The incidence of Dengue fever in Brazil, post-pandemic COVID-19: Reduction in the number of cases or increase in underreporting? An integrative review

Antonio Cruz Lacerda Neto
Bachelor of Medicine
Institution: Faculdade Nova Esperança (FAMENE)
Address: Av. Frei Galvão, 12, Gramame João Pessoa - Paraíba, CEP: 58067-695
E-mail: antoniolacerda75@outlook.com

Brenno Higor Sousa Gomes
Bachelor of Medicine
Institution: Faculdade Nova Esperança (FAMENE)
Address: Av. Frei Galvão, 12, Gramame João Pessoa - Paraíba, CEP: 58067-695
E-mail: brennohigor17@gmail.com

João Pedro Albuquerque Lins
Bachelor of Medicine
Institution: Faculdade Nova Esperança (FAMENE)
Address: Av. Frei Galvão, 12, Gramame João Pessoa - Paraíba, CEP: 58067-695
E-mail: joaopedrolins.qi@gmail.com

Jônatas Queiroga de Melo
Bachelor of Medicine
Institution: Faculdade Nova Esperança (FAMENE)
Address: Av. Frei Galvão, 12, Gramame João Pessoa - Paraíba, CEP: 58067-695
E-mail: jonatasqm@hotmail.com

Rafael Ataíde Paiva
Bachelor of Medicine
Institution: Faculdade Nova Esperança (FAMENE)
Address: Av. Frei Galvão, 12, Gramame João Pessoa - Paraíba, CEP: 58067-695
E-mail: rafaelataide01@gmail.com

Ricardo Pires de Sá Espínola
Bachelor of Medicine
Institution: Faculdade Nova Esperança (FAMENE)
Address: Av. Frei Galvão, 12, Gramame João Pessoa - Paraíba, CEP: 58067-695
E-mail: espinolasustentavel@gmail.com

Alysson Kennedy Pereira de Souza

PhD in Zoology from the Federal University of Paraíba (UFPB) Institution: Faculdade Nova Esperança (FAMENE), Centro Universitário Uniesp Address: Av. Frei Galvão, 12, Gramame, João Pessoa - Paraíba, CEP: 58067-695
E-mail: akps2001@gmail.com

Isabela Tatiana Sales de Arruda
PhD in Health Biotechnology from
Renorbio Institution: Faculdade Nova Esperança (FAMENE)
Address: Av. Frei Galvão, 12, Gramame, João Pessoa - Paraíba, CEP: 58067-695
E-mail: isabelaarruda@yahoo.com.br

ABSTRACT
The objective of the present study was to analyze the impact of the COVID-19 pandemic on arbovirus notifications, comparing values obtained in epidemiological bulletins from 2019 to 2022. Thus, noting a large number of possible unreported diseases of these diseases during the pandemic period. This is a quantitative study, intending to establish a relationship between the numbers obtained methodologically through searches of SCIELO articles, journals, epidemiological bulletins, and data from DATASUS and the amount of underreporting identically reported in the study period. The results obtained showed a similarity between the data analyzed in the years 2019 and 2022, however, there was a relevant discontinuity between the intervals of 2020 and 2 021. It is concluded that this fact is about underreporting of cases during the period of greatest incidence of the SARS-CoV-2 virus, influenced by the changes that the pandemic brought to the fore in the spheres of society, politics, economy, and especially the entire area of health, because during the pandemic period, it was identified that the main attention of Brazilian health was focused on solving or reducing the damage caused by a new virus and neglecting health promotion and prevention actions for endemic diseases in our territory, such as dengue.

Keywords: Dengue, Underreporting, Covid-19.

1 INTRODUCTION

The study of vector-borne diseases, such as mosquitoes, is of great value for the planning and control of public health, as well as the understanding of the pathologies related to them, due to these transmitters being responsible for 17% of the communicable diseases and cause 700,000 deaths per year globally. Among these mosquito-borne diseases, dengue is a great exponent at the continental and, mainly, national levels.

