

**Chikungunya outbreak in Réunion: epidemiology and surveillance, 2005 to early January 2006**

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Last week, *Eurosurveillance* reported on the chikungunya outbreak in Réunion [1]. The epidemic pattern of the outbreak has considerably changed since the end of December 2005, as the weather conditions are currently favourable for vector multiplication. The article below describes the situation as it was in early January 2006 [2]. The weekly number of reported cases has been underestimated for the last two weeks of December and the first week of January, as transmission is now occurring very rapidly. The surveillance system described in this article, based on active case finding, was replaced by a sentinel system in January 2006.

### Introduction

A large outbreak of chikungunya [3,4] occurred in the Comoros islands, off the east coast of Africa, in early 2005, with more than 5000 cases notified between January and March. Since then, the virus has been circulating to other islands in the Indian Ocean, and cases have been reported in Mayotte and Mauritius. The first case of chikungunya infection was identified in the island of Réunion, which is an overseas administrative 'département' of France, in March 2005, and an outbreak has been ongoing in Réunion ever since.

While the outbreak situation is constantly subject to change, this study gives an overview of the epidemiology of chikungunya disease, 10 months after the first cases were reported in Réunion. The study also highlights the existence of neurological forms of the disease, never described before.

### Method

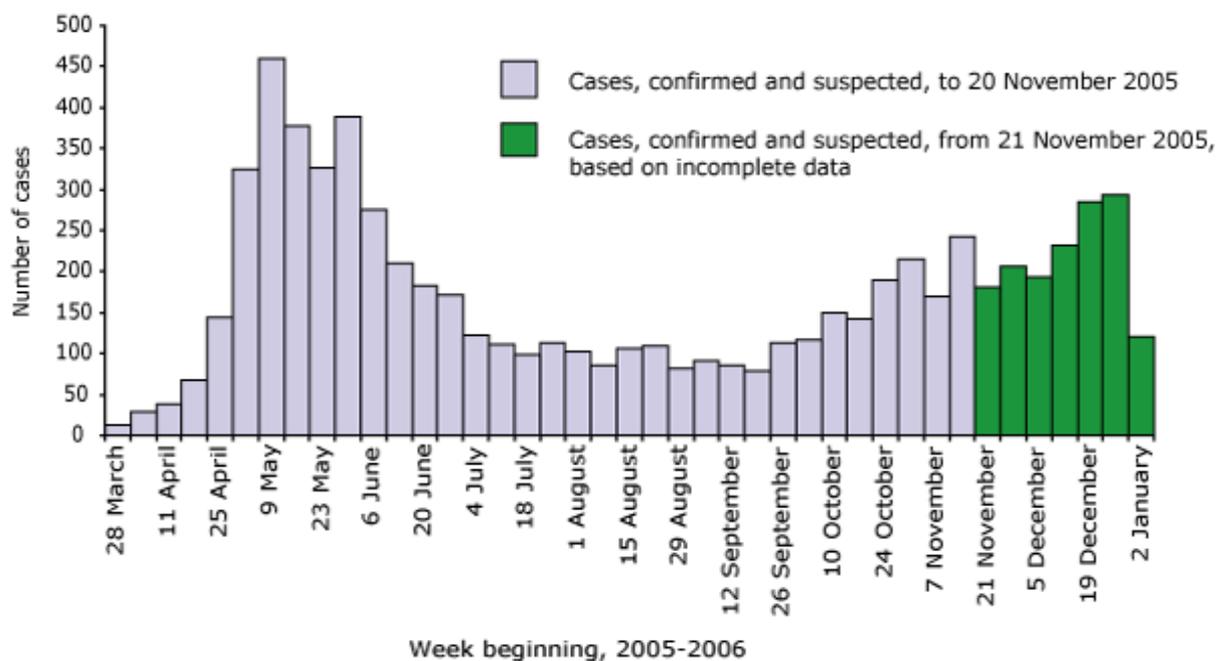
The epidemiological surveillance system for chikungunya infections aims to describe the characteristics of the outbreak, and make early identification of new transmission clusters. It is based on data transmitted from mobile vector control teams, who carry out active case finding based on information from cases notified through the network of sentinel physicians, microbiology laboratories and general practitioners, and from patients themselves. This surveillance is complemented by a surveillance of severe cases by hospitals.

