis Encephalitis Virus**

SLEV is a flavivirus maintained in a cycle between *Culex* species mosquitoes and birds. The geographic range of SLEV extends from North to South America, but the majority of cases have occurred in the eastern and central U.S., where periodic epidemics have occurred since the 1930s (CDC). In Texas and states with milder climates, SLEV can circulate year round. From 2003-2015, Texas reported 38 human cases of Saint Louis encephalitis (annual median = 1 case, range: 0-18 cases/year). In 2016, one SLEV-positive mosquito pool was identified in Nueces County. In addition, Galveston County reported 2 SLEV antibody-positive sentinel chickens (Note: Galveston County is the only Texas county currently testing sentinel chickens for SLEV antibodies).

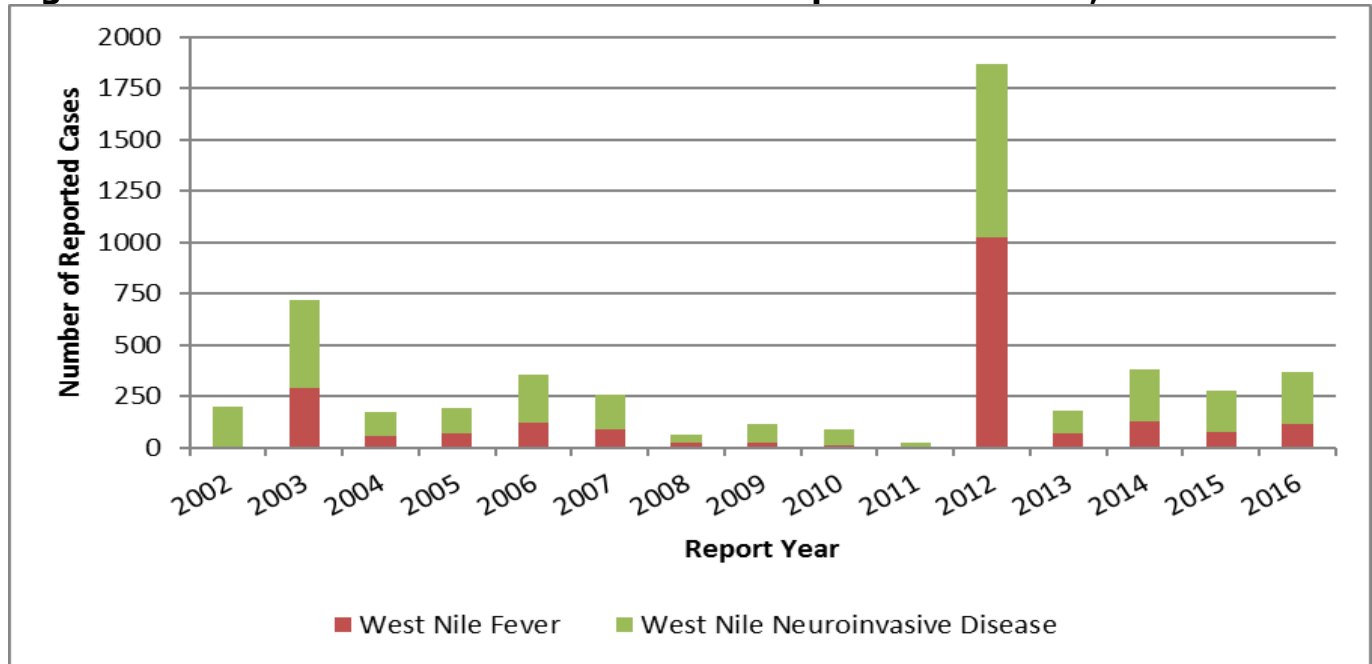
**West Nile Virus**

WNV is a flavivirus maintained in a cycle between mosquitoes (primarily *Culex* species) and birds. WNV circulates on every continent except Antarctica. Before 1999, WNV had not been documented in the Western Hemisphere. In 1999, human disease associated with WNV infection was identified in New York City. By the end of October 1999, WNV infections had been confirmed in multiple native species of

birds as well as horses from New York City and areas within a 200-mile radius of the city. Since 1999, WNV infections in humans, birds, equines, other animals, and mosquitoes have been reported throughout the U.S.

