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# Imported Cases in Continental Chile and Autochthonous In Easter Island

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## Abstract

*Aedes aegypti* is the main vector for several arboviruses including dengue, chikungunya and Zika virus. The emergence of these viruses' transmission is possible in places where the vector exists. In Chile, *A. aegypti* was introduced in the year 2000 to Easter Island, being the responsible of the first dengue outbreak by dengue 1 serotype in the country in 2002. Just recently April 2016 *Aedes aegypti* has been found in Arica, the northernmost city of the country. On Easter Island, at the beginning of 2014, Zika outbreak was diagnosed with about 170 cases reported.

The introduction of dengue and Zika virus on Easter Island was preceded by an outbreak of DEN-1 and Zika virus on the French Polynesia in 2001 and 2013, respectively. Considering the presence of chikungunya outbreak on the French Polynesia the risk of introduction of Chikungunya on Easter Island is very high.

Cases of chikungunya in continental Chile correspond to imported cases in travelers.

This chapter reviews the epidemiology and clinical features of chikungunya infection in travelers to Latin American countries and updates the situation of the risk of introduction to Easter Island.

**Keywords:** Chikungunya, Chile, Easter Island, travelers, autochthonous cases

## 1. Introduction

*Aedes aegypti* is the main vector for several arboviruses including dengue, chikungunya and Zika viruses. The emergence of these diseases is possible in places where the vector exists. In Chile, *A. aegypti* was introduced in the year 2000 to Easter Island with the consequent risk of the introduction of arboviral infection to its inhabitants. *Aedes aegypti* has been just introduced into Arica, the northernmost city of the country.

This chapter reviews the epidemiology and clinical features of chikungunya infection in Chilean travelers to Latin American countries and updates the situation on Easter Island and the potential risk of introduction of this infection to Chilean insular territory.

## 2. Epidemiological situation in Chile

### 2.1. Epidemiological situation in Continental Chile

Continental Chile just recently, 2016, have the presence of *Aedes aegypti* in the northernmost city of the country, but arbovirus infections are only seen in travelers to endemic areas or residents of Easter Island.

Continental Chile is surrounded by countries where the presence of *Aedes* mosquitoes is spread as it is the circulation of arboviruses, mainly dengue, and since 2014, Latin America has suffered outbreaks of chikungunya and nowadays Zika viruses. Chile was until recently the only Latin American country where there was no vector, with the exception of its insular territory, Easter Island. For this reason the Ministry of Health is continuously watching for diseases transmitted by mosquitoes as well as for the emergence of vectors by placing ovitraps and larval traps from the North of Chile to the metropolitan region (center of the country).

The study of the samples captured in these traps, received from mainland Chile and Easter Island, has shown to date presence of *Aedes* on Easter Island and in the north of Chile along with the presence of *Anopheles* [1].

Arboviral disease surveillance system has dengue as notifiable disease but not chikungunya. After the introduction of chikungunya into the Americas, in Chile 30 cases of imported chikungunya have been reported up to epidemiological week 15 of 2016, 21 in mainland Chile and 3 on Easter Island. During 2014 22 cases were reported and 6 cases during 2015. During 2016 two cases of imported chikungunya have been reported. However, chikungunya is not a notifiable disease so it is very likely that there is an underreporting of cases. In the report from the Chilean Ministry of Health, most of the cases of chikungunya in Chile came from Dominican Republic, Haiti and Bolivia. (not available online)

### 2.2. Chikungunya in international travelers

During 2014–2015 in the laboratory of Virology of the School of Medicine of the Pontificia Universidad Católica de Chile, we diagnosed 26 people with chikungunya infection by indirect immunofluorescence assay IgM or IgG. We obtained demographic and clinical data in 16 of them. In 4 of them the diagnosis was retrospective by IgG because they were working as voluntary corps for the Chilean Army in Haiti and they could not confirm the diagnosis until they were back several months later.