A suspected case is defined as a patient with a rapid onset of fever over 38.5°C with incapacitating joint pain. A case is confirmed by the detection of anti-chikungunya virus IgM and/or detection of viral ARN by RT-PCR or virus isolation.

### Results

Between 28 March 2005 and 8 January 2006, 7138 cases of chikungunya infection were reported by the surveillance system implemented in Réunion, representing an attack rate of 9.4/1000 inhabitants. The epidemic curve shows a first peak of 450 cases between 9 and 15 May 2005. From the end of September 2005, the number of cases rapidly rose again to over 300 cases in the last week of 2005 (figure 11). A total of 2147 cases (30%) were laboratory confirmed.

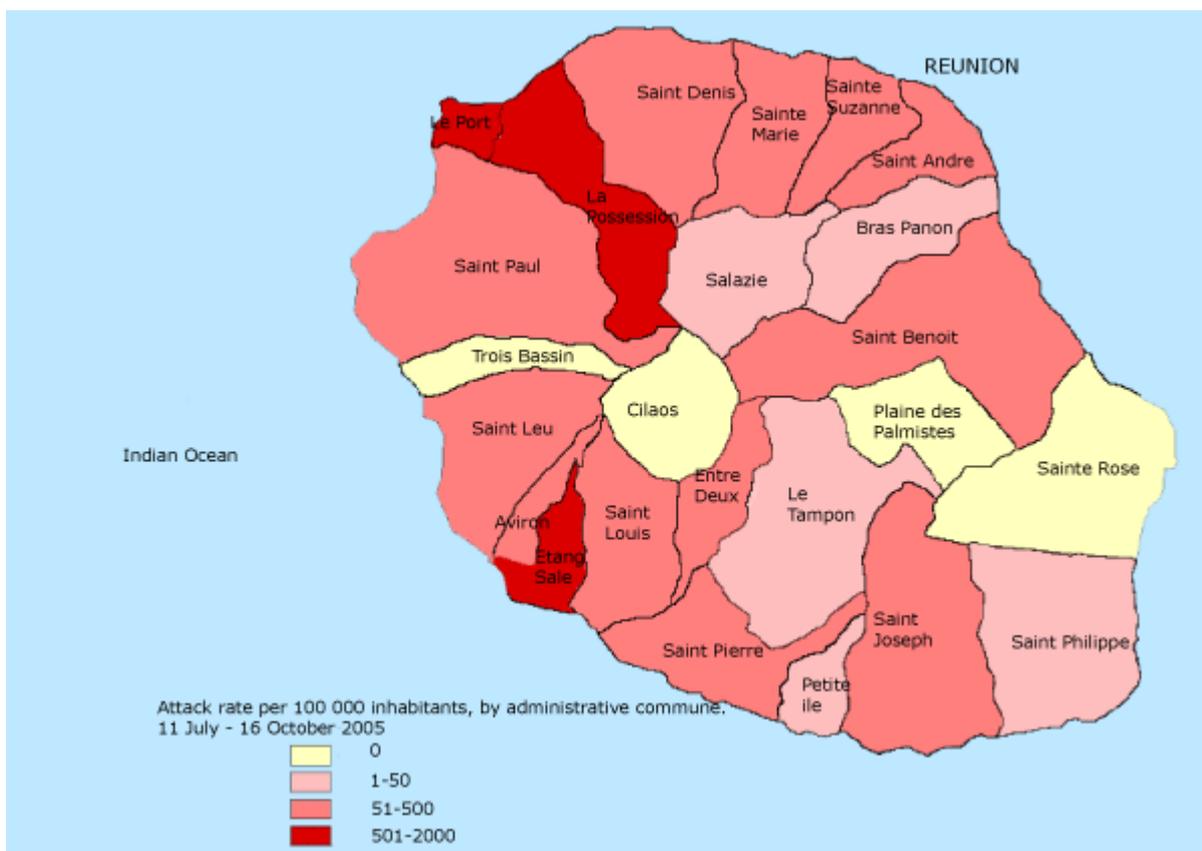
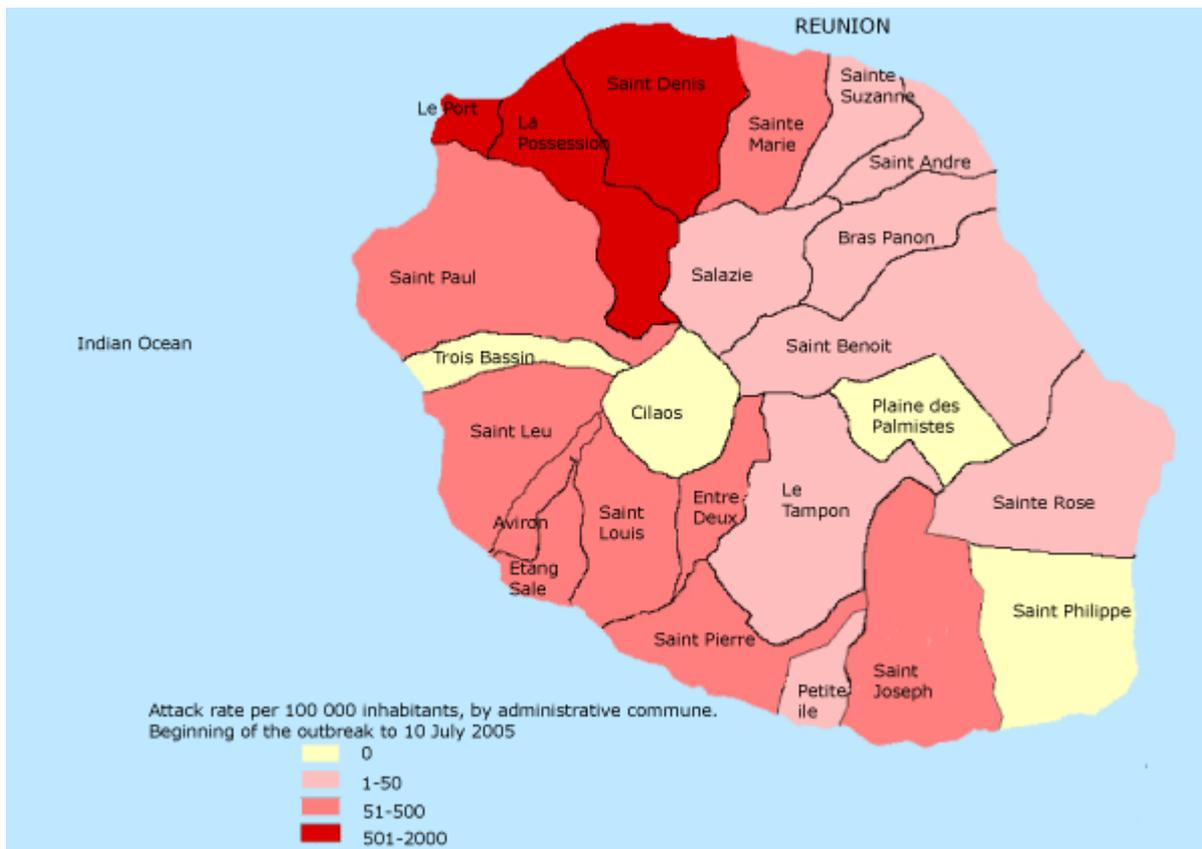
**Figure 1.** Chikungunya cases (confirmed and suspected, n=7438), Réunion, 28 March 2005 - 8 January 2006. Source: CIRE Reunion-Mayotte.

