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Clinical and epidemiological profile of dengue in a municipality in southwest Paraná

Perfil clínico e epidemiológico da dengue em um município do Sudoeste do Paraná

Perfil clínico y epidemiológico del dengue en un municipio del suroeste de Paraná

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ABSTRACT

Objective: To analyze the clinical and epidemiological profile of dengue in a municipality in Southwestern Paraná, using data from the National System of Notifiable Diseases. **Methodology:** This is a descriptive and exploratory study with a quantitative, cross-sectional, and retrospective approach conducted in a municipality in Southwestern Paraná throughout the year 2024, based on data from the National System of Notifiable Diseases, totaling 21.944 cases. **Results:** The study showed that, in the analyzed municipality, reported dengue cases occurred predominantly among men, adults, white individuals, economically active persons, and residents of urban areas, presenting classic dengue symptoms, with a low hospitalization rate and a high recovery rate, reflecting a typical pattern of classic dengue. **Conclusion:** The results contribute to understanding the dynamics of dengue in the municipality, providing valuable information for public policies and epidemiological surveillance practices across the region.

DESCRIPTORS:

Epidemiology; Public Health; Nursing; Morbidity and Mortality Indicator; Risk Factors.

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RESUMO

Objetivo: Analisar o perfil clínico e epidemiológico da dengue em um município do Sudoeste do Paraná, utilizando dados do Sistema de Informação de Agravos de Notificação. **Metodologia:** Trata-se de um estudo descritivo e exploratório, com abordagem quantitativa, transversal e retrospectiva em um município do Sudoeste do Paraná ao longo do ano de 2024, com base no Sistema Nacional de Agravos e Notificação, totalizando 21.944 casos. **Resultados:** O estudo evidenciou que, no município analisado, os casos notificados de dengue ocorreram predominantemente em homens, adultos, brancos, economicamente ativos, residentes em áreas urbanas, apresentando sintomas clássicos da dengue, com baixa taxa de hospitalização e alta taxa de cura, refletindo um padrão típico da dengue clássica. **Conclusão:** Os resultados contribuirão para a compreensão da dinâmica da dengue no município, fornecendo informações valiosas para políticas públicas e práticas de vigilância epidemiológica em toda a região.

DESCRITORES:

Epidemiologia; Saúde Pública; Enfermagem; Indicador de Morbimortalidade; Fatores de Risco.

RESUMEN

Objetivo: Analizar el perfil clínico y epidemiológico del dengue en un municipio del Sudoeste de Paraná, utilizando datos del Sistema Nacional de Notificación de Enfermedades. **Metodología:** Se trata de un estudio descriptivo y exploratorio, con enfoque cuantitativo, transversal y retrospectivo, realizado en un municipio del Sudoeste de Paraná durante el año 2024, basado en datos del Sistema Nacional de Notificación de Enfermedades, con un total de 21.944 casos. **Resultados:** El estudio evidenció que, en el municipio analizado, los casos notificados de dengue ocurrieron predominantemente en hombres, adultos, personas blancas, económicamente activas y residentes en áreas urbanas, que presentaron síntomas clásicos de dengue, con baja tasa de hospitalización y alta tasa de curación, reflejando un patrón típico del dengue clásico. **Conclusión:** Los resultados contribuirán a la comprensión de la dinámica del dengue en el municipio, proporcionando información valiosa para las políticas públicas y las prácticas de vigilancia epidemiológica en toda la región.

DESCRIPTORES:

Epidemiología; Salud Pública; Enfermería; Indicador de Morbimortalidad; Factores de Riesgo.

INTRODUCTION

Dengue is an infectious disease of tropical climate, caused by an arbovirus of the family Flaviviridae, genus *Flavivirus*. The responsible for this disease is the dengue virus, identified as DENV, and its spread occurs through the bite of mosquitoes of the genus *Aedes*. This disease presents a wide range of clinical manifestations, ranging from asymptomatic cases to critical situations that can lead to death. In addition, elements such as climate and environmental factors play an important role in the genesis, multiplication and spread of dengue[1].

