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INCIDENCE AND SEASONALITY OF CHIKUNGUNYA CASES IN THE STATE OF RIO DE JANEIRO, 2017-2020

Incidência e sazonalidade de casos de chikungunya no estado do Rio de Janeiro, 2017-2020

Incidencia y estacionalidad de casos de chikungunya en el estado de Rio de janeiro, 2017-2020

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ABSTRACT

Objective: describe the incidence and seasonality of cases reported in the notifiable diseases information system, in the state of Rio de Janeiro, from 2017 to 2020. **Method:** descriptive ecological study, with analysis of data provided by the Department of Informatics of the Unified Health System. **Results:** 156,579 cases were reported in the period; 5,970 in 2017; 45,429 in 2018; 99,436 in 2019; and 5,744 in 2020; as for seasonality, in 2017 the months from may to july stood out; in 2018 and 2019, the months from april to june; and in 2020, the period from january to march. **Conclusion:** it is necessary to intensify surveillance actions in regions with the highest incidence in order to direct control policies.

DESCRIPTORS: Arbovirus infections; Disease notification; Health information systems.

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RESUMO

Objetivo: descrever a incidência e a sazonalidade de casos notificados no Sistema de Informação de Agravos de Notificação, no estado do Rio de Janeiro, no período de 2017 a 2020. **Método:** estudo ecológico descritivo, com análise de dados disponibilizados pelo Departamento de Informática do Sistema Único de Saúde. **Resultados:** foram notificados 156.579 casos no período; 5.970 em 2017; 45.429 em 2018; 99.436 em 2019; e 5.744 em 2020; quanto à sazonalidade, em 2017 destacaram-se os meses de maio a julho; em 2018 e 2019, os meses de abril a junho; e em 2020, o período de janeiro a março. **Conclusão:** faz-se necessária a intensificação de ações de vigilância nas regiões de maior incidência, direcionando as políticas de controle.

DESCRITORES: Infecções por arbovirus; Notificação de doenças; Sistema de informação em saúde.

RESUMEN

Objetivos: describir la incidencia y la estacionalidad de los casos notificados en el sistema de información de enfermedades de declaración obligatoria, en el estado de Río de Janeiro, de 2017 a 2020. **Método:** estudio ecológico descriptivo, con análisis de datos proporcionados por el Departamento de Informática del Sistema Único de Salud. **Resultados:** 156.579 casos fueron notificados en el período; 5.970 en 2017; 45.429 en 2018; 99.436 en 2019; y 5.744 en 2020; en cuanto a la estacionalidad, en 2017 destacaron los meses de mayo a julio; en 2018 y 2019, los meses de abril a junio; y en 2020, el período de enero a marzo. **Conclusión:** es necesario intensificar las acciones de vigilancia en las regiones de mayor incidencia para orientar las políticas de control.

DESCRIPTORES: Infecciones por arbovirus; notificación de enfermedades; Sistema de información de salud.

INTRODUCTION

Chikungunya virus (CHIKV), from the genus Alphavirus in the family Togaviridae, is a single-stranded, enveloped, RNA genome virus. Transmission occurs through the bite of female mosquitoes of the genus Aedes (Aedes aegypti and Aedes albopictus). Human infection begins after the bite, which introduces the agent into the skin and blood circulation, generating high viremia. When the virus reaches the target organs, the symptoms begin, based mainly on fever, myalgia, and arthralgia.[1,2]

The National Health Surveillance Agency (ANVISA) considers that there are favorable conditions for the spread of the virus in Brazil, mainly related to the disorderly growth of urban centers, without guarantee of adequate infrastructure for the population. Water supply, collection and disposal of solid waste, together with the intense flow of people visiting the country as tourists and the humid climate, with high temperatures, contribute to a scenario of uncontrolled proliferation of the vector.[3]

The prevention and control of Chikungunya fever is related to health surveillance of the Aedes mosquito. The states are responsible for organizing this intervention on a routine basis, inspecting commercial establishments and homes, with the help of the vector control teams. The places visited must be inspected for the existence of hotbeds that are favorable to the reproduction and dissemination of the mosquito. In addition, educational measures must be taken to provide guidance on good health practices; risk situations must be monitored, and the state or municipal coordination must be informed of irregularities that put the health of the population at risk.[3]

The CHIKV virus was discovered in Tanzania in 1952, and since then it has generated epidemic periods in several countries.[4] Since then, it has been frequently associated with the occurrence of major epidemics.