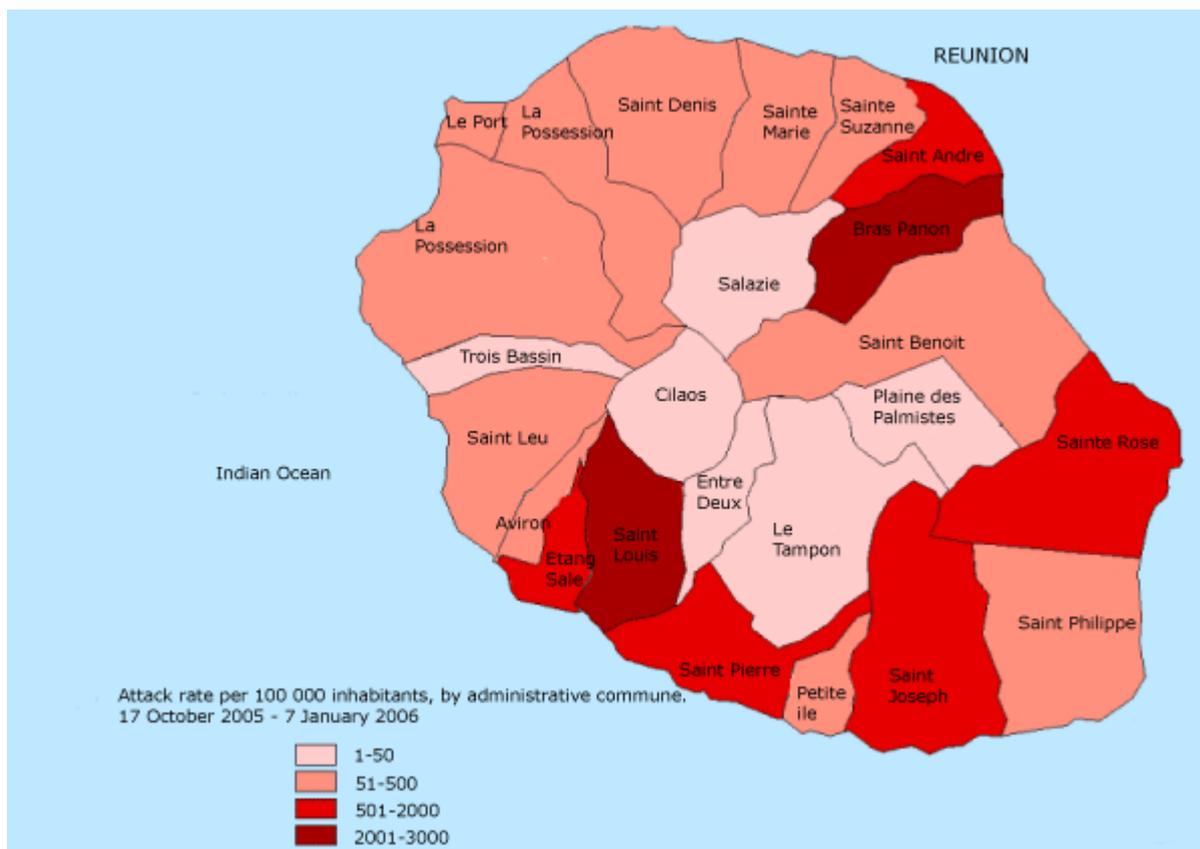


The male/female ratio is 0.68. The predominance of female cases is observed in all age groups, except in children under 15 years. All age groups are affected, and the attack rate increases according to age, from 3.8/1000 in the 0-15 years age group to 10.2/1000 in people 60 years and over (Chi<sup>2</sup> for linear trend 853,  $p < 10^{-5}$ ).

