



# Chikungunya Occurrence among a Religious Missions Trip to Haiti in the Summer of 2014 and Implications for Community Health

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## Background

Chikungunya (CHIK-V) is a single-stranded RNA alpha virus of the family *Togaviridae*, first isolated from mosquitoes and humans during an outbreak in Tanzania in 1952 to 1953. The onset of symptoms of a CHIK-V infection is usually 3-7 days after being bitten. Infection elicits an acute febrile and incapacitating polyarthralgia typically affecting the hands and feet. Other manifestations include headache, myalgia, maculopapular rash, gastrointestinal involvement, and persistent rheumatologic symptoms [1]. With the presence of the vector that spreads CHIK-V (*A. aegypti*) in Fresno County [2], there is concern that residents who travel abroad to regions endemic for diseases such as Dengue or CHIK-V may import the disease and infect local mosquito species, which could result in local transmission of diseases that have previously not presented in the region. The purpose of the study was to evaluate the attack rate, onset times, and activities of a small group of missionaries who returned from a region endemic for CHIK-V and evaluate the potential for medical and public health action.

## Significance

The rheumatologic and neurological consequences of CHIK-V infection carry a significant economic burden in the fields of healthcare [3]. The annual individual and population economic burden of rheumatic conditions is growing in developed countries, primarily due to the aging population rather than costs per case [4].

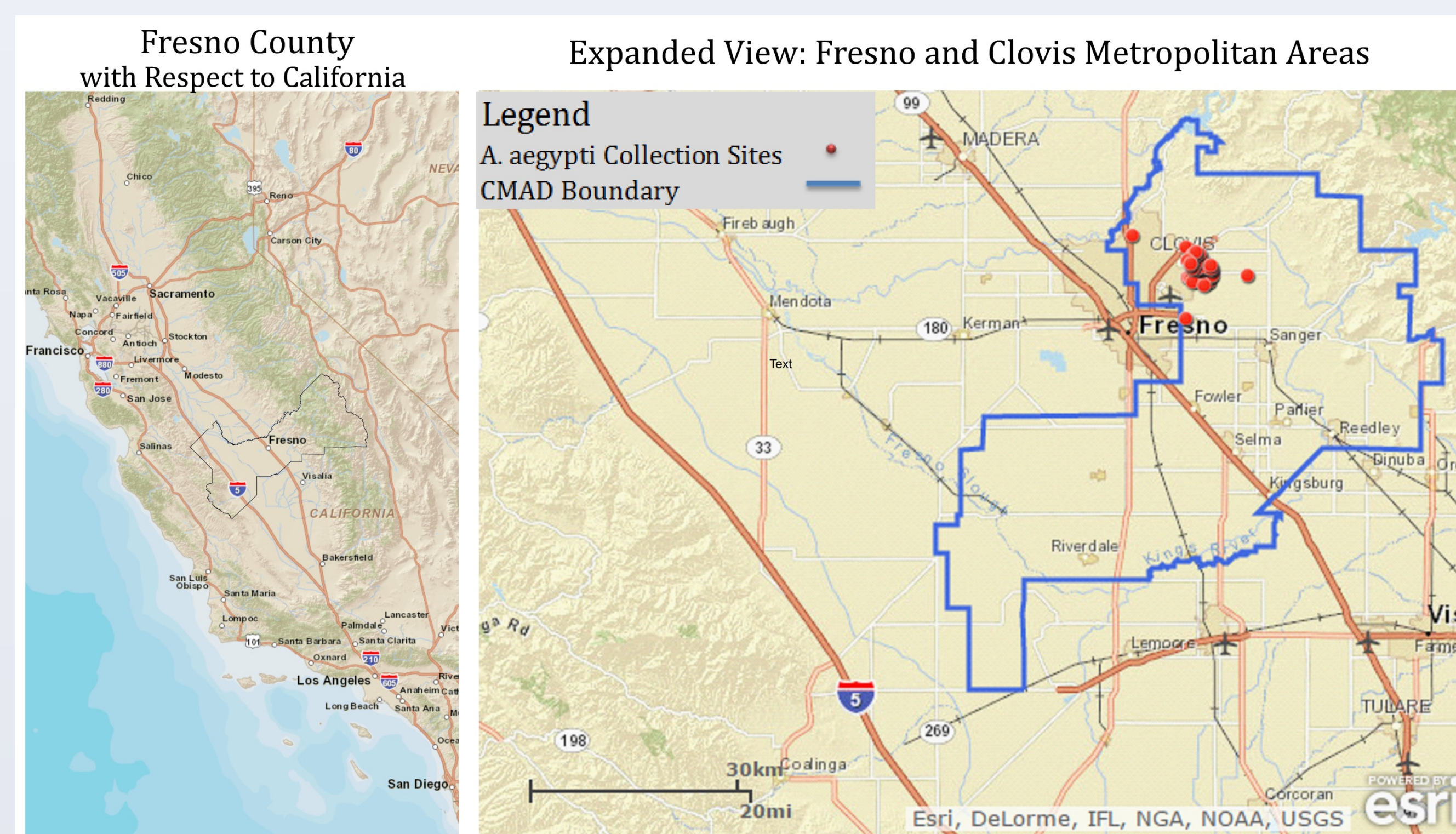
The plausibility of increased transmission by the local Fresno mosquito population in the presence of infected travelers warrants public health intervention, namely, education for post-exposure prophylaxis and control measures such as the continued application of repellent. By developing a protocol for vector control and limiting exposure, the economic burden due to long-term CHIK-V infection sequelae can be greatly alleviated.