Between 2005 and 2006, in Réunion (France), an outbreak of the disease affected one third of the population (>266,000 cases); during the same period, 254 deaths were reported and directly or indirectly attributed to the virus. This major epidemic was related to the occurrence of the A226V mutation, which allowed the virus to successfully adapt to the vector Aedes albopictus.[5]

According to the World Health Organization (WHO), in 2014, the CHIKV virus hit Europe again, with 1,500 cases recorded, affecting France and the United Kingdom to a greater extent. That same year, more than 1 million suspected cases were reported to the Pan American Health Organization (PAHO) regional office.[6]

At the end of 2013, the reporting of the transmission of the first autochthonous cases of Chikungunya fever in the Americas drew the attention of international health organizations.[5] In Brazil, the first autochthonous cases were identified in September 20144, in the North and Northeast regions of the country, involving Asian and South, Central and Eastern African (ECSA) variants.

In Brazil, the latest bulletin published in 2021 by the Ministry of Health (MS) observed 90,147 cases in the year 2021, considering the period between epidemiological weeks 1 and 44. There was, therefore, an increase of 29.5% in relation to the previous year, affecting mainly the Northeast (incidence of 106.6 cases/100,000 inhab.), followed by the Southeast (28.9 cases/100,000 inhab.). Moreover, 11 deaths from Chikungunya were identified in Brazil in 2021, distributed among the states of São Paulo (4), Espírito Santo (2), Sergipe (1), Pernambuco (2), Minas Gerais (1), and Bahia (1), emphasizing that 31 deaths were under investigation.[7]

In Rio de Janeiro, a state in the Southeast region of Brazil with a high flow of international and domestic flights, and host of the Olympic games in 2016, the first cases occurred in 2015. Despite being the second largest capital city in Brazil, little data is available on the genomic CHIKV epidemic.[8] In 2021, 510 probable cases were observed, with an incidence of 2.9 cases/100,000 hab.[7]

Knowing that arboviroses are a challenge for Brazilian public health, and that interventions are related to vector control and continuous analysis of the health situation of the population,[9] it becomes relevant to monitor the incidence and seasonality of cases of Chikungunya in the state of Rio de Janeiro from current data, considering it a place conducive to the maintenance of the endemic by the aforementioned factors. This study aims to contribute to the strengthening of actions and services that intervene in a timely manner based on epidemiological evidence, thus allowing the gaps in prevention care and health education to be filled.

This study aims to describe the incidence and seasonality of cases reported in the Sistema de Informação de Agravos de Notificação (SINAN), in the state of Rio de Janeiro, from 2017 to 2020.

METHOD

This is a descriptive ecological study, of the type person, time and place, about the pattern of the incidence and seasonality of Chikungunya in the state of Rio de Janeiro. In this type of study, the interest is the collective, in what may be predominant as a group characteristic. We used secondary data from the Sistema de Informação de Agravos de Notificação (SINAN), made available by the Departamento de Informática do Sistema Único de Saúde (DATASUS).

Rio de Janeiro was chosen for this study because its indicators show a considerable number of reported cases of arbovirosis, which points to the need for better preventive strategies and vector control. According to data from the Brazilian Institute of Geography and Statistics (IBGE)10, Rio de Janeiro had a population of approximately 15,989,929 inhabitants in 2010, with an estimated population of 16,718. 956 for 2017, being distributed in 92 municipalities and administratively divided into eight macro-regions, in an area of 43,780.157 km.[2] The state is 4th on the list of states with the highest Municipal Human Development Index (HDI) in Brazil, with an index of 0.761, while the average for Brazil is 0.710.

All notified cases of Chikungunya fever, registered in SINAN, in the 92 municipalities of the state of Rio de Janeiro, in the period between 2017 and 2020, were included in the study. The incidence rate per 100,000 inhabitants was calculated, and thematic maps and historical series graphs were prepared for the period studied.

