

# Epidemiological Scenario of Probable Cases of Chikungunya in Brazil from 2017 to 2022

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## ABSTRACT

**Introduction/Objectives:** Arboviruses infections are important public health problems that are increasingly growing in number of cases, particularly the Chikungunya virus (CHIKV) it has altered the natural course of the infection with progression to death. To assess the clinical and socio-epidemiological profile in the Brazilian territory of probable cases of Chikungunya in the period from 2017 to 2022.

**Methods:** This is an epidemiological, ecological, descriptive, population-based study that had used secondary data from the public database, called the Notifiable Diseases Information System (SINAN) of the Brazilian Ministry of Health (MS). The variable ages (from 60 to 80 years or older), sex, race, education, evolution of the disease in the 26 federative units and the federal district that make up the Brazilian territory in the period from 2017 to 2022 were considered.

**Results:** In the period 2017 to 2022, 600.428 probable cases of Chikungunya were notified and, ignored/white (143.579) and discarded (301.969) among the federative units that make up the Brazilian territory. Regarding sex, the majority were female (63.04%), race/skin color were brown (66.16%), age group 60 to 64 years (33.06%), finished high school adjusted for the age group 60 to 64 years showed higher educational level (44.96%) and, the outcome cure (42.438 cases: 98.80%).

**Conclusions:** the growth of these probable cases of Chikungunya, especially in areas of expressive concentrations of elderly individuals in recent years, signals the eminent need to restructure health services in primary health care to implement improvements in the care network and intensify prevention campaigns, to minimize the socioeconomic impacts resulting from negligence in this disease.

**Keywords:** Chikungunya; Probable Cases; Epidemiologic; Public Health

## Introduction

Brazil is a Latin American country located in the southern hemisphere with an extension of 8.564.411 km<sup>2</sup> composed of 26 states and 1 federal district, tropical climate [1]. Given the frequent immigration flows in the world, low level of education, inadequate disposal of garbage and, the precarious conditions of basic sanitation and, the disordered growth in large cities, arboviruses have become increasingly growing in number of cases [2]. Social vulnerability provides the ideal environment for the interaction between the virus, the vector, and the host [3], especially in developing or underdeveloped countries, and

the epidemiological scenario of arboviruses undergoes drastic changes in the evolutionary course of the natural history of this zoonosis and also, particularly newborns and elderly who are mostly severe affected [4].

Chikungunya fever, caused by an alphavirus of the Togaviridae family and transmitted by the bite of the Aedes sp. Mosquito [5]. In recent years, there has been a growing number of cases reported in the Brazilian territory, with worsening cases and progression to death. The autochthonous transmission of CHIKV in Brazil was documented in the second half of 2014, initially in the states of Amapá (Oiapoque

city) and Bahia (Feira de Santana city) and, from this record, autochthonous cases were observed in several regions of the country [6]. In the state of São Paulo, one of the most populous in the Brazilian federation, cases were imported and detected at the end of 2014 [7], and in the following year, the 1st autochthonous case was identified and, thereafter, the municipalities reported sporadic cases of the disease. In 2021, the first Chikungunya epidemic was documented in the Baixada Santista (coastal city) [8,9]. In the affected communities, the striking feature is epidemics with significant attack rates, ranging from 31% to 75% [10].

Additionally, climate change and deforestation in the Amazon contribute greatly to the increase in the number of probable cases of the disease and there has an economic impact on the Public Health System (SUS) linked to the Brazilian Ministry of Health, responsible for investigating/monitoring cases through epidemiological surveillance in the states and municipalities. Arboviruses are responsible for numerous clinical manifestations ranging from mild to severe febrile illness, hemorrhagic episodes, and invasion of the central nervous system (CNS) with Guillain Barré Syndrome, Meningoencephalitis, Viral Encephalitis [11] which are the most reported forms. The purpose of this study was to show the clinical and socio epidemiological profile of probable cases of Chikungunya in Brazil in the period from 2017 to 2022, age ranging from 60 to 80 or more, based on notifications registered in the public database SINAN.

## Methodology

Data collection was carried out using secondary, publicly accessible data from the Notifiable Diseases Information System (SINAN) of the Brazilian Ministry of Health (MS). For this purpose, the 26 federative units and the Federal District of Brazil were included in the survey and the attributes of gender, age, race, level of education and the clinical evolution of the probable cases of Chikungunya analyzed. To prepare the database, we used the Epi-Info program, and the qualitative variables were represented by absolute (n) and relative (%) frequency.