Dengue is a systemic disease of viral and acute etiology, transmitted by arthropods. The vector of transmission of this pathology is the female Aedes aegypti gnat, whose intense proliferation results in seasonal explosive epidemics occurring every 4 to 5 years, associated with climatic fluctuations, in several regions of Brazil, in addition to the fact that in the last ten years, in addition to the high number of cases, the increase in the severity of the disease has been observed, and, consequently, hospitalizations. [3]

Dengue infection may be asymptomatic (without symptoms), and present mild symptoms, alarm signs, and severity. Usually, the first manifestation of dengue fever is a high fever (>38°C), of abrupt onset, which usually lasts from 2 to 7 days, accompanied d and headache, body and joint pain, as well as prostration, weakness, pain behind the eyes, and red spots on the skin. Rashes and itching of the skin may also occur. Thus, during the coronavirus pandemic, due to the initial symptomatology of the two diseases being similar, there was a convergence in the most likely hypothesis and in the vast majority of cases, the diagnosis of COVID-19 was given, due to its greater focus during the period. [5]

A study by Nacher et al. in 2020 in French Guiana showed that there was a reduction in the search for care in health networks, as well as in Brazil, both the fact that non-urgent cases are advised palliative treatment, as well as a growing popular fear about mass contamination and recommendation of the World Health Organization (WHO) to remain in social isolation. [4] In addition, due to the similar clinical picture, patients were tested a priori for SARS-Cov-2 and after deriving the sample, other causes would be investigated for confirmation of the clinical picture, resulting in delays in the diagnosis of Dengue cases. [4]

Through the explanation, the question is asked: Would the incidence of dengue in Brazil, after the COVID-19 pandemic, be an increase in the number of cases or a reduction in underreporting?

Therefore, there is a probable relationship between the absence of medical care in primary healthcare networks and a dubious misdiagnosis (dengue and Covid-19). This relationship denotes a possible hypothesis of underreporting to be studied by the methodological comparison of data from epidemiological bulletins for the years 2019 to 2022. [3]

The present research aimed to perform a descriptive analysis to establish a relationship between the numbers obtained according to the scientific literature through research and the underreporting analyzed,

in addition to seeking to understand how the pandemic of the Coronavirus influenced masking the notification of probable cases of dengue in Brazil. Thus, this study serves as a source of knowledge in the search, for current and future events, for prevention and health promotion, as well as inspire research aimed at increasing the effectiveness of dengue diagnoses, in addition to directing proper care from the correction of the numbers of notifications. Guaranteeing the principles of integrality, universality, and equity of the Unified Health System (SUS).

2 METHODOLOGY

A qualitative analytical documentary study on the behavior of dengue in Brazil from 2019 to 2022 was carried out through descriptive analysis. To this end, epidemiological bulletins released by the Ministry of Health and reports were used. The weeks chosen were the ones that, historically, presented the highest incidence of cases. In addition to the analysis of the numbers obtained in the epidemiological bulletins, we took into account articles produced during the COVID-19 pandemic that infer an increase in the number of underreporting of arboviruses, due to a reduction in the search for the care of the symptoms of the pathology in health networks. Among this research, the articles that contained the most information clearly and consistently about the disease were chosen, and the types of articles selected were expanded articles and epidemiological studies on dengue. The period of choice of articles was from the year 2019 to the year 2022.

Parallel with the study was also carried out a comparison test, for this was selected the last 4 years of dengue cases in Brazil, the data were taken from the site TABNET and DATASUS. The comparison of the tests in the last analyzed periods was performed both for the regions of Brazil (north, northeast, center-west, south, and southeast) and the 27 Brazilian states. With this, it was possible to analyze whether or not there was a change in the number of dengue cases in the range of 2019 to 2022 in Brazil.

3 FINDINGS

Table 1 – relationship between epidemiological week and year in the notification of dengue cases in Brazil.

EPIDEMIOLOGIC WEEK	2019	2020	2021	2022
11	42951	42762	16840	42554
15	76940	41132	26058	70278
19	100294	38320	21124	98842
24	47454	13598	12906	29841

Table 2 – relationship between epidemiological week and year in the notification of zika virus cases in Brazil.