Since this is a study with secondary and aggregated data, publicly available, without the possibility of identifying individuals and without risks to them, this research does not require the approval of the Research Ethics Committee.

The project was submitted and approved by the CEP/UERJ Ethics Committee on April 30, 2020, with opinion number 4.000.701 and presentation certificate for ethical review (CAAE) 31057620.0.0000.528.

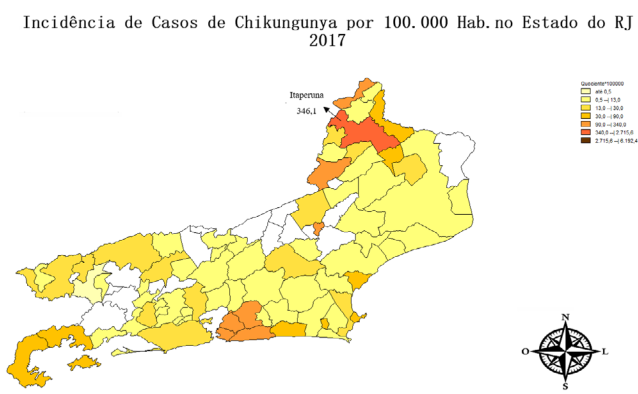
RESULTS

156,579 cases of Chikungunya fever were reported in the state of Rio de Janeiro in the period between 2017 and 2020, with a cumulative incidence of 908.7 cases per 100,000 inhabitants.

In 2017, 5,970 cases were reported, with an incidence of 35 cases per 100,000 inhabitants. Among the municipalities that presented the highest number of notified cases, the following stood out: Rio de Janeiro (1,925), São Gonçalo (1,115), Itaboraí (732), Niterói (601) and Itaperuna (353), with Itaperuna being the municipality with the highest incidence of cases per 100,000 inhabitants (346.1/100,000), followed by Itaboraí (309.4/100,000).

Nineteen municipalities had no reported cases in 2017. In terms of seasonality, the months from May to July stood out, with peak registration in July (690 cases), consistent with the literature in terms of seasonal period of arboviroses in the country.

Figure 1 - Incidence of Chikungunya cases per 100,000 inhabitants. Rio de Janeiro, RJ, Brazil, 2017

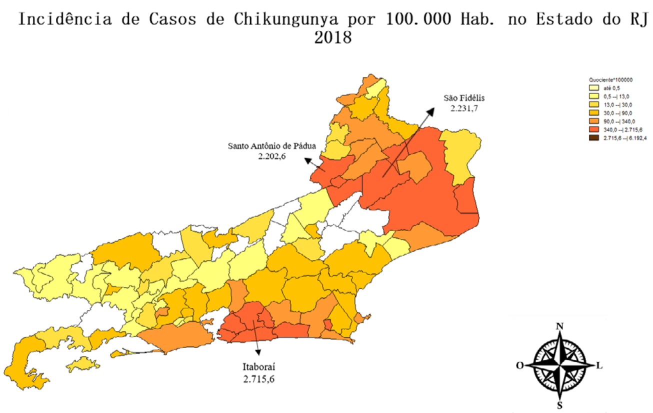


Source: IBGE, 2023

In 2018, 45,429 cases were reported, with an incidence of 264.7/100,000 inhab. The municipalities with the highest number of reported cases were: Rio de Janeiro (10,655), followed in descending order by São Gonçalo (8,154), Campos dos Goytacazes (7,590), Itaboraí (6,482), Niterói (2,953), and Maricá (1,732). In relation to incidence, Itaboraí ranked first

(2,715.6/100,000), followed by São Fidélis (2,231.7/100,000), Santo Antônio de Pádua (2,202.6/100,000), Itaocara (1,935.7/100,000) Campos dos Goytacazes (1. 507.7/100,000), Aperibé (1,110.9/100,000), Maricá (1,097.7/100,000), and São João da Barra (1,076.4/100,000); it is important to note that São Fidélis and Aperibé had, respectively, 1 and 0 cases reported in 2017. In addition, thirteen municipalities had no reported cases.