## Results

During the period from 2017 to 2022, there were a total of 1.045.976 register of probable cases of Chikungunya which were notified in SINAN, between the Brazilian federative units. Out of these, only 600.428 (57.40%) probable cases of Chikungunya (Table 1). In the study, we considered for the analyses exclusively individuals in the age group from 60 to 80 years or more. In the assessment of gender, the probable cases of CHIKV in this study period (2017 to 2022) are equivalent to a total of 153.754 notifications, women were more representative and corresponded to a total of 96.936 (63.04%) versus 56.818 men (36.96%). The highest concentration of these cases when adjusted for the age groups of the study, showed that the age group of 60 to 64 years regardless of gender was more expressive with 51.305 notified cases (Table 2).

**Table 1:** Total number of CHIKV cases registered in Brazil in the study period - 2017 to 2022.

	Number of cases	% of cases
Ignored or blank cases	143.579	13.72%
Disposed cases	301.969	28.88%
Chikungunya	600.428	57.40%
Total	1.045.976	100%

**Table 2:** CHIK notifications by age group and gender in the study period - 2017 to 2022.

Age Group	Female	Male
60 to 64 years	32.754	18.551
65 to 69 years	25.144	14.219
70 to 79 years	27.943	17.533
80 or more years	11.095	6.895
Total	96.936	56.818

The race/skin color attribute measured by the study participants and stratified into White, Black, Yellow, Brown and Indigenous and also adjusted by age group (Table 3) showed that brown color totaled the majority of cases regardless of age group and corresponded to 78.335 cases (66.16%). Regarding the education aspect, considering illiterate, elementary school (complete or incomplete), high school (complete or incomplete) and higher education (complete or incomplete) and, adjusting for the age groups of interest in the study, it was observed that the age group 60 to 64 years showed the highest educational level with 4.251 records of complete high school (Table 4) and, in the other groups from 65 years onwards, education corresponded to incomplete elementary education (1<sup>st</sup> to 4<sup>th</sup> grade of elementary school). When evaluating the evolution of probable CHIKV cases, for the outcome of cure or death, it was observed that cure was frequent in all age groups analyzed and corresponded to 98.78% of case records (n = 42.438). Still in this aspect, 519 deaths (1.22%) were documented in age groups from 70 years onwards (Table 5).

**Table 3:** CHIK notifications by age group and race or skin color in the study period - 2017 to 2022.

Age	White	Black	Yellow	Brown	Indigenous
60 to 64 years	9.266	2.576	493	26.037	111
65 to 69 years	7.195	1.889	367	19.987	87
70 to 79 years	8.307	1.898	427	23.233	106
80 or more years	3.362	708	161	9.078	30
Total	28.130	7.071	1.448	78.335	334

**Table 4:** CHIK notifications by Level of education adjusted for Age group in the study period - 2017 to 2022.

Education Level	60 to 64 years	65 to 69 years	70 to 79 years	80 or more years
Illiterate people	1.039	1.083	2.029	1.188
1st to a 4th Incomplete elementary education	3.522	<b>3.188*</b>	<b>4.358*</b>	<b>1.714*</b>
2nd to 4th complete elementary education	1.729	1.402	1.614	530
5th to 8th Incomplete elementary education	2.542	1.750	1.747	519
Complete Elementary Education	1.974	1.528	1.565	496
Secondary school incomplete	1.251	847	781	208
High school complete	<b>4.251*</b>	2.590	2.043	569
Incomplete higher education	257	136	85	16
Higher education complete	1.536	865	676	140

\* Refers to the highest concentrations of individuals by Level of education adjusted by Age group

**Table 5:** CHIK notifications by clinic evolution adjusted for Age group in the study period - 2017 to 2022.

Age	Cure	Death
60 to 64 years	13.836	88
65 to 69 years	10.672	85
70 to 79 years	12.949	<b>161</b>
80 or more years	4.981	<b>185</b>
Total	42.438	519

## Discussion/ Final Considerations

Study surveys have increasingly identified the need for the health care network to prepare the infrastructure of economic and human resources for the contingency of arboviruses in the world [12]. The need is mainly due to the poignant social vulnerability as well as the etharism and the preservation and sustainability of the environment, in addition to the frequent outbreaks that have been occurring in Latin American countries, until then without records of CHIKV cases [13], as recently occurred in Argentina and Paraguay. In Brazil, in the period 2017 to 2022, our study identified a total of 1.045.976 Chikungunya records that were notified in SINAN, among the Brazilian federative units. Of these, only 600.428 (57.40%) were probable cases of Chikungunya. In this sample we considered for the analysis exclusive-ly individuals in the age group of 60 to 80 years or more.