EPIDEMIOLOGIC WEEK	2019	2020	2021	2022
11	749	704	313	266*
15	988	426	452	-
19	1212	765	602	-
24	981	510	591	-

Table 3 – relationship between epidemiological week and year in the notification of chikungunya cases in Brazil

Development and its applications in scientific knowledge
The incidence of Dengue fever in Brazil, post-pandemic COVID-19: Reduction in the number of cases or increase in underreporting? An integrative review

3

EPIDEMIOLOGIC WEEK	2019	2020	2021	2022
11	3163	2792	4160	4319
15	6492	1685	4229	5852
19	9410	3931	4253	6388
24	6099	3124	4929	6112

Table 4 - synthesis of the articles selected for the bibliographic review

Title	Author	Year	RESULT
Simultaneous dengue and COVID-19 epidemics: Difficult days ahead?	Mathieu Nacher; Maylis Douine.	2020	According to this modeling, the study was conducted by Natcher in a survey done in Guyana, which evaluated the impacts of social distancing on dengue epidemics. Reporting and proving the reduction of vector control (intradomiciliary or composite interventions), and drastic reduction of the maintenance of public spaces and potential breeding sites. Reductions that were drivers for the Aedes aegypti vector. However, the same distancing was of fundamental importance for the decrease of COVID-19 transmission among the population. Another preponderant factor for the increase of cases is the climatology of the region, which during the evaluated period of social distancing, a rainy season was perceived. Portant, the study suggested a preponderant relationship between the decrease in territorial population circulation in the country, climatological seasons, and the reduction of endemic disease policies – driven by the COVID-19 pandemic – to the increase in endemic disease cases.
Dengue and COVID-19, overlapping epidemics? An analysis from Colombia	James A. Cardona-Ospina; Kovy Arteaga-Livias	2020	In this article by Cardona-Ospina, a study was conducted in Colombia to analyze the trends of viral infections in the country during the 2020 E.S. comparing the infections of COVID-19 and Dengue cases. In addition to analyzing the possibility of coinfection and its consequences in undue discrimination by the similarities of signs and clinical findings.
Impacts on the epidemiological profile of **Dengue** amid the **COVID-19 Pandemic in Sergipe**	Crysvânia Santos Nascimento; João Paulo Siqueira Correia.	2021	According to the research conducted by Santos, the disruption caused in the global health system was preponderant in the state of Sergipe, evidencing a decrease in Dengue cases reported during the period of the COVID-19 Pandemic, the presentation of data on population fear in the search for medical help in the possible contamination of the new infectious agent.
Reduction of dengue incidence in Brazil in 2020: control or underreporting of COVID-19 cases?	Cicero dos Santos Leandro; Francisco Bernardo de Barros.	2020	In this study conducted by Santos. Comparing SE that historically had peaks of dengue notifications between years before the COVID-19 pandemic. Observing a possible movement of underreporting of Dengue cases during the year 2020.

Development and its applications in scientific knowledge
The incidence of Dengue fever in Brazil, post-pandemic COVID-19: Reduction in the number of cases or increase in underreporting? An integrative review
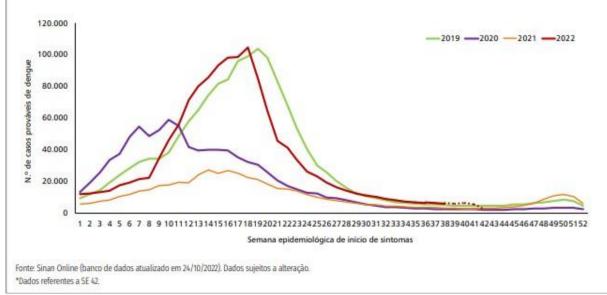
4

Figure 1: The epidemic curve of probable cases of dengue, by epidemiological weeks of symptom onset, Brazil, 2019 to 2022*

Source: Ministry of Health, 2022

4 DISCUSSION / DATA ANALYSIS

Table 1 shows that the years 2019 and 2022 showed a remarkable similarity concerning the number of reported cases of dengue. In Epidemiological Week (SE) 19, there were 100,294 cases reported in 2019 and 98,842 notifications in 2022. That is, among the years cited there was a variation of only 1.5%, which denotes a statistical linearity of the cases since the years cited were outside the pandemic period. Nevertheless, in the analysis of Table 1, it is possible to infer a significant numerical contiguity of cases between the years 2020 and 2021. In SE 19, there were 38,320 notifications of probable cases in the year 2020 and 21,124 cases in the year 2021. [6]