Figure 2 - Incidence of Chikungunya cases per 100,000 inhabitants. Rio de Janeiro, RJ, Brazil, 2018

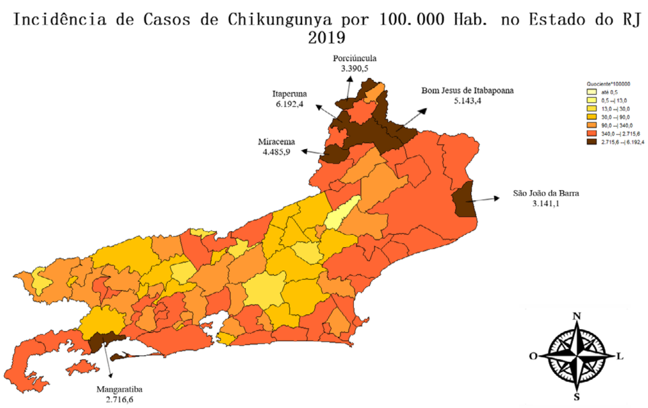


Source: IBGE, 2023.

In 2019, 99,436 cases were notified, with an incidence of 575.9/100,000 inhab. representing 63.5% of the total cases in the period 2017-2020, and therefore characterizing an epidemic year. The municipalities with the most reported cases were: Rio de Janeiro (39,348), Campos dos Goytacazes (8,208), Itaperuna (6,392), Nova Iguaçu (4,489), Macaé (2,585), São João de Meriti (2,377), Duque de Caxias (2,174), and São Gonçalo (2,031). In terms of incidence, Itaperuna stood out with 6,192.4/100,000, Bom Jesus de Itabapoana (5,143.4/100,000), Miracema (4,485.9/100,000), Porciúncula (3,390.5/100,000) and São João da Barra (3,141.1/100,000).

In 2019, all municipalities in the state had reported cases of Chikungunya; the lowest absolute numbers were in São José do Vale do Rio Preto (3), Comendador Levy Gasparian (2) and São Sebastião do Alto (1). Regarding seasonality, in 2018 and 2019 the months of April to June stood out, especially the month of May in both years; 9,016 cases were notified in May 2018 and 28,236 cases in May 2019.

Figure 3 - Incidence of Chikungunya cases per 100,000 inhabitants. Rio de Janeiro, RJ, Brazil, 2019.

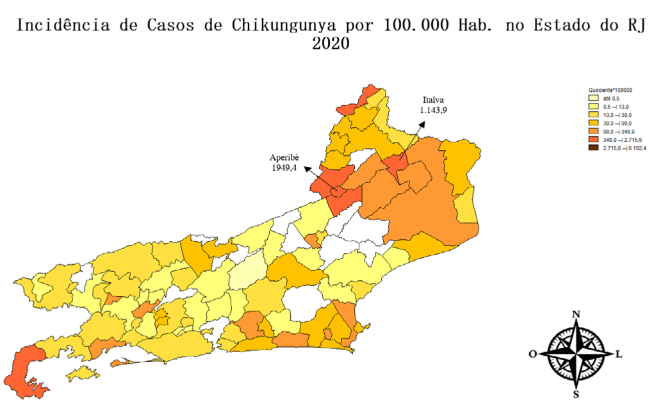


Source: IBGE, 2023.

In 2020, 5,744 cases were reported, with an incidence of 33.1/100,000 inhab. The municipalities that presented the highest number of reported cases were Rio de Janeiro (1,091) and Campos dos Goytacazes (1,002). Regarding incidence, Aperibé (1,949.4/100,000) and Italva (1,143.9/100,000) stood out in first and second place, respectively, and 14 municipalities had no reported cases in 2020. The period from January to March stood out with respect to the seasonality of Chikungunya cases in 2020, with January standing out, with 1,644 cases.

Through the geographical distribution evidenced by the maps, it is observed that the Northwest region of the state presented the highest incidence rates in three of the four years of the studied period.