## Case Presentation

In the summer of 2014, one group consisting of 10 members of a local congregation went to Haiti to provide support and share their religion. The regions that were visited were Maissade, Port Au Prince, and Hinche. The duration of the stay was 9 days and 8 nights. Upon return, 2 members of the congregation had fallen ill and one sought medical care. The local health department was not notified until the Dengue and CHIK-V serology results were returned from the laboratory, which limited the public health action of mosquito surveillance to the area surrounding the index patient's house.

## Case Presentation (cont.)

The local epidemiologist contacted the patient to obtain a list of participants and the name of the church. All involved members were contacted and requested to participate; if selected, they were administered a CHIK-V and Dengue test, and interviewed. Mosquito traps were set up around the residence of suspected cases. The distribution of *A. aegypti* in Fresno County is depicted in Figure 1.



**Figure 1:** Sites within Fresno County where *A. aegypti* have been isolated January 1, 2014-December 31, 2014, Consolidated Mosquito Abatement District (CMAD).

## Descriptive Statistics

A total of 8 out of 10 (80% participation) missionaries elected to participate. Those that opted not to did so because they resided outside of the health jurisdiction of the epidemiologist conducting the investigation. Due to the structured nature of this trip, the group participated in all of the same activities and encountered the same environmental exposures. Of the 8 participants, 7 completed the serology tests for both CHIK-V and Dengue. The attack rate based on confirmed cases was 10% (n=1), but the other patient who was symptomatic did not submit to a blood test, and it was concluded this was a highly suspect case, thus yielding an estimated attack rate of 20% (n=2).

Onset of illness occurred on the day of return to the US, for both cases, which implicates they were bitten in the highly urban region of Port Au Prince prior to the application of their insecticide, given the incubation of the illness. Considering the urban environmental preference of *A. aegypti*, Port Au Prince is a plausible site of disease transmission [5]. The risk factor analysis based upon various participant exposures and distributions of symptoms among participants are illustrated in tables 1 and 2, respectively.

| Activity                                    | Yes     | No      | Unknown |
|---|---------|---------|---------|
| Use of insect repellent                     | 8 (80%) | 0 (0%)  | 2 (20%) |
| Mosquito bites per day                      | 8 (80%) | 0 (0%)  | 2 (20%) |
| Mosquito bites in urban environment         | 1 (10%) | 2 (20%) | 7 (70%) |
| Mosquito bites in rural environment         | 8 (80%) | 0 (0%)  | 2 (20%) |
| Previous trips to Haiti                     | 4 (40%) | 4 (40%) | 2 (20%) |
| Previous trips to other Caribbean countries | 2 (20%) | 6 (60%) | 2 (20%) |

**Table 2: Distribution of Symptoms Among Participants**

| Symptoms             | Yes     | No      | Unknown |
|----------------------|---------|---------|---------|
| Joint Pain           | 2 (20%) | 8 (80%) | 0 (0%)  |
| Fever                | 3 (30%) | 7 (70%) | 0 (0%)  |
| Rash                 | 3 (30%) | 7 (70%) | 0 (0%)  |
| Chikungunya Serology | 1 (10%) | 6 (60%) | 3 (30%) |
| Dengue Serology      | 0 (0%)  | 7 (70%) | 3 (30%) |

## Discussion

Yellow Fever is sporadically present in California. Fresno County is one of the regions where the vector is present [2]. Missionaries returning from CHIK-V endemic areas could potentially pose a risk to local residents by bringing back a virus and infecting the local mosquito population. Viremia with CHIK-V infection spans a brief period, typically 2-6 days [6,7] and this is the time that the patient poses the greatest risk of propagating transmission, to the mosquito vector, as well as other people that may come into contact with the patient's infected blood. In addition to the health information that missionaries are given prior to visiting these areas they should also be encouraged to continue application of the mosquito repellent once they return. This additional measure could potentially reduce the risk of infection of local mosquito species.

While the probability of experiencing symptoms is high with this disease [4], it could go under-reported due to the low mortality rate and lack of specific treatment. As a result of the outbreak among the mission's trip to Haiti, Fresno County Department of Public Health has developed specific guidelines for travel clinics and faith based organizations to better provide education to those they may be at risk for exposure. The County Health Department will educate and distributing materials to providers, travel clinics, and faith based organizations in 2015 in an effort to reduce the risk of infecting local mosquito species capable of transmitting this virus.

## References

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