However, with an analysis of SE 11, it is noticed that there is a remarkable uniformity among the cases reported in the years 2019, 2020, and 2022: 42,951, 42,762, and 42,554, respectively. Presenting, then, variations of on average 0.46% justifying the similarity found. However, it is recognized that from March 2020, when actions against COVID-19 in the country were intensified, there was a substantial reduction in the number of notifications,

Thus, as of week 15, 41,132 were registered in the year 2020, and in the years 2019 and 2022, 76,940 and 70,278 reported cases. Demonstrating that, while the years 2019 and 2022 respected the trend of the cyclical behavior of arboviruses transmitted by Aedes aegypti of these weeks, however, 2020 bucked the epidemiological curve remaining below the pattern drawn compared to other years, as seen in Figure 1 the same occurred in the year 2021 which, in the same way, remained remarkably below common behavior. [19]

During the pandemic, COVID-19 prevention and prevention measures have been taken, including social distancing. According to the information note n° 08/2020, new recommendations were made for health professionals in primary care, making the work of the Agents to Combat Endemic Diseases more restricted, hindering an important way to combat the Aedes Aegypti vector, the transmitter of the disease.

Development and its applications in scientific knowledge
The incidence of Dengue fever in Brazil, post-pandemic COVID-19: Reduction in the number of cases or increase in underreporting? An integrative review

5

This measure may have had negative impacts on coping with arboviruses, since mosquitoes lay their eggs on the walls of containers filled with water in the house and the surroundings, thus being able to infer that more people would be infected by the dengue virus e. [4]

However, notifications have been reduced, which according to Natcher et al. (2020) can, inductively, sustain a significant weight increase in Dengue underreporting during the years 2020, and consequently 2021, the years most affected by the COVID-19 pandemic. Mainly due to the fear of the population seeking hospitals or

consulting health care workers for fear of attending places that the patient would possibly be exposed to being infected by the novel COVID-19. In addition to the patient's attempt to respect as much as possible the WHO recommendation No. 036, determined compliance with the lockdown. In this way, it would also reduce the risks of co-infection by diseases, a fact that would further overload the health system and generate a scarcity of resources.   [21]

Similar results were found by Cardona-Ospina et al. (2020), in a study in Colombia on the overlap of dengue and COVID-19. Noting a coincidental reduction in arbovirus cases, which were on an upward trend, as the country's public health attention turned to coping with the novel coronavirus, due to the alarming number of cases, public calamity, care failures, and urgent   Rising death tolls meant dengue had been neglected and soon underreported.

Because of the studies in Table 4, its compilation and analysis, it was seen that it was expected to maintain the numbers of notification of arboviruses among the current years, in Brazil, in the same way, as well as occurred in neighboring Latin American countries despite going through the moment of COVID-19 Pandemic. However, due to the pandemic period in the years 2020 and 2021, a decrease in the number of notifications of arboviruses has been demonstrated, to the detriment of the increase in the number of coronavirus cases. In this way, it generates an absence of linearity and patterns previously verified and fought.

5 CONCLUSION / FINAL CONSIDERATIONS

This study sought to bring, through the survey of numbers, epidemiological bulletins, and ideas contained in Latin American scientific articles, a succinct analysis of cold numbers and interpret them from opinions formed by other authors. It is hoped that this article, too, can serve as a bridge for the expansion and deepening of other new research. To better understand and promote reflection on the data presented here.

Considering the epidemiological performance of arboviruses in Brazil, in the hypothesis of an apparent decrease in the number of notifications in the years 2020 and 2021 in specific SE (11,15,19,24), we sought to understand the apparent motivation for this reduction. Thus, a more concrete evaluation made had the intention of producing an exhortation to the theme and assuming an increase in the number of underreporting during these years. Thus, better detail was obtained about the causes of the decrease in

Development and its applications in scientific knowledge
The incidence of Dengue fever in Brazil, post-pandemic COVID-19: Reduction in the number of cases
or increase in underreporting? An integrative review   6

notifications of   cases of arboviruses, a greater understanding of the impacts caused by the COVID-19 pandemic and its influence on actions to cope with another relevant disease that is dengue.