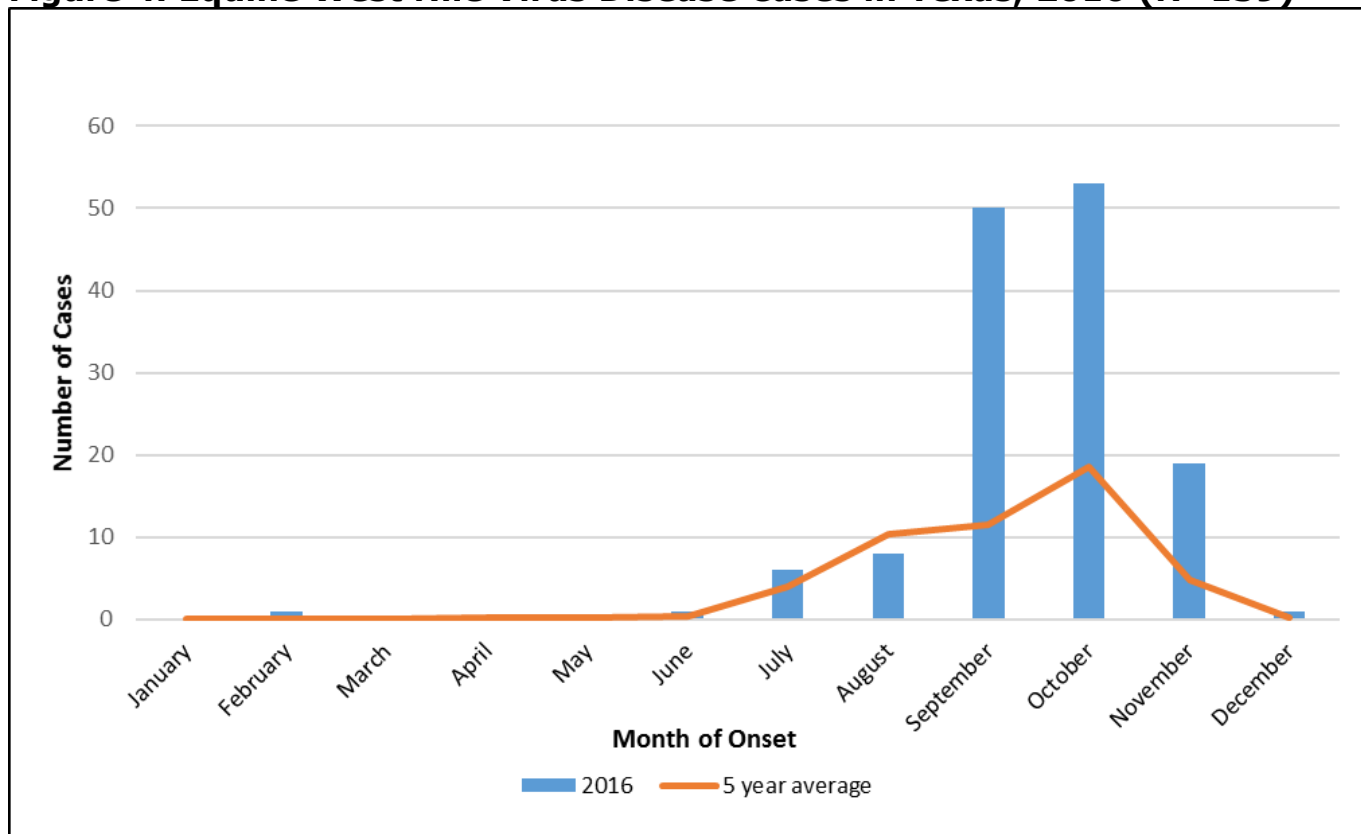
From 2002-2015, 4,907 cases of WNV disease were reported in Texas (annual median = 199 cases, range: 27-1868 cases/year). In 2011, Texas reported its lowest number of human WNV disease cases, 27, but then a record high number of 1,868 cases were reported in 2012 (Figure 3).