Most of them acquired the disease in Latin America and only 3 in Asia and Oceania. Countries with higher frequency of exposure were Colombia and Haiti.

Most were women (75%), average age 39 years (27–52 years old) and median-length trip was 10 days. Twelve people started to show symptoms with a median of 5 days prior to the return and 4 started to show symptoms 2.5 days on average from return. First symptom was joint pain in 69%. Arthralgia was present in 94%, arthritis in 75% and exanthema in 63%, which was itchy in the majority of cases. The median duration of arthralgia was 3 months. In the hemogram the hematocrit was normal and WBC count was 5549 cells/mm<sup>3</sup> on average with predominance of PMN and lymphopenia. The absolute count of lymphocytes in average was 1049 cells/mm<sup>3</sup>. Only one patient presented less than 150,000 platelets/mm<sup>3</sup> (Table 1; unpublished data)

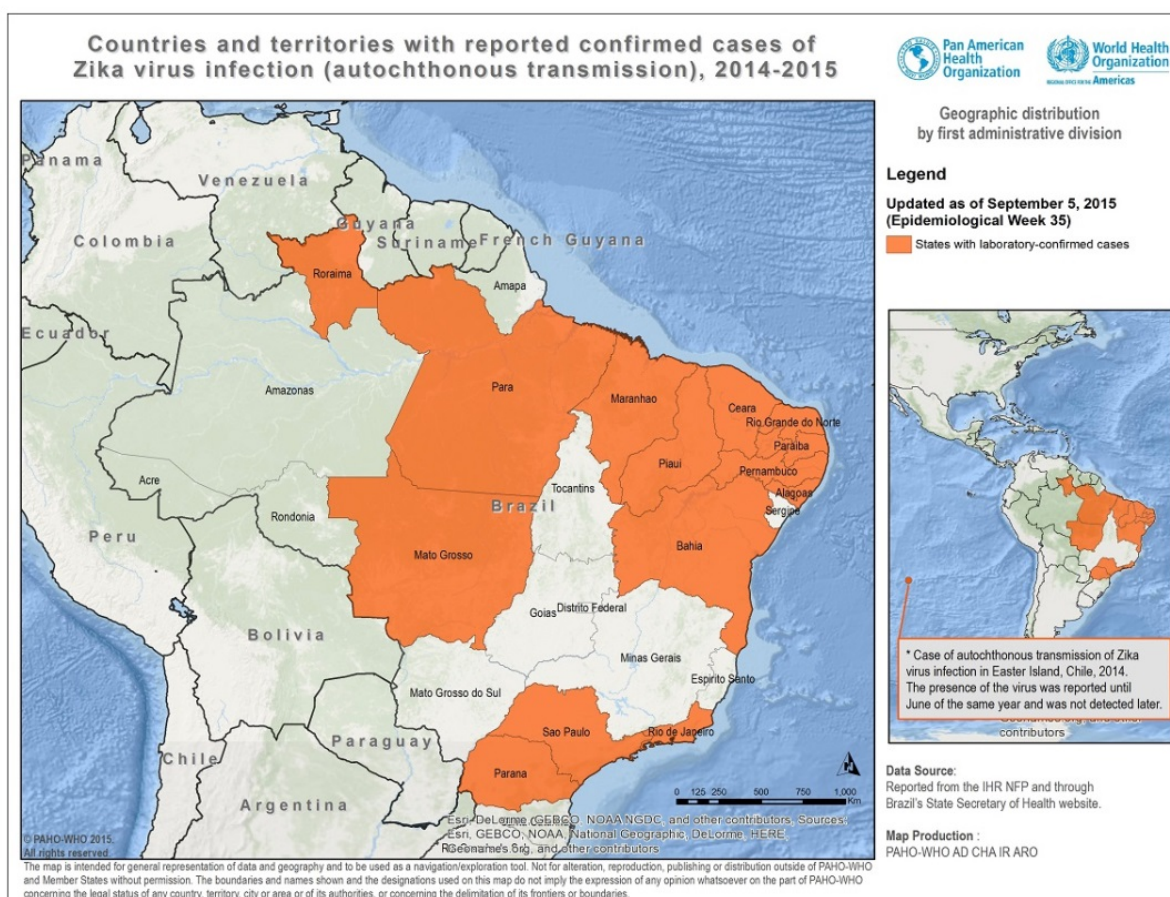
Symptoms	Number n=16	Percentage (%)
Myalgia	16	100
Fever	15	94
Arthralgia	15	94
Headache	13	81
Arthritis	12	75
Anorexia	12	75
Diffuse rash	10	63
Retro-orbital pain	8	50
Nauseas	7	44
Vomiting	4	25
Diarrhea	3	19
Itching	1	19

