HHS Public Access

Author manuscript

*J Community Health*. Author manuscript; available in PMC 2018 June 01.

Published in final edited form as:

*J Community Health*. 2018 June ; 43(3): 566–569. doi:10.1007/s10900-017-0453-1.

# Demographic and Travel Characteristics of Travel-Associated Zika Virus Infection Case-Patients in San Diego County, California (January 1, 2016–March 31, 2017)

**Gabriela Escutia**[1], **Eric McDonald**[1], **Alfonso Rodríguez-Lainz**[2], and **Jessica Healy**[1,3]

[1]County of San Diego Health and Human Services Agency, 3851 Rosecrans St., San Diego, CA 92110, USA

[2]Division of Global Migration and Quarantine, Centers for Disease Control and Prevention, 3851 Rosecrans St., MS-P575, San Diego, CA 92110, USA

[3]Centers for Disease Control and Prevention, 1600 Clifton Road, Atlanta, GA 30329, USA

## Abstract

Most Zika disease cases diagnosed in the continental US have been associated with travel to areas with risk of Zika transmission, mainly the Caribbean and Latin America. Limited information has been published about the demographic and travel characteristics of Zika case-patients in the United States, besides their age and gender. During 2016–2017 the County of San Diego Health and Human Services Agency, California, expanded the scope and completeness of demographic and travel information collected from Zika case-patients for public health surveillance purposes. The majority (53.8%) of travel-related Zika virus infection case-patients (n = 78) in the county were Hispanic, significantly higher ($p \leq 0.05$) than the 33.0% of Hispanics in the county. Foreign-born residents, mainly from Mexico, were also overrepresented among cases compared to their share in the county population (33.3 vs. 23.0%; $p \leq 0.05$). Seventeen (21.8%) patients reported a primary language other than English (14 Spanish). Most case-patients traveled for tourism (54%) or to visit friends and relatives (36%). This surveillance information helps identify higher-risk populations and implement culturally targeted interventions for Zika prevention and control.

### Keywords

Zika virus; Travel; Hispanics; Foreign-born

## Introduction

Zika virus (ZIKV) is an emerging mosquito-borne virus that has rapidly spread into the Americas. As of August 23, 2017, 5423 ZIKV disease cases have been reported in the

Correspondence to: Alfonso Rodríguez-Lainz.

**Compliance with Ethical Standards**

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical Approval** The San Diego County Health and Human Services Ethics Committee determined this project not to be human subject research requiring institutional review board approval.

continental United States [1]. Most cases are associated with travel to areas with risk of ZIKV transmission, mainly the Caribbean and Latin America [2]. ZIKV cases are reported to the national arboviral surveillance system (ArboNET) by state, territorial, and local health departments using standard case definitions and a case reporting form. The reporting form includes some demographic (age, gender, race/ethnicity, country of birth) and travel (country of travel) information. Currently, no information is collected on primary language or purpose or duration of travel, despite evidence of differential risk for mosquito-borne diseases by traveling reason (e.g., tourism vs. visiting friends and relatives) [3]. Although collected by ArboNET, there is limited published information about the race/ethnicity and country of birth characteristics of ZIKV case-patients in the United States.

San Diego County, California, in the US-Mexico border region, has a large (3.3 million) and culturally and linguistically diverse population that frequently travels to and maintains close social contacts with Mexico and other Latin American countries with risk of ZIKV transmission [4, 5]. This analysis aims to describe race/ethnicity, country of birth, language and travel characteristics of travel-associated ZIKV case-patients in San Diego County to guide the development of culturally and linguistically targeted public health interventions.