**Figure 3. Human West Nile Disease Cases Reported in Texas, 2002-2016**



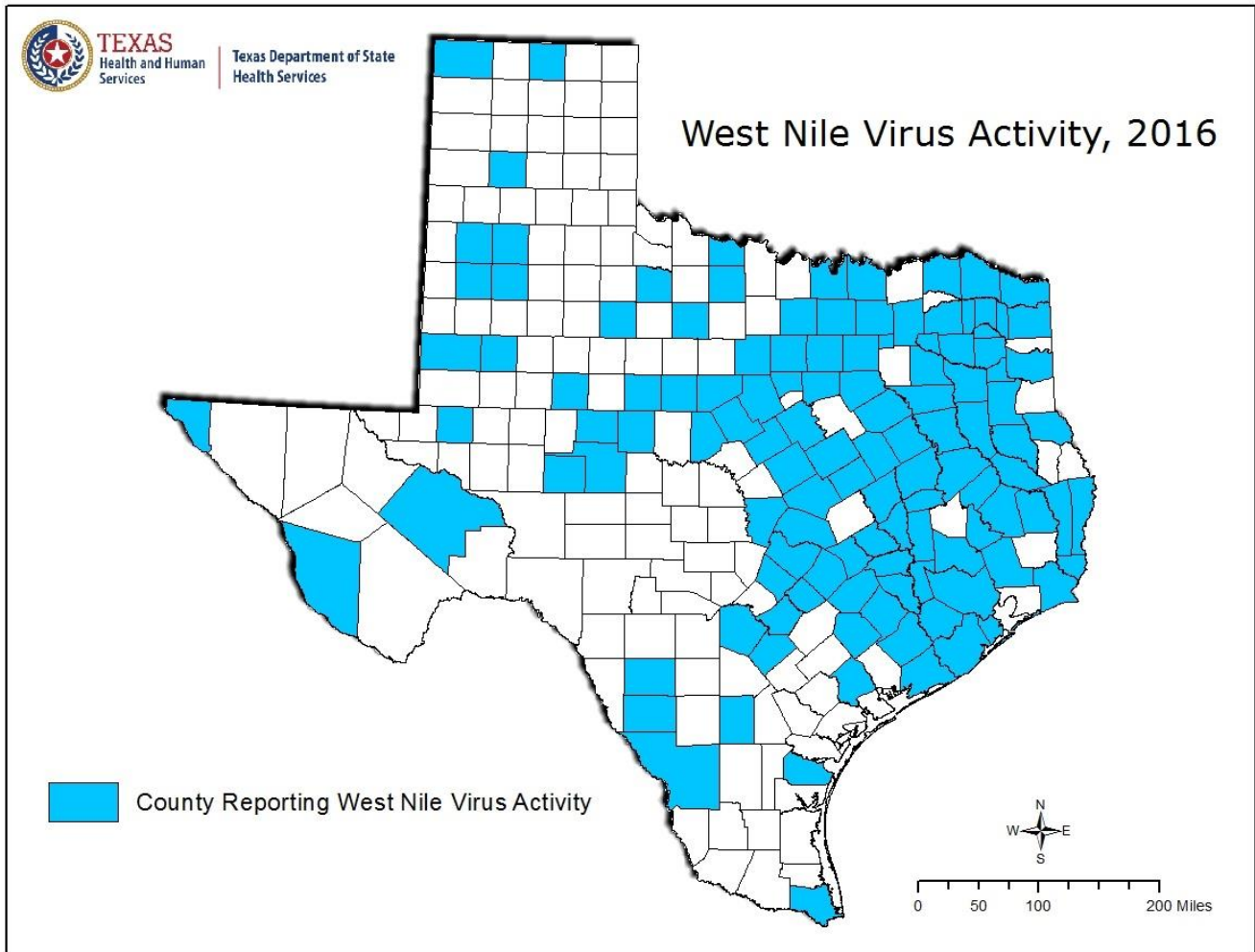
In 2016, WNV infection was reported in 1,775 mosquito pools, 5 dead birds, 139 horses and 17 sentinel chickens. Waller County reported the highest number of WNV-infected horses (5%). The majority (74%) of WNV-infected horses had onsets of illness in September and October (Figure 4).

**Figure 4. Equine West Nile Virus Disease Cases in Texas, 2016 (N=139)**



In 2016, evidence of WNV activity (human, horse, bird, mosquito, or sentinel chickens) was reported from 121 (48%) of the 254 counties in Texas (Figure 5). Thirty (12%) counties reported WNV-positive mosquito pools, 86 (34%) reported human WNV disease cases, 27 (11%) reported presumptive viremic blood donors (PVDs), 75 (30%) reported WNV-infected horses, 4 (2%) counties reported WNV-positive birds, and 1 county reported WNV-positive sentinel chickens (Note: Galveston County is the only Texas county currently testing sentinel chickens for WNV antibodies).

**Figure 5. Texas Counties Reporting WNV Activity\* in Any Species, 2016**



\*Indicated by an WNV-positive bird, mosquito pool, sentinel chicken, horse, or human (disease case or presumptive viremic donor). Absence of WNV activity from counties may be due to absence of an active surveillance program.

In 2016, 370 WNV disease cases were reported in humans: 252 (68%) were West Nile neurologic disease (WNND) and 118 (32%) were West Nile fever (WNF). Additionally, there were 47 PVDs reported by blood collection agencies (Table 2).



**Table 2. WNV Activity Reported by Species and County, Texas, 2016**

County	WNV								COUNTY TOTAL
	M	A	E	SC	H				
					WNF	WNND	PVD‡	TOTAL	
Anderson			1			1		1	2
Angelina					2	7		9	9
Archer			1						1
Austin			3						3
Bastrop		1	2		2	3	1	5	8
Bell	2					2	1	2	4
Bexar	3					2	1	2	5
Bosque						2		2	2
Bowie			5		2		1	2	7
Brazoria	18		2		1	4		5	25
Brazos			2		2		1	2	4
Brown					1	1		2	2
Burleson			2						2
Burnet			1						1
Caldwell			1						1
Callahan						1		1	1
Cameron	1								1
Camp			1						1
Cass			2		2			2	4
Cherokee			3			1		1	4
Coke			1						1
Collin	89		1		10	12	1	22	112
Colorado						1		1	1
Comanche			1						1
Cooke	3		1						4
Coryell	1								1
Dallam							1		0
Dallas	703				21	40	2	61	764
Dawson						1		1	1
Denton	78		3		10	10	3	2	101
Dimmit						1		2	2
Eastland			1			1		1	2
Ector			1			1		1	2
El Paso	10	2			2	4		6	18
Ellis	30					3		3	34
Erath			4						4
Falls						1		1	1
Fayette			2						2
Fort Bend	1					2	2	2	3