Distribution of cases is heterogeneous on the island territory. The comparison of attack rate according to the area of residence for each of the three outbreak periods shows successive cluster patterns. The north of the island was affected by the first outbreak peak, and the south and east of the island were affected by subsequent peaks from the beginning of the southern hemisphere summer (Figure 2).

**Figure 2.** Attack rates for chikungunya infections per 100 000 inhabitants, by administrative commune, Réunion, March 2005 - January 2006





The main clinical symptoms in patients are fever (99.6%), joint pain (99.2%), muscle pain (97.7%) and headache (84.1%). Almost a quarter (23%) of patients had haemorrhagic symptoms, such as bleeding from the nose or gums. From the 2570 completed medical forms, the proportion of patients admitted to hospital was 3.9%. No death directly due to chikungunya infection has been reported since the beginning of the outbreak in Réunion.

The French national reference centre for arbovirology confirmed a diagnosis of chikungunya for six newborns who showed symptoms of acute infection, and presented with a meningoencephalitis picture, within five days of birth. The mothers of all six children had acute chikungunya infection within the 48 hours before delivery. Six adult cases of meningoencephalitis were reported and confirmed by the national reference centre in elderly patients who were already in poor health due to old age or an underlying chronic disease. These neurological forms represent 1.7/1000 of all patients. Furthermore, acute severe infections with no neurological picture have been reported in 2 newborns and 13 infants. All were admitted to hospital following pain and fever syndromes resistant to common treatments. Some of the infants needed artificial feeding because of jaw pain. Evidence of mosquito bites was found in at least three of the infants.

### Discussion

In contrast to what had happened in neighbouring islands, and despite a period of lower transmission between July and October, transmission of chikungunya virus did not stop in Réunion, and case numbers began to increase again with the arrival of the southern hemisphere summer in December.

Most of the available data used to estimate the size of the outbreak came from active case finding carried out as part of the vector control campaign. From the end of December, the increase of the daily number of notifications exceeded investigation capacity, and this led to an underestimate of the number of cases. Because of this situation, and the fact that infections in people who had no or very few symptoms were not notified, the surveillance data currently available underestimate the true size of the outbreak.

Despite this limitation, the surveillance system has been able to describe disease

spatiotemporal trends, and to detect transmission clusters early, and this has been useful for optimising control measures. Most of the island has been affected by the virus, except for high altitude areas where vectorial transmission is low. It seems that the outbreak disseminates as clusters, affecting each town in turn. The impact of vector control measures, combined with the progressive acquisition of immunity by the exposed population, could explain this dynamic.

Twelve meningoencephalitis cases associated with chikungunya infection have been classified as confirmed following detection of anti-chikungunya virus IgM and/or viral genome in the cerebrospinal fluid (CSF) or in the sera, associated with clinical symptoms and brain imagery. Although described for the first time, these observations are not surprising, considering that the chikungunya virus belongs to a family of viruses, *Togaviridae*, which are known to be neurotropic and cause human meningoencephalitis in North and South America. Mother-to-child transmission is the most likely route of transmission for the six affected children with encephalitis diagnosed between three and five days after birth, and born to mothers with acute infections. The outbreak in Réunion is the first outbreak of this size in a population that has an efficient surveillance system and access to a healthcare structure with sophisticated paraclinical and microbiological facilities. This may be why neurological forms have been detected in addition to mother-to-child transmission of the chikungunya virus, never described during previous outbreaks [5,6,7]. To date, these neurological forms remain very rare compared with the total number of chikungunya cases observed. All patients so far have recovered, although it is not yet possible to draw mid- and long-term consequences on the psychomotor development of affected newborns. In addition to neurological complications, there may be indirect consequences for debilitated and weak patients, such as elderly people and those with chronic diseases.

These events have led to a reinforcement of prevention and control measures. The surveillance system is being further simplified and modified, in particular, by mobilising clinician networks on the island to be better adapted to the new epidemic dynamics.

*This article has been translated and adapted from reference 2.*

#### Acknowledgments

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