## Materials and Methods

In February 2016, the County of San Diego Health and Human Services Agency initiated efforts to expand the scope and quality of demographic and travel information collected from ZIKV patients for public health surveillance purposes. Purpose and duration of travel and primary language were added to the data collected for ArboNET. Data quality assurance was completed weekly by dedicated Agency staff to ensure completeness and accuracy of data. Cases of travel-associated symptomatic and asymptomatic ZIKV infection diagnosed among San Diego County residents between January 1, 2016 and March 31, 2017 were included in this analysis. This period included the time from the first reported Zika cases in the County and when the number of accumulated cases provided strong statistical evidence of racial and nativity disease disparities requiring immediate public health action. Cases met the Council of State and Territorial Epidemiologists' definition for either confirmed or probable ZIKV infection or disease and had a history of travel to an area with risk of ZIKV transmission [6]. Analysis excluded case-patients with no travel information available. Country of birth was classified as US-born or foreign-born (Mexico, Central America, South America, Caribbean, or other region). Country of travel was categorized as Mexico, Central America, South America, Caribbean (including Puerto Rico), or other region. Responses to purpose for travel were categorized as tourism, business, study, or visiting friends and relatives (VFR). We used $\chi^2$ tests to analyze race/ethnicity by purpose of travel, and country of birth by country of travel, and to compare race/ethnicity, gender, and country of birth distribution of ZIKV case-patients to their respective underlying county population based on US Census Bureau estimates [7]. Differences in travel duration (days) by purpose of travel were tested using a Mann–Whitney test. Data on Zika case-patients for this analysis was collected as part of routine public health surveillance practice, and therefore this project was determined by the County's Ethical Committee not to be human subject research requiring institutional review board approval.

## Results

During January 1, 2016 to March 31, 2017 a total of 78 ZIKV case-patients were reported in San Diego County. Characteristics of the case-patients are presented in Table 1. The majority of case-patients were Hispanic (n = 43), representing a statistically significantly higher proportion than the county Hispanic population (53.8 vs. 33.0%, $p \leq 0.05$) (Fig. 1). Among Hispanic case-patients, the difference between the underlying county populations was greater for women (65.5 vs. 34.0%; $p \leq 0.05$) than for men (46 vs. 33%; $p \leq 0.05$). Although the majority of the 78 case-patients were US-born, the percentage of foreign-born case-patients (primarily from Mexico) was significantly higher than the county's foreign-born population (33.3 vs. 23.0%; $p \leq 0.05$). Seventeen (21.8%) patients reported a primary language other than English (14 Spanish).

The most frequently reported purposes of travel were tourism (n = 42; 53.8%) and VFR (28; 35.9%). Mexico was the most frequent travel destination (n = 14; 38.0%), followed by countries in Central America (21; 27.0%) and the Caribbean (15; 19.1%). Median travel duration was 9 days and was longer for VFR than non-VFR travelers (10 vs. 8 days, $p \leq 0.05$). Compared to non-Hispanics, a higher percentage of Hispanic case-patients were VFR travelers (51.0 vs. 23.0%, $p \leq 0.05$). Most (92.4%) foreign-born case-patients reported traveling to their country of birth, while US-born case-patients had more diverse destinations.

Of the six pregnant women with ZIKV infection, four were Hispanic and two were Asian. Three of the pregnant women were born in Mexico and one in the Philippines. Three of the pregnant women were VFR travelers, two were tourists, and one was a business traveler.

## Discussion

In this analysis, Hispanics represent the highest proportion of ZIKV case-patients, both overall and among pregnant women, compared to other race/ethnic groups in San Diego County. Foreign-born case-patients were overrepresented among county residents. Reasons for these findings may include differences in travel patterns (e.g., destination, frequency, duration, purpose), risk of Zika exposure while traveling, or care-seeking behavior between His-panic and non-Hispanic residents and between foreign-born and U.S.-born individuals. In our analysis, a higher percentage of Hispanic and foreign-born patients were VFR travelers. VFR travelers have been reported to be less likely than tourists or business travelers to seek pre-travel health advice or to follow health prevention recommendations during travel [8]. They are also more likely to have longer stays [9], to stay in family settings (increasing their risk of mosquito exposure), and to have sexual encounters with the local population (increasing their risk of ZIKV sexual transmission) [10]. Given that Hispanic and foreign-born residents of San Diego County experience limited access to healthcare compared to other residents [11], it is unlikely that their higher proportions among ZIKV case-patients is due to greater ZIKV testing [12]. In this analysis, the proportion of ZIKV case-patients who were VFR travelers (36%) was similar to that reported by the GeoSentinel travel clinics' surveillance network among travelers to the Americas (39%) [13], but smaller

than in several ZIKV surveillance reports from Europe [14], and also smaller than among travel-associated malaria cases in the United States (70%) [15].

The findings in this report are subject to at least three limitations. First, the surveillance data used may underestimate ZIKV cases-patients because most infections are asymptomatic or mild, and an infected person might not seek medical care or be tested. Also, many Hispanics in the county, particularly Mexicans, seek healthcare in Mexico, and thus cases of ZIKV infection in this population might be missed by the county's surveillance system [12]. Second, the small number of cases prevented more in-depth analysis of risk factors for ZIKV infection. Finally, findings may not be generalizable to other areas of the country due to variations in the demographic and travel patterns of the population.