The exposition of this theme in addition to establishing the importance of protocols, especially in endemic areas, seeks to serve as a basis for future research and from these propose concrete changes so that notifications are effective and disease containment measures are more rigorous. Therefore, the fight against dengue requires a more refined look at the implementation of strategies and policies aimed at encouraging notification, awareness, and education of the population, hygiene sanitary, and elimination of breeding sites of the vector mosquito.

Development and its applications in scientific knowledge
The incidence of Dengue fever in Brazil, post-pandemic COVID-19: Reduction in the number of cases or increase in underreporting? An integrative review

7

REFERENCES

RODRIGUES LISBOA, T.; BATISTA MEDEIROS SERAFIM, I. .; CAROLINE MEDEIROS SERAFIM, J.; CAMPANHA RAMOS, A. .; MONTEIRO DO NASCIMENTO, R.; NUNES BANDEIRA RONER, M. Relação entre incidência de casos de arboviroses e a pandemia da COVID-19. Revista Interdisciplinar de Ciência Aplicada, [S. l.], v. 6, n. 10, p. 31– 36, 2022. DOI: 10.18226/25253824.v6.n10.04. Disponível em: https://sou.ucs.br/revistas/index.php/ricaucs/article/view/103. Acesso em: 7 set. 2022.

SOUSA, P. M. L. de .; CARTAXO, H. B. .; COELHO, C. I. H. M. .; GALVÃO, J. G. F. . .; BRITO, S. A. . Impactos do perfil epidemiológico da dengue durante a pandemia da COVID– 19. E-Acadêmica, [S. l.], v. 3, n. 2, p. e3332198, 2022. DOI: 10.52076/eacad-v3i2.198. Disponível em: https://eacademica.org/eacademica/article/view/198. Acesso em: 8 set. 2022.

NASCIMENTO, C. S.; CORREIA, J. P. S.; TEMÓTEO, C. C. S.; CAMPOS, A. L. B. Impacts on the epidemiological profile of Dengue amid the COVID-19 Pandemic in Sergipe . Research, Society and Development, [S. l.], v. 10, n. 5, p. e3610514544, 2021. DOI: 10.33448/rsd- v10i5.14544. Disponível em: https://rsdjournal.org/index.php/rsd/article/view/14544. Acesso em: 7 sep. 2022.

Nacher, M., et al. (2020). Simultaneous dengue and COVID 19 epidemics: Difficult days ahead? PLOS Neglected Tropical Diseases.

LEANDRO, C. dos S.; BARROS, F. B. de; CÂNDIDO, E. L.; AZEVEDO, F. R. de. Reduction of dengue incidence in Brazil in 2020: control or sub notification of cases due to COVID-19?. Research, Society and Development, [S. l.], v. 9, n. 11, p. e76891110442, 2020. DOI: 10.33448/rsd-v9i11.10442. Disponível em: https://rsdjournal.org/index.php/rsd/article/view/10442. Acesso em: 7 sep. 2022.

Boletim Epidemiológico Vol. 51 No 11 — Português (Brasil) [Internet]. www.gov.br. [cited 2022 Sep 30]. Available from: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/edicoes/2020/boletim-epidemiologico-vol-51- no-11.pdf/view

Boletim Epidemiológico Vol. 51 No 12 — Português (Brasil) [Internet]. www.gov.br. [cited 2022 Sep 30]. Available from: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/edicoes/2020/boletim-epidemiologico-vol-51- no-12.pdf/view

Boletim Epidemiólogico Vol. 51 No 16 — Português (Brasil) [Internet]. www.gov.br. [cited 2022 Sep 30]. Available from: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/edicoes/2020/boletim-epidemiologico-svs- 16.pdf/view

Boletim Epidemiológico Vol. 52 - No 11 — Português (Brasil) [Internet]. www.gov.br. [cited 2022 Sep 30]. Available from: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/edicoes/2021/boletim_epidemiologico_svs_1 1.pdf/view