Constituted as an arbovirus, dengue poses a pressing challenge to global public health, with marked prevalence in tropical and subtropical climate regions. Its expansion dynamics, driven by urbanization, the increase in population mobility and climate change, demands an in-depth analysis and

effective intervention strategies[2].

In Brazil, dengue has become a serious challenge for public health, with an increase of 195.9% in the cases registered in 2022 compared to the same period of the previous year[3]. Climate change, accelerated urbanization and the change in the behavior of *Aedes aegypti* contributed to the spread of dengue cases throughout the country, making Santa Catarina the second state with the highest number of deaths in the first half of 2022. In addition, it is a compulsory notification disease, and even suspected cases must be reported to the Information System on Notifiable Diseases (SINAN)[4].

In the Brazilian context, this disease assumes an endemic character, manifesting seasonally that exert considerable pressure on the health system and impacts the quality of life of the population, since the clinical complexity of the disease ranges from asymptomatic to severe manifestations, as hemorrhagic fever and dengue shock syndrome, conditions that can culminate in death[5].

An epidemiological study carried out in a city in the southwest of Paraná shows alarming data related to the incidence of the disease. After analyzing 20,945 notifications, it was evidenced that the majority of cases affect adult (60.6%), white individuals (66%), with predominance of women (53.2%) revealing higher incidence in urban areas (88.9%), being the most common symptoms: fever (73.1%), myalgia (73.1%) and headache (72%)[6].

In this scenario, local epidemiological investigations reinforce a pattern identified in this research, with prevalence of cases in neighborhoods with inadequate sanitation and alleged lower schooling among their residents, since the information on education is ignored in most cases, and may infer a greater lack of knowledge about such an injury, also justifying the higher number of notifications over the years.

Therefore, the relevance of epidemiological studies that characterize the profile of dengue in different geographical contexts becomes evident, offering subsidies for the formulation of more assertive prevention and control actions. Thus, the present research proposes to answer the following question: What is the clinical and epidemiological profile of dengue in southwest Paraná?

OBJECTIVE

To analyze the clinical and epidemiological profile of dengue in a municipality in southwest Paraná, using data from the Notifiable Diseases Information System.

METHODOLOGY

Design

This is a descriptive and exploratory study, with quantitative approach, cross-sectional and retrospective, whose objective is to characterize the dengue cases in a municipality of southwest Paraná throughout the year 2024.

Study site and period

The research was carried out based on dengue cases reported by the Municipal Health Department of the municipality of Francisco Beltrão in 2024, located in the Southwest region of the state of Paraná, which according to data from the Brazilian Institute of Geography and Statistics (IBGE), had an estimated population of 96,666 inhabitants and has a humid subtropical climate, characterized by cooler winters and warmer summers.

Sample

The sample of this study was made up of all dengue notification forms present in the National System of Notifiable Diseases (SINAN), in the area covered by the Municipal Health Department in 2024. Notifications prior to 2024 and those occurring in 2025 were excluded from the research, and, including all records of notifications during the study year, totaling 21,944 notifications.

Data collection

Data collection occurred using a structured form with closed questions, based on the SINAN dengue notification form, where the following sociodemographic variables were analyzed: (age, sex, education, race, marital status, occupation, if pregnant: trimester of pregnancy and date of first symptoms), clinical data (pre-existing diseases, probable site of infection, clinical signs and whether there was hospitalization); and laboratory data (serology, clinical presentation, diagnostic criteria, serotype classification and case evolution).

Data collection took place during the month of April 2024, considering the dengue notification sheets recorded in the municipality of origin, fed by the municipal epidemiological surveillance department.

Statistical analysis

The results were tabulated in the Microsoft Excel Program (2010) and subsequently analyzed through the Statistical Package for the Social Sciences (SPSS) version 25.0. Descriptive statistics were used to characterize the sample and distribution of frequencies of the different variables analyzed, presenting all data as tables.