This analysis illustrates the importance for ZIKV surveillance programs of collecting and reporting ZIKV case-patients disaggregated by race/ethnicity, country of birth, primary language, and purpose of travel, in addition to other traditionally reported variables. Enhanced demographic and travel information among ZIKV case-patients can be used to identify population groups at higher disease risk, implement more culturally and linguistically targeted outreach and education activities, and enhance access to prevention and treatment services for those communities [12]. Such approaches may not only better protect the health of more-affected communities but also help prevent local ZIKV transmission in the United States.

## Acknowledgments

**Funding** Funding was provided by Centers for Disease Control and Prevention (Cooperative Agreement No. 1U38OT000143-04)

## References

1. Centers for Disease Control and Prevention. Zika Virus. 2017. Case Counts in the US, Retrieved June 17, 2017, from https://www.cdc.gov/zika/reporting/2017-case-counts.html. Accessed on 2017
2. Walker WL, Lindsey NP, Lehman JA, Krow-Lucal ER, Rabe IB, Hills SL, et al. Zika virus disease cases—50 States and the District of Columbia, January 1–July 31, 2016. MMWR Morbidity and Mortality Weekly Report. 2016; 65(36):983–986. [PubMed: 27631604]
3. LaRocque RC, Deshpande BR, Rao SR, Brunette GW, Sotir MJ, Jentes ES, et al. Pre-travel health care of immigrants returning home to visit friends and relatives. American Journal of Tropical Medicine and Hygiene. 2013; 88(2):376–380. [PubMed: 23149585]
4. Pan American Health Organization/World Health Organization. Zika—Epidemiological Report Mexico. Washington, D.C: PAHO/WHO; 2017. March 2017Retrieved from http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&gid=35106&Itemid=270. Accessed on 2017
5. Matthews CE, Wooten W, Gomez MGR, Kozo J, Fernandez A, Ojeda VD. The California border health collaborative: A strategy for leading the border to better health. Frontiers in Public Health. 2015; 3:141. https://doi.org/10.3389/fpubh.2015.00141. [PubMed: 26075195]
6. Centers for Disease Control and Prevention. National Notifiable Diseases Surveillance System. Zika Virus Disease and Zika Virus Infection 2016 Case Definition. 2016. Approved June 2016. Retrieved from https://wwwn.cdc.gov/nndss/conditions/zika/case-definition/2016/06/. Accessed on 2017
7. United States Census Bureau. Quick Facts. 2015. Retrieved from https://www.census.gov/quickfacts/fact/table/sandiegocountycali-fornia/BZA11021. Accessed on 2017

8. Hagmann SH, Han PV, Stauffer WM, Miller AO, Connor BA, Hale DC, et al. Travel-associated disease among US residents visiting US GeoSentinel clinics after return from international travel. Family Practice. 2014; 31(6):678–687. [PubMed: 25261506]

9. Leder K, Tong S, Weld L, Kain KC, Wilder-Smith A, von Sonnenburg F, et al. Illness in travelers visiting friends and relatives: A review of the GeoSentinel Surveillance Network. Clinical Infectious Diseases. 2006; 43(9):1185–1193. [PubMed: 17029140]

10. Bacaner N, Stauffer B, Boulware DR, Walker PF, Keystone JS. Travel medicine considerations for North American immigrants visiting friends and relatives. JAMA. 2004; 291(23):2856–2864. [PubMed: 15199037]

11. Wallace SP, Mendez-Luck C, Castaneda X. Heading south: Why Mexican immigrants in California seek health services in Mexico. Medical Care. 2009; 47(6):662–669. [PubMed: 19434002]

12. Lee CT, Vora NM, Bajwa W, Boyd L, Harper S, Kass D, et al. Zika virus surveillance and preparedness—New York City, 2015–2016. MMWR Morbidity and Mortality Weekly Report. 2016; 65(24):629–635. [PubMed: 27337505]

13. Hamer DH, Barbre KA, Chen LH, Grobusch MP, Schlagenhauf P, Goorhuis A, et al. Travel-associated Zika virus disease acquired in the Americas through February 2016: A GeoSentinel Analysis. Annals of Internal Medicine. 2017; 166(2):99–108. [PubMed: 27893080]

14. Diaz-Menendez, M., de la Calle-Prieto, F., Montero, D., Antolin, E., Vazquez, A., Arsuaga, M., et al. Initial experience with imported Zika virus infection in Spain. Enfermedades Infecciosas y Microbiologia Clinica. 2016. Available online 12 October 2016. https://doi.org/10.1016/j.eimc.2016.08.003

15. Cullen KA, Mace KE, Arguin PM. Malaria surveillance—United States, 2013. MMWR Morbidity and Mortality Weekly Report Surveillance Summary. 2016; 65(2):1–22.