Although the severity of CHIKV infection observed is associated with the direct action of the virus as well as clinical decompensations of pre-existing conditions [14,15], the age group eligible for the study was made due to the longer time spent in the domestic environment, little or no intimacy with long-range and accessible media, and the supposedly associated morbid conditions. Senescence and low educational level may have an important impact on the outcome of the disease. This is because the behavior of the elderly when it comes to zoonoses may not be changed, mostly precise because of the lack of accessibility or little intimacy with social media where prevention

campaigns occupy more and more space in the campaigns of these diseases. Our work provides an overview of the profile of the available data on CHIKV currently registered in Brazil and, that as of 2019 with the advent of the COVID-19 pandemic, there may have been a reduction in the number of notifications due to social isolation and the co-evolution of CHIKV with Covid-19 and, other arboviral diseases, such as dengue, particularly in these age group considered in the study.

## References

1. Painel de Indicadores. Instituto Brasileiro de Geografia e Estatística (2023) <https://www.ibge.gov.br/indicadores.html>. Access on July 24, 2023.
2. Ruckert C, Ebel GD (2018) How do virus-mosquito interactions lead to viral emergence? *Trends Parasitol* 34: 310-321.
3. Anubis Vega-Rúa, Karima Zouache, Romain Girod, Anna-Bella Failloux, Ricardo Lourenço-de-Oliveira (2014) High Level of Vector Competence of *Aedes aegypti* and *Aedes albopictus* from Ten American Countries as a Crucial Factor in the Spread of Chikungunya Virus. *J Virol* 88(11): 6294-6306.
4. Burt FJ, Chen W, Miner JJ, Lenschow DJ, Merits A, et al. (2017) Chikungunya virus: an update on the biology and pathogenesis of this emerging pathogen. *Lancet Infect Dis* 17(4): e107-e117.
5. Wang P, Zhang R (2019) Chikungunya Virus and (Re-) Emerging Alphaviruses. *Viruses* 11(9): 779.
6. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. (2020) Monitoramento dos casos de arboviroses urbanas transmitidas pelo *Aedes Aegypti* (dengue, chikungunya e zika), semanas epidemiológicas 1 a 46. *Bol Epidemiol* 51:1-33.
7. Ministério da Saúde (Brasil). Secretaria de Vigilância em Saúde. Departamento de Vigilância das Doenças Transmissíveis. (2017) Chikungunya: manejo clínico. Brasília: Ministério da Saúde.
8. Hennessey MJ, Ellis EM, Delorey MJ, Panella AJ, Kosoy OI, et al. (2018) Seroprevalence and symptomatic attack rate of chikungunya virus infection, United States Virgin Islands, 2014-2015. *Am J Trop Med Hyg* 99(5): 1321-1326.
9. Sergon K, Yahaya AA, Brown J, Bedja SA, Mlindasse M, et al. (2007) Seroprevalence of Chikungunya virus infection on Grande Comore Island, union of the Comoros, 2005. *Am J Trop Med Hyg* 76(6):1189-1193.

10. Secretaria da Saúde de São Paulo (estado). Coordenadoria de Controle de Doenças. (2021) Protocolo de manejo clínico de chikungunya no estado de São Paulo. Secretaria da Saúde; São Paulo, Brasil.
11. Chauhan L, Matthews E, Piquet AL, Henao-Martinez A, Franco-Paredes C, et al. (2022) Nervous System Manifestations of Arboviral Infections. *Curr Trop Med Rep* 9(4): 107-118.
12. Junior JBS, Massad E, Lobao-Neto A, Kastner R, Oliver L, et al. (2022) Epidemiology and costs of dengue in Brazil: a systematic literature review. *International Journal of Infectious Diseases* 122: 521-528.
13. World Health Organization (2023) Geographical expansion of cases of dengue and chikungunya beyond the historical areas of transmission in the Region of the Americas <https://www.who.int/emergencies/disease-outbreak-news/item/2023-DON448>. Access on July 24, 2023.
14. Alvarez MF, Bolívar-Mejía A, Rodríguez-Morales AJ, Ramirez-Vallejo E (2017) Cardiovascular involvement and manifestations of systemic Chikungunya virus infection – a systematic review. *F1000 Res* 6: 390.
15. Brizzi K (2017) Neurologic manifestation of chikungunya virus. *Curr Infect Dis Rep* 19 (2): 6.

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