Ethical aspects

The said study was submitted previously to the evaluation of the Ethics Committee, under approval of the opinion 7.448.931 and CAAE 86809225.0.0000.0109, respecting the ethical and legal aspects, maintaining secrecy about the information, following the recommendations according to Resolution 466/2012.

RESULTS

The sociodemographic analysis of dengue cases reported in 2024 in the studied municipality revealed an expressive predominance of records in the first quarter of the year, concentrating 87.4% of the cases. With regard to the reporting unit, the Emergency Care Unit (UPA) (40.9%) and in relation to age, adults aged between 19 and 60 years corresponded to the majority of cases (56.6%).

The gender distribution was very balanced, with 51.8% of cases in males and 48.1% in women, while the rate of affected pregnant women was reduced (0.8%). In relation to race/color, a significant portion of the cases was observed in white individuals (76.1%), and as for the variable schooling it was observed that 84.1% of the notifications were marked as "not informed", which prevents detailed analysis on the connection between the level of education and susceptibility to dengue.

In geographical terms, the neighborhoods that presented the highest frequency were Padre Ulrico (10.2%), Pinheirão (6.7%) and São Miguel (6%), with the urban area responsible for 88.4% of notifications (Table 1).

Table 1. Sociodemographic profile of dengue cases in Francisco Beltrão, Southwest Paraná, 2024.

Variable	N	%
Notification Quarter	-	-
1st Quarter	19,180	87.4
2nd Quarter	2,344	10.6
3rd Quarter	206	0.9
4th Quarter	210	0.9
Notifying unit	-	-
FHS São Miguel	659	3.0
FHS Padre Ulrico	743	3.3
São Vicente de Paula Polyclinic	1,327	6.0
FHS Cristo Rei	575	2.6
FHS Pinheirão	568	2.5
UPA 24h	8,994	40.9
Health Center	3,289	14.9
Others (61 units)	5,788	26.3
Age Group	-	-
Under 1 year old	53	0.2
Child (1 - 12 years old)	4,399	20.0
Adolescent (13 - 18 years old)	2,026	9.2
Adult (19 - 60 years old)	12,428	56.0
Senior (Above 60 years old)	3,037	13.8
	-	-

Sex		
Male	11,382	51.8
Female	10,556	48.1
Ignored	5	0.0
Pregnant Woman	-	-
Yes	175	0.8
No	9,406	42.8
Not applicable	12,114	55.2
Ignored	248	1.1
Race	-	-
White	16,705	76.1
Black	61	0.2
Yellow	28	0.1
Brown	863	3.9
Indigenous	52	0.2
Ignored	4,234	19.3
Education	-	-
Illiterate	12	0.0
Incomplete Elem. School	235	1.0
Complete Elem. School	90	0.4
Incomplete High School	115	0.5
Complete High School	261	1.1
Incomplete College	36	0.1
Complete College	150	0.6
Ignored	18,462	84.1
Not applicable	2,582	11.7
Neighborhood	-	-
Cristo Rei	1,170	5.3
São Miguel	1,337	6.0
Padre Ulrico	2,258	10.2
Pinheirinho	1,021	4.6
Sadia	915	4.1
Pinheirão	1,482	6.7
Ignored	2,137	9.7
Others (38 neighborhoods)	11,620	52.9
Residence Zone	-	-
Urban	19,405	88.4
Rural	1,199	5.4
Periurban	6	0.0
Ignored	1,333	6.0

FHS: Family Health Strategy
UPA: Emergency Care Unit (*Unidade de Pronto Atendimento*).
Source: Information System on Notifiable Diseases-SINAN (2024).

Clinical data show that the classical dengue symptoms were widely present in the affected population: fever (85.3%), myalgia (82.5%) and headache (80.7%). In relation to the history of previous health conditions, hypertension was prevalent (7.5%), followed by diabetes (2.6%). Autoimmune diseases, liver problems and chronic renal diseases presented prevalence below 1% (Table 2).

Table 2. Symptomatic presentation and past medical history of dengue cases in Francisco Beltrão, Southwest