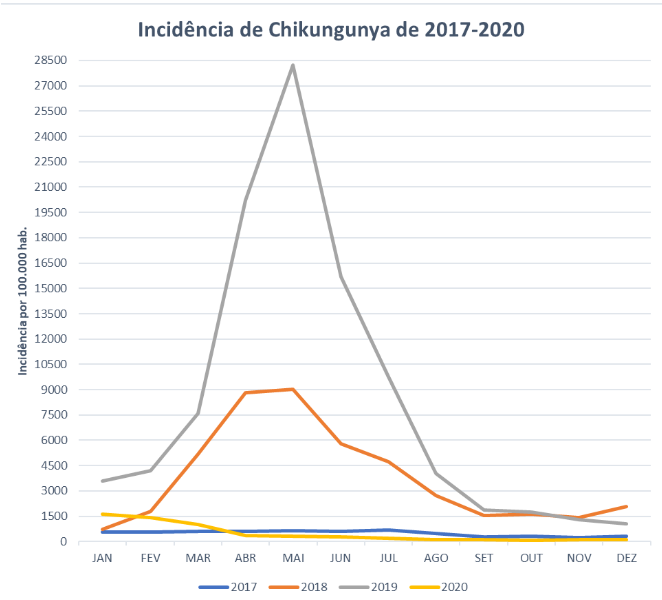
Figure 4 - Incidence of Chikungunya cases per 100,000 inhabitants. Rio de Janeiro, RJ, Brazil, 2020



Source: IBGE, 2023.

Regarding the historical series of the disease in the period, in Figure 5 it is possible to visualize the monthly distribution of reported cases during the years studied, characterizing 2019 as an epidemic year.

Figure 5 - Incidence per 100,000 inhabitants and seasonality of Chikungunya cases. Rio de Janeiro, RJ, Brazil, 2017-2020.



Source: DATASUS, 2023.

In terms of seasonality, an increase in the incidence of cases in the period from March to June is evident, which is consistent with the literature in terms of the seasonal period of arboviroses in the country.

It is important to consider the hypothesis of underreporting in municipalities that had fewer cases and/or no records during the period studied. The notifications made by health services come from information from infected individuals who seek the services; however, for various reasons, such as asymptomatic infections, problems of access to services, and misdiagnosis, many cases may not have been reported.

DISCUSSION

In the period analyzed, the notifications had exponential growth between the years 2018 and 2019, with an important decline in 2020. The year 2019 showed the highest number of notifications in the period studied. In terms of seasonality, in 2017 the months of May to July stood out; in 2018 and 2019, the months of April to June; and in 2020, the period from January to March.

Through the geographical distribution exposed in the maps, it is observed that the Northwest region of the state presented the highest incidence rates in three of the four years of the studied period. Regarding seasonality, an increase in the incidence of cases was observed in the period from March to June, which is consistent with the current literature on arboviroses in the country.

Over the past decades, studies have shown that the process of insect domiciliation is correlated to the accelerated urbanization of cities, enabling the dispersion of pests and disease transmitters and causing socioeconomic disruption to society as a result of health problems.[11] This risk becomes greater in countries that have a tropical climate such as Brazil, where temperature and rainfall distributions favor the proliferation of the vector mosquito.[12]

The study by Pereira (2018)13, conducted in Maranhão, found that in the municipalities that had probable cases of the disease, patients most often resided in urban areas (83.9%), which reinforces the idea that it is an urban disease. The intensity of this problem occurs mainly in tropical countries and those with greater social vulnerability, because besides having important favorable conditions for vector infestation, such as climate, they have problems related to epidemic control services, lack of physical maintenance of installed infrastructure, difficulties in urban planning, basic sanitation, and, consequently, in the control of disease dissemination.

In parallel to these issues are the urban problems characterized by precarious services, inadequate infrastructure, increased production of non-organic waste, and the migratory dynamics that generate subnormal settlements, important factors that contribute to the worsening of the situation and dissemination of the vector in cities.[14]

Another important issue involves the income conditions of the population, because it has been observed that municipalities with low and medium income usually have a higher number of cases of the disease. However, it is not the family income that conditions families to Chikungunya fever, but the housing conditions and public services with poorer infrastructure.[15]

Thinking about a sustainable control for arbovirosis necessarily involves the need to make water available in sufficient quantity, with adequate distribution and storage for the population, in addition to a sewage network capable of collecting and treating what is consumed. Sanitation alone cannot solve this problem, given the influence of climate and environmental issues.[16]