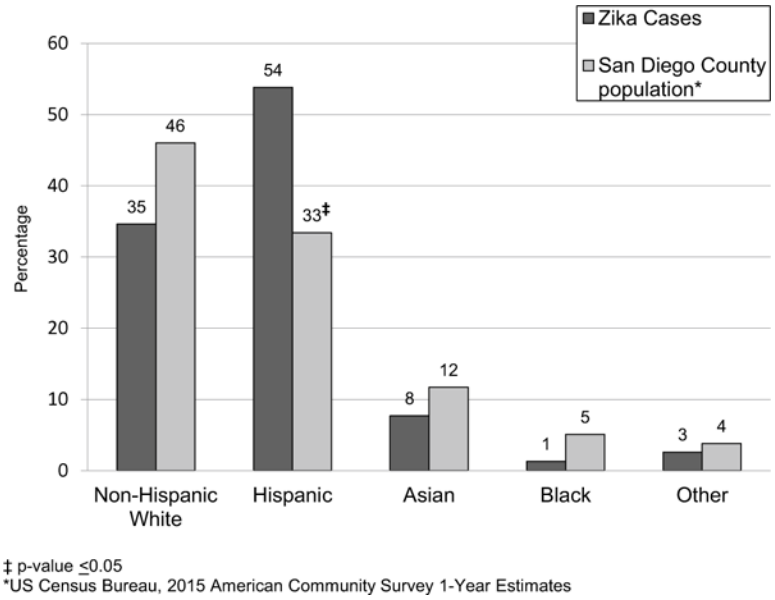


**Fig. 1.**

Race/ethnicity distribution of travel-associated Zika cases-patients compared to County population, San Diego County, California (n = 78) January 1, 2016 to March 31, 2017

## Table 1

Demographics and travel patterns of travel-associated Zika case-patients in San Diego County, California, January 1, 2016 to March 31, 2017 (n = 78)

| Case-patient characteristics | Number (%) |
|---|---|
| Symptomatic | |
| Yes | 72 (92.3) |
| No | 6 (7.7) |
| Age (years) | |
| 0–19 | 6 (7.7) |
| 20–39 | 43 (55.1) |
| 40–59 | 23 (29.5) |
| ≥ 60 | 6 (7.7) |
| Sex | |
| Female | 43 (55.1) |
| Male | 35 (44.9) |
| Pregnancy status[†] | |
| Yes | 6 (14) |
| No | 36 (83.7) |
| Unknown | 1 (2.3) |
| Race/ethnicity | |
| Hispanic/Latino | 42 (53.8) |
| White | 27 (34.6) |
| Black | 6 (7.7) |
| Asian | 1 (1.3) |
| Other | 2 (2.6) |
| Country of birth | |
| US-born | 47 (60.3) |
| Foreign-born | 26 (33.3) |
| Mexico | 14 (53.8) |
| Central America | 4 (15.4) |
| South America | 4 (15.4) |
| Caribbean | 1 (3.8) |
| Other | 3 (11.6) |
| Unknown | 5 (6.4) |
| Purpose of travel | |
| Tourism | 42 (54.0) |
| Visiting friends and relatives | 28 (36.0) |
| Business | 6 (7.8) |
| Study | 1 (1.3) |
| Country of travel | |
| Mexico | 30 (38.5) |
| Central America | 21 (27.0) |

| Case-patient characteristics | Number (%) |
|---|---|
| South America | 5 (6.4) |
| Caribbean | 15 (19.1) |
| Other | 7 (9.0) |
| Travel duration, median (days)[‡] | |
| All travel | 9 |
| Visiting friends and relatives | 10 |
| Travel other than for visiting friends and relatives (tourism, business, study) | 8 |
| Language of the interview | |
| English | 61 (78.2) |
| Spanish | 14 (18.0) |
| Other | 3 (3.8) |

Includes symptomatic and asymptomatic case-patients

[†]Females only (n = 43; 1 case missing pregnancy status)

[‡]Case-patients with missing information on travel dates were excluded (n = 5)