**Table 2 (continued)**

County	WNV								COUNTY TOTAL
	M	A	E	SC	H				
					WNF	WNND	PVD‡	TOTAL	
Franklin			2			1		1	3
Freestone			3		1	1		2	5
Gaines						1		1	1
Galveston	3		1	17	1	5	2	6	27
Grayson	49		1		1	5		6	56
Gregg	4		1			4	1	4	9
Grimes			4			2		2	6
Guadalupe			1				1		1
Hale					1			1	1
Hamilton					1			1	1
Hansford						1		1	1
Harris	97	1	4		6	18	13	23	125
Harrison			1						1
Hays			1						1
Henderson			2			4		4	6
Hockley					1	1		2	2
Hood					2			2	2
Hopkins			3		2	2	1	4	7
Houston			1						1
Hunt	11		3		2	4	1	6	20
Irion					1	1		2	2
Jasper			2						2
Jefferson	4				7			7	11
Johnson	16					5		5	20
Knox						1		1	1
Lamar			1			2		2	3
Lamb						1		1	1
Lavaca			1						1
Lee			1						1
Leon			1						1
Liberty						2	1	2	2
Limestone			1			1		1	2
Lubbock	4				1			1	5
Madison			1						1
Matagorda						1		1	1
McLennan			1		3	4		7	8
McMullen			1						1
Mitchell			1						1
Montgomery	2		4		2	8	1	1	16

**Table 2 (continued)**

County	WNV								COUNTY TOTAL
	M	A	E	SC	H				
					WNF	WNND	PVD‡	TOTAL	
Morris			4						4
Nacogdoches			3		1	2		3	6
Navarro			1		1	4		5	6
Newton						1		1	1
Nueces	24					5	1	5	29
Orange	4				1		1	1	5
Palo Pinto			1			2		2	3
Parker			1			2		2	3
Pecos						1		1	1
Polk			1			2		2	3
Presidio						1		1	1
Rains						1		1	1
Randall			1		1			1	2
Red River						1	1	1	1
Robertson			2						2
Rockwall	21		1			1		1	23
Runnels						1		1	1
Rusk						3		3	3
San Jacinto			3						3
Shelby			1			1		1	2
Smith	5	1	5		1	5	1	6	17
Stonewall			1						1
Tarrant	558		2		15	29	4	44	605
Taylor			1			1		1	2
Throckmorton			1						1
Titus			2		1		1	1	3
Tom Green			1						1
Travis	16		1		3			3	19
Trinity			2		1			1	3
Tyler					1			1	1
Upshur			3			1	1	1	4
Van Zandt			2		2	3		5	7
Victoria			1						1
Waller			7			2		2	9
Washington			3				1		3
Webb	4								4
Wharton						1	1	1	1
Wichita	2		2						4
Williamson	12		1			2		2	15

**Table 2 (continued)**

County	WNV								COUNTY TOTAL
	M	A	E	SC	H				
					WNF	WNND	PVD‡	TOTAL	
Wilson						1		1	1
Wise						1		1	1
Wood			1		3	1		4	5
Zavala						1			1
<b>Total Number of Reports</b>	<b>1775</b>	<b>5</b>	<b>139</b>	<b>17</b>	<b>118</b>	<b>252</b>	<b>47</b>	<b>370</b>	<b>2306</b>

M-Mosquito A-Avian E-Equine SC-Sentinel Chicken H-Human

WNV-West Nile Virus WNF-West Nile Fever WNND-West Nile Neuroinvasive Disease

PVD-Presumptive Viremic Blood Donor

‡PVDs are not included in any of the "Total" columns.

Of the cases with WNND, 155 (62%) presented with encephalitis, including meningoencephalitis, and 93 (37%) presented with meningitis only (Table 3). The median age at onset of illness was 58 years (range: 9-91 years) for all cases. Cases with WNND tended to be slightly older (median = 61 years, range: 10-91 years), while case patients with WNF were slightly younger (median = 54 years, range: 9-86 years). The majority (77%) of all WNV disease cases were non-Hispanic whites, followed by Hispanics (14%).