However, its improvement is an initial and primordial step towards the resolution of the epidemics that devastate the Brazilian population. Health education is necessary, considering the importance of making the population aware of its responsibility in taking care of its own health and avoiding attitudes that favor the proliferation of vectors and the dissemination of arboviroses.[11]

Another relevant factor to be highlighted are the delays in the notifications, processing, and transfer of information resulting from the inadequate use of SINAN. The lack of knowledge and perception of the public health relevance of the diseases subjected to surveillance are factors that contribute to the problem of underreporting. On the other hand, we can highlight the delays due to operational problems, such as failures in the information system, ignorance, or little interest of health professionals in reporting cases.[13]

The timely diagnosis is essential for the appropriate clinical and therapeutic management of cases, especially in endemic areas for other diseases with similar symptoms, such as dengue.[17] However, it is known that laboratory investigation is not related to patient treatment, because so far Chikungunya fever has no specific antiviral treatment, but support with symptoms, hydration, rest, and care to prevent possible complications.

However, the confirmation of the diagnosis is essential for prevention and control measures to be taken in order to minimize the risk of new epidemics. Attention should be drawn to the fact that once the sustained transmission of Chikungunya fever is characterized in a given area, with laboratory confirmation of the first cases, the other cases can be confirmed by the clinical-epidemiological criterion.[18]

However, in many regions of Brazil, with low economic level and reduced availability of services, the diagnosis usually depends on the presentation of clinical manifestations. Therefore, a greater orientation of health professionals and authorities involved in surveillance of arboviroses is fundamental, as well as health education actions aimed at the population to face, in part, the insufficiencies faced in the diagnostic sector.[19]

The poor distribution of health services and insufficient investment in prevention, as well as discontinuity in treatment, cause the following situation that can explain the fluctuation of case rates: when one year presents a decline in the number of cases, there is a decrease in attention and investment, resulting in an increase in cases the following year.[4]

The service also needs to be prepared for the high demand of patients during outbreaks/epidemics. Preparatory activities should be carried out to train the health team to manage the cases and assess the need for supplies, materials, equipment, and medicines to provide adequate care to patients. It is also necessary to make available the flowchart with risk classification and management of the patient with suspected Chikungunya fever in all health units. The organization of health services is essential for an adequate response to a possible increase in the number of cases in a given year. It is necessary to promote adequate patient care, organize prevention and control actions, and strengthen the integration of different areas and services.[18]

Care for patients suspected of having Chikungunya fever, in most cases, is characterized by the use of care technologies that do not require more complex and expensive facilities and equipment. The reception with risk classification should be implemented in all health units and primary care teams should be the preferred gateway of entry for patients.[18]

As intrinsic limitations to this study design, we highlight the problems of underreporting and incomplete data, which impair the knowledge about the incidence of cases, underestimating the magnitude of the disease and its impacts on health and society.

CONCLUSION

The Health Information System is extremely important for the decision-making process and for Health Surveillance actions. The numerous challenges with the maintenance of the Chikungunya endemic disease in the state are evident, since the only known form of prevention is vector control, requiring public policies of health education and sanitation that aim to control the disease. It is necessary to expand the understanding of nursing professionals about the dynamics of incidence and seasonality of arboviroses in the state of Rio de Janeiro, subsidizing the measures of prevention and control of endemics.

It is necessary to intensify epidemiological and environmental surveillance actions in regions of higher incidence of arboviroses in the state, which allow knowledge of the geographic and temporal distribution of the disease in their territories, in order to better direct and consolidate control policies, designing better preventive and educational strategies.

Furthermore, it is extremely important to carry out analytical ecological studies that explore arboviroses in Brazil and in the state of Rio de Janeiro in a temporal and spatial way, comparing the distribution of cases with sociodemographic indicators.

It is urgent to prioritize government actions to control vectors, through approaches that include health education for the population on a continuous basis and not only in epidemic periods, in order to reduce the annual frequency of cases and consequently improve the quality of life of the population. In addition, it is essential to clarify the need and importance of the notification and investigation of cases by health professionals, since these serve as a basis for planning and programming public health action

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