Boletim Epidemiológico Vol. 52 - No 12 — Português (Brasil) [Internet]. www.gov.br. [cited 2022 Sep 30]. Available from: https://www.gov.br/saude/pt-br/centrais-de-

conteudo/publicacoes/boletins/epidemiologicos/edicoes/2021/boletim_epidemiologico_svs_1 2.pdf/view

Boletim Epidemiológico Vol. 52 - No 14 — Português (Brasil) [Internet]. www.gov.br. [cited 2022 Sep 30]. Available from: https://www.gov.br/saude/pt-br/centrais-de-

Development and its applications in scientific knowledge
The incidence of Dengue fever in Brazil, post-pandemic COVID-19: Reduction in the number of cases or increase in underreporting? An integrative review

8

conteudo/publicacoes/boletins/epidemiologicos/edicoes/2021/boletim_epidemiologico_svs_1 4_atualizado.pdf/view

Boletim Epidemiológico Vol. 52 - No   18 — Português (Brasil) [Internet]. www.gov.br. [cited 2022 Sep   30]. Available   from: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/edicoes/2021/boletim_epidemiologico_svs_1 8.pdf/view

Boletim Epidemiológico Vol. 52 - No   21 — Português (Brasil) [Internet]. www.gov.br. [cited 2022 Sep   30]. Available   from: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/edicoes/2021/boletim_epidemiologico_svs_2 1.pdf/view

Boletim Epidemiológico Vol.53 No11 — Português (Brasil) [Internet]. www.gov.br. Available from: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/edicoes/2022/boletim-epidemiologico-vol-53-no11.pdf/view

Boletim Epidemiológico Vol.53 No12 — Português (Brasil) [Internet]. www.gov.br. [cited 2022 Sep 30]. Available from: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/edicoes/2022/boletim-epidemiologico-vol-53-no12.pdf/view

Boletim Epidemiológico Vol.53 No14 — Português (Brasil) [Internet]. www.gov.br. [cited 2022 Sep   30]. Available   from: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/edicoes/2022/boletim_epidemiologico_svs_1 4.pdf/view

Boletim Epidemiológico Vol.53 No18 — Português (Brasil) [Internet]. www.gov.br. [cited 2022 Sep   30]. Available   from: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/edicoes/2022/boletim-epidemiologico-vol-53- no18/view

Boletim Epidemiológico Vol.53 No21 — Português (Brasil) [Internet]. www.gov.br. [cited 2022 Sep 30]. Available from: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/edicoes/2022/boletim-epidemiologico-vol-53- no21/view

CONASS. (2020). Conselho Nacional de Secretarias de Saúde. Painel CONASS COVID-19. Recuperado de https://www.conass.org.br/painelconasscovid19/

Cardona-Ospina JA, Arteaga-Livias K, Villamil-Gómez WE, Pérez-Díaz CE, Katterine Bonilla-Aldana D, Mondragon-Cardona Á, et al. Dengue and COVID-19, overlapping epidemics? An analysis from Colombia. Journal of Medical Virology. 2020 Jul 11;93(1):522– 7.

Anjos L dos. RECOMENDAÇÃO No 036, DE 11 DE MAIO DE 2020 [Internet]. Conselho Nacional de Saúde. Available from: https://conselho.saude.gov.br/recomendacoes-cns/1163- recomendac-a-o-n-036-de-11-de-maio-de-2020

Nunes JB, Santos LRD dos, Neto DA, Sousa MA de, Pereira C de S, Silva JBLG da, et al. COVID-19 e dengue: ocorrência síncrona, em cidade endêmica, no sul da Bahia: COVID-19 and dengue: synchronous occurrence in an endemic city in southern Bahia. Brazilian Journal of Health Review [Internet]. 2022 Nov 30 [cited 2023 Jan 16];5(6):23215–38. Available from: https://ojs.brazilianjournals.com.br/ojs/index.php/BJHR/article/view/54784

Development and its applications in scientific knowledge
The incidence of Dengue fever in Brazil, post-pandemic COVID-19: Reduction in the number of cases or increase in underreporting? An integrative review

9