The most common symptoms reported by WNND cases were fever (93%), headache (69%), nausea or vomiting (63%), confusion (61%), and severe malaise (60%) (Table 3). The most common symptoms reported by WNF cases were fever (93%), headache (81%), chills (72%), severe malaise (64%), and nausea or vomiting (61%). The majority of WNND cases were hospitalized (96%), compared with only 25% of WNF cases. The median length of hospitalization for WNND cases was 8 days (range: 0-97 days) while the median length of hospitalization for WNF cases was 5 days (range: 1-11 days). There were 18 deaths attributed to WNV (7%) among reported cases of WNND in 2016. No WNV-related deaths were reported among WNF cases.

**Table 3. Characteristics of Reported Human WNV Disease Cases, Texas, 2016**

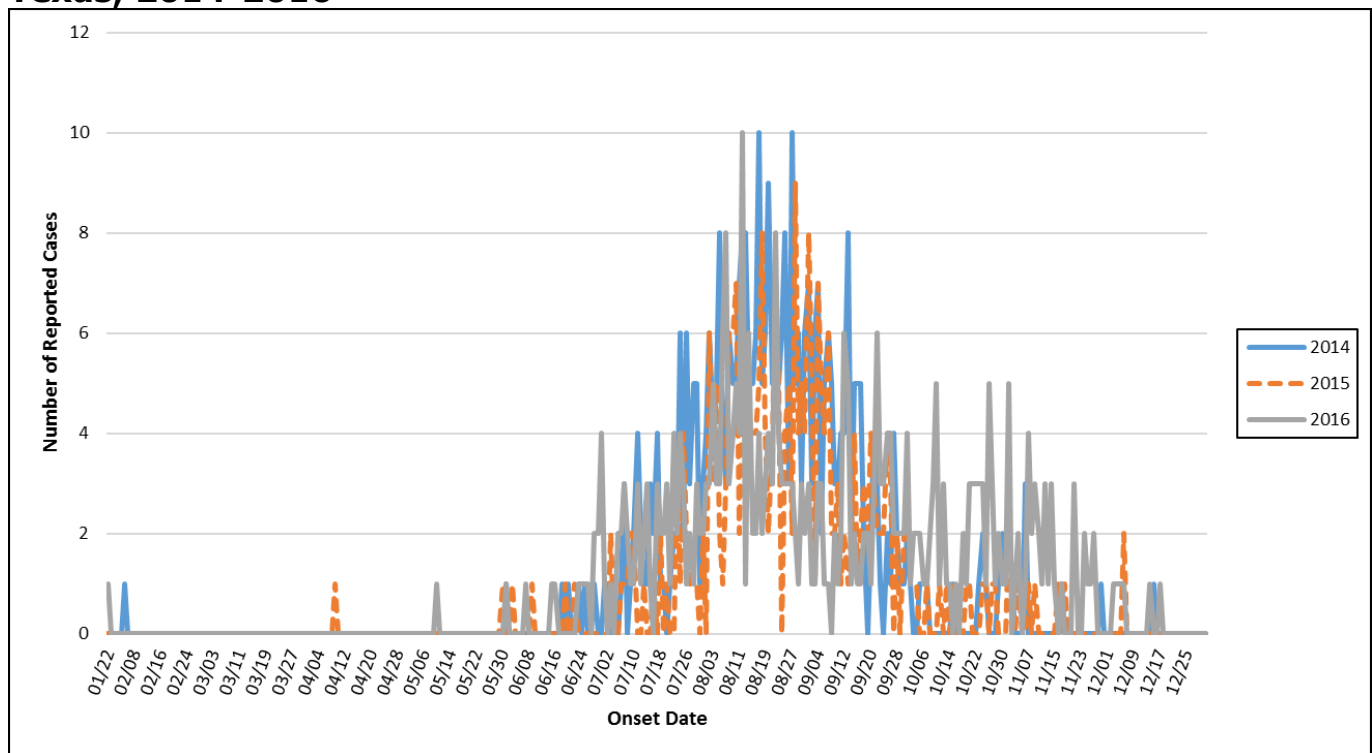
Characteristic	WNND (N=252)		WNF (N=118)	
	Number	%	Number	%
<b>Gender</b>				
Male	170	67	56	47
Female	82	33	62	53
<b>Age (years)</b>				
<1-9	-	-	1	1
10-19	7	3	-	-
20-29	9	4	11	9
30-39	20	8	15	13
40-49	29	11	16	14
50-59	54	21	37	31
60-69	65	26	25	21
70-79	44	17	10	8
80+	24	10	3	3
<b>Race/Ethnicity</b>				
Non-Hispanic White	177	70	98	83
Hispanic	44	16	6	5
Asian/Pacific Islander	2	1	1	1
Black	9	4	5	4
American Indian/Alaska Native	1	1	-	-
Unknown	19	8	8	7
<b>Clinical Syndrome</b>				
Encephalitis/Meningoencephalitis	155	61	-	-
Meningitis	93	36	-	-
Other Neuroinvasive Presentation	1	1	-	-
Acute Flaccid Paralysis	2	1	-	-
Guillain-Barré Syndrome	1	1	-	-
Uncomplicated Fever	-	-	118	100
<b>Clinical Signs/Symptoms</b>				
Fever	234	93	110	93
Headache	173	69	95	81
Nausea or Vomiting	158	63	72	61
Confusion	153	61	7	6
Severe Malaise	152	60	76	64
Altered Mental Status	151	60	7	6
Chills	143	57	85	72
Muscle Weakness	133	53	62	53
Anorexia	106	42	70	59
Stiff Neck	95	38	47	40
Myalgia	92	37	65	55
Arthralgia	58	23	60	51
Rash	51	20	61	52

**Table 3 (continued)**

Characteristic	WNND (N=252)		WNF (N=118)	
	Number	%	Number	%
<b>Clinical Course</b>				
Hospitalized	242	96	29	25
Median Length of Stay (Days)	8		5	
Death	18	7	-	-

In 2016, dates of symptom onset for all human WNV disease cases ranged from January 22nd to December 17th (Figure 6). The median date of symptom onset in 2016 was August 28th, which is similar to the median symptom onset in 2015 (August 26th) and 2014 (August 20th).

**Figure 6. Epidemiologic Curve of Reported Human WNV Disease Cases, Texas, 2014-2016**



In 2016, the statewide incidence of all human WNV disease cases was 1.3 cases per 100,000 population. The statewide incidence for WNND was 0.9 cases per 100,000 population (Table 4). Overall, WNV disease incidence was highest in Angelina County (9.9 cases per 100,000 population) and Navarro County (9.6 cases per 100,000 population). WNND incidence was highest in Angelina County (7.7 cases per 100,000 population) and Grayson County (3.9 cases per 100,000 population).

In 2016, DSHS Health Service Regions (HSR) 4/5N and 2/3 were disproportionately affected by WNV disease (Table 5). HSR 4/5N reported 3.8

cases per 100,000 population and HSR 2/3 reported 2.3 cases per 100,000 population.

**Table 4. Reported Human WNV Disease Incidence Rates in Counties with 5 or More\*\* Cases, 2016**

County	Population*	WNF and WNND Cases	Incidence Rate (per 100,000)	Only WNND Cases	Incidence Rate (per 100,000)
Angelina	91,260	9	9.9	7	7.7
Bastrop	89,519	5	5.6	3	**
Brazoria	369,056	5	1.4	4	**
Collin	990,954	22	2.2	12	1.2
Dallas	2,523,596	61	2.4	40	1.6
Denton	822,800	20	2.4	10	1.2
El Paso	889,588	6	0.7	4	**
Galveston	317,421	6	1.9	5	1.6
Grayson	128,539	6	4.7	5	3.9
Harris	4,556,524	24	0.5	18	0.4
Hunt	96,651	6	6.2	4	**
Jefferson	260,739	7	2.7	0	**
Johnson	172,015	5	2.9	5	2.9
McLennan	246,103	7	2.8	4	**
Montgomery	574,435	10	1.7	8	1.4
Navarro	52,000	5	9.6	4	**
Nueces	360,168	5	1.4	5	1.4
Smith	229,695	6	2.6	5	2.2
Tarrant	1,996,266	44	2.2	29	1.5
Van Zandt	56,117	5	8.9	3	**
All Texas Counties	28,288,353	370	1.3	252	0.9

\*2016 population projections accessed 6/02/17, DSHS Center for Health Statistics

<http://soupfin.tdh.state.tx.us/>

\*\*Calculation of rates is not recommended when there are fewer than five events in the numerator because the calculated rate can be unstable and exhibit wide confidence intervals.

**Table 5. Reported Human WNV Disease Cases and Incidence Rates in Texas by DSHS Health Service Region (HSR), 2016**

HSR	Population*	WNF and WNND Cases	Incidence Rate (per 100,000)
1	899,673	7	0.8
2/3	8,185,824	187	2.3
4/5N	1,588,464	61	3.8
6/5S	7,367,119	62	0.8
7	3,421,098	30	0.9
8	2,928,214	5	0.2
9/10	1,531,283	13	0.8
11	2,366,678	5	0.2
<b>TOTAL</b>	<b>28,288,353</b>	370	1.3

\*2016 population projections accessed 6/02/17, DSHS Center for Health Statistics  
<http://soupfin.tdh.state.tx.us/>

### **Zika Virus**

ZIKV is a flavivirus that is maintained in a cycle between *Aedes aegypti* or *Ae. albopictus* mosquitoes and human hosts. Zika virus was first discovered in 1947 and is named after the Zika Forest in Uganda. The first human cases of Zika were detected in the 1950s and since then, sporadic outbreaks of Zika disease have been reported in tropical Africa, Southeast Asia, and the Pacific Islands (CDC). The majority of infections with ZIKV are asymptomatic. In late 2015, the first local transmission of ZIKV in the Americas was reported in Brazil. Since then, locally acquired cases of Zika have been reported throughout Latin America and the Caribbean basin. Prior to the emergence of ZIKV in the Americas in 2015, Texas reported only 1 travel-associated Zika disease case (ZIKVD). In 2015, Texas reported 8 travel-associated cases of ZIKVD.

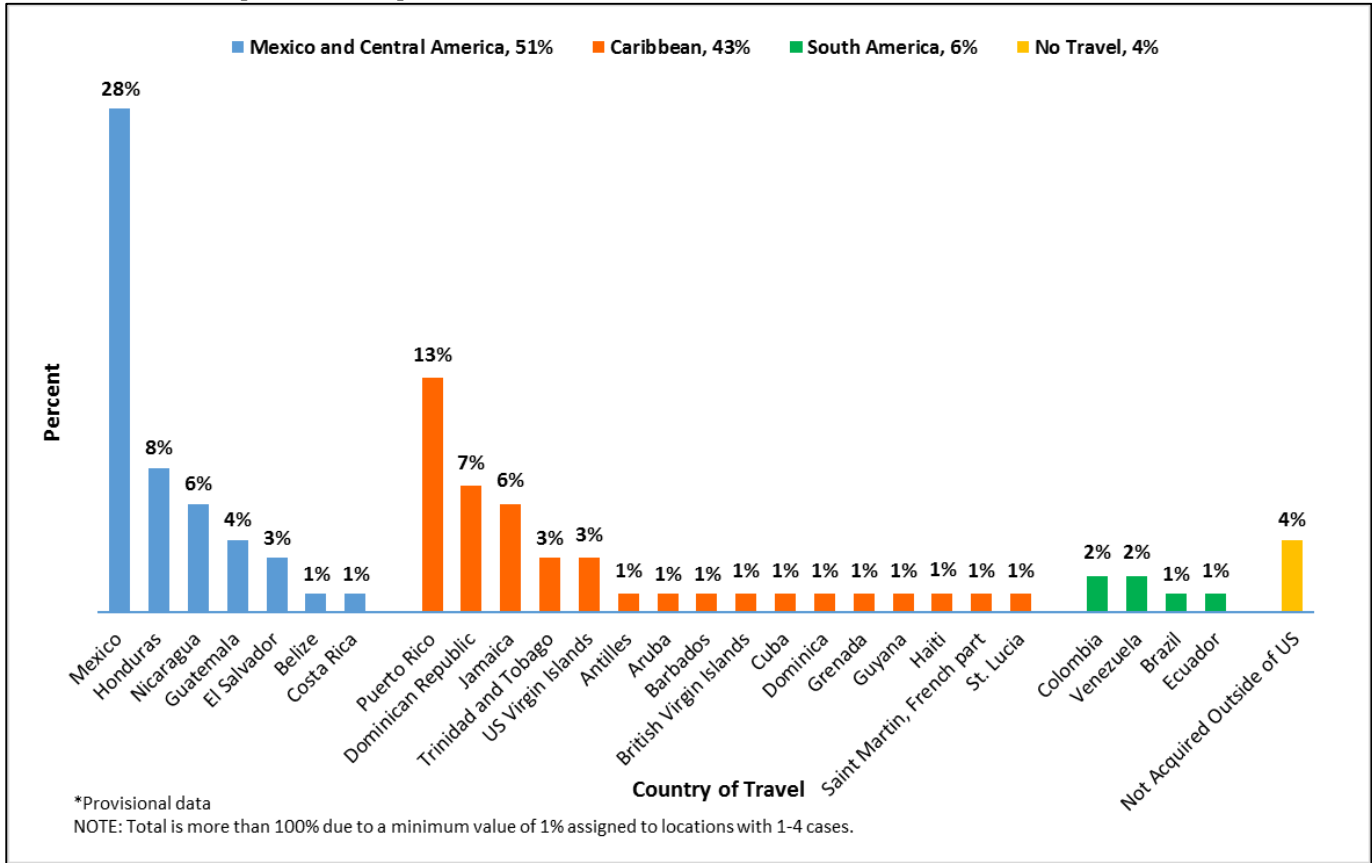
In 2016, Texas reported 315 ZIKVD cases: 6 (2%) locally-acquired vector-borne cases, 3 (1%) congenital disease cases, 2 (1%) sexually transmitted cases, and 304 (96%) travel-associated vector-borne cases. The majority of travel-associated ZIKVD cases reported travel to: Mexico (28%), Puerto Rico (13%), Honduras (8%), Dominican Republic (7%), Nicaragua (6%), and Guatemala (4%) (Figure 7).

In 2016, Harris (24%), Dallas (15%), Tarrant (9%), Cameron (8%), Bexar (7%), and Travis (6%) counties reported the most ZIKVD cases (Table 6).

A total of 4 presumptive viremic blood donors (PVDs) were reported by blood collection agencies.



**Figure 7. Reported Cases of Zika Disease by Region and Country of Travel, Texas, 2016 (N = 315)**



**Table 6. Zika Disease Cases Reported by County, Texas, 2016**

County	Number of Cases
Angelina	2†
Bastrop	1
Bell	7
Bexar	21
Brazoria	2
Brazos	4
Burnet	1
Cameron	26‡
Collin	8
Dallas	44†
Denton	9
El Paso	3
Ellis	1
Fort Bend	11
Frio	1
Galveston	9
Gray	1
Grayson	1
Gregg	1
Hamilton	1
Harris	74
Hays	1
Hidalgo	6
Hockley	1
Jackson	1
Jefferson	2
Jones	1
Lee	1
Lubbock	1
Matagorda	1
Medina	1
Midland	1
Montgomery	1
Navarro	1
Palo Pinto	1
Parker	1
Randall	1
Rusk	1
Smith	1

**Table 6 (continued)**

County	Number of Cases
Starr	1
Tarrant	28
Travis	18
Upshur	1
Val Verde	1
Walker	1
Webb	6
Willacy	1
Williamson	5
Wise	1
<b>Total Number of Reports</b>	<b>315</b>

† Includes cases sexually transmitted in Texas: Angelina (1), Dallas (1).

‡ Includes cases transmitted by mosquitoes in Texas: Cameron (6).

The median age at onset of illness was 38 years (range: 0-81 years) for all ZIKVD cases. The majority (55%) of all ZIKVD cases were Hispanics, followed by non-Hispanic whites (30%). Sixty-two percent of reported ZIKVD cases were females and 38% were males (Table 7).

Of the 315 ZIKVD cases reported, 72% reported a febrile illness, 27% reported other illness (rash, conjunctivitis and/or arthralgia with no fever), and 1% were infants with congenital Zika manifestations. The most common symptoms reported by ZIKVD cases were rash (90%), fever (72%), arthralgia (66%), headache (53%), and myalgia (49%). Seven cases were hospitalized (2%), and the median length of hospitalization for Zika disease cases was 2 days. There were no Zika-related deaths among reported cases in 2016 (Table 7).

**Table 7. Characteristics of Reported Zika Disease Cases, Texas, 2016**

Characteristic	Number	%
<b>Gender</b>		
Male	119	38
Female	196	62
<b>Pregnancy Status (N = 194)</b>		
Pregnant	41	21
Non-pregnant	153	79
<b>Age at Onset (years)</b>		
<1-9	11	3
10-19	26	8
20-29	62	20
30-39	74	24
40-49	73	23
50-59	38	12
60-69	26	8
70-79	3	1
80+	2	1
<b>Race/Ethnicity</b>		
Hispanic	172	55
Non-Hispanic White	94	30
Black	21	7
Asian/Pacific Islander	4	1
American Indian/Alaska Native	-	-
Unknown	24	7
<b>Clinical Syndrome</b>		
Febrile Illness	228	72
Other	84	27
Congenital	3	1
<b>Clinical Signs/Symptoms</b>		
Rash	284	90
Fever	227	72
Arthralgia	208	66
Headache	168	53
Myalgia	153	49
Conjunctivitis	132	42
Severe Malaise	101	32
Muscle Weakness	99	31
Chills	97	31
Nausea Vomiting	59	19
Retro-orbital Pain	58	18
Diarrhea	49	16
Stiff Neck	33	10
Zika-Associated Birth Defects	3	1
<b>Clinical Course</b>		
Hospitalized	7	2
Median Length of Stay (Days)	2	
Death	-	-

Note: Cases of Zika disease (individuals who report symptoms) and Zika infection (individuals who report no symptoms) became nationally notifiable in 2016. Zika infections are not included in public data reports given the minimal impact on distribution of cases across the state and to maintain patient confidentiality.

**Resources:**

CDC La Crosse Encephalitis Virus webpage: <https://www.cdc.gov/lac/>

CDC Chikungunya Virus webpage: <https://www.cdc.gov/chikungunya/>

CDC Dengue Virus webpage: <https://www.cdc.gov/dengue/>

CDC Eastern Equine Encephalitis webpage:  
<https://www.cdc.gov/EasternEquineEncephalitis/>

CDC Saint Louis Encephalitis Virus webpage: <https://www.cdc.gov/sle/>

CDC West Nile Virus webpage: <https://www.cdc.gov/westnile/>

CDC Zika webpage: <https://www.cdc.gov/zika/>

**Acknowledgements and data sources:**

Local and regional health departments, DSHS laboratory, mosquito control agencies, medical providers, veterinarians and the Texas Veterinary Medical Diagnostic Laboratory.