**Table 1.** Symptoms of 16 imported cases of confirmed chikungunya in travelers

### 2.3. Current situation on Easter Island

Easter Island received thousands of visitors yearly, arriving either from Santiago Airport or from Tahiti. In this territory there is a surveillance of febrile patients as well as vector surveillance to timely diagnose the introduction of any *Aedes*-borne infection due to the presence of this vector on the Island. *A. aegypti* was first noticed on the island in 2000. In 2002 a big outbreak of DEN-1 infection occurred, affecting nearly the whole island population. Only not complicated dengue cases were observed [2]. Genetic studies show that the virus was introduced from the French Polynesia [3]. Since then, sporadic cases of dengue fever have been reported. In the year 2014 occurred an outbreak of Zika infection with about 170 autochthonous cases reported being introduced again from the French Polynesia; 51 of them were confirmed by PCR at the National Institute of Public Health. Phylogenetic analysis has shown that viral strains from Easter Island were found to be most closely related to those found in the French

Polynesia (Figure 1) [4]. After the introduction of Zika virus to Brazil and its spread to Latin America during 2015 and 2016, no autochthonous cases of Zika have been diagnosed so far.



**Figure 1.** Countries and territories with reported confirmed cases of Zika virus infection (autochthonous transmission), 2014–2015.

A current outbreak of dengue 1 virus is occurring on the Island. Twenty nine autochthonous cases have been notified. There were no cases of severe dengue probably because of the same serotype circulating since 2002.

To date no indigenous cases of chikungunya have been reported beside 3 cases imported from Tahiti, at the beginning of 2015 and fortunately without secondary cases.

### 3. Conclusions

Chikungunya infection is introduced in the Americas at the end of the year 2013, in a region where the presence of its vector, *A. aegypti* and *A. albopictus*, is highly spread. As expected in





**Figure 2.** Countries/territories with autochthonous transmission or imported cases of chikungunya in the Americas, EW 49, 2013–EW 8, 2016.

a short time almost all the countries in the region are reporting indigenous cases with the exception of Chile and Uruguay (Figure 2).

Up to epidemiological week 8, in 2016, more than 1,800,000 cases across the continent have been reported since its introduction in 2013 [5].

In Chile chikungunya is still an infection to be expected in travelers to endemic areas, especially within Latin America and the Caribbean, which are the most frequent destination for Chilean

tourists. Chikungunya is a disease to be considered in Chile for international travelers returning with fever and arthralgia. Arthralgia is the cardinal symptom and tends to be long-lasting. Preventive measures should be indicated to travelers visiting high-risk areas. As we have the presence of the mosquito in Continental Chile, autochthonous and imported cases will be expected.

Surveillance systems must be alert and sensible to detect early introduction of chikungunya to Easter Island, where the vector remains in a high percentage of households. In this scenario it is very likely to have chikungunya introduced from Tahiti as it has happened with dengue and Zika. Once chikungunya enters to Easter Island, an outbreak of great magnitude is expected as it has happened in all countries where this virus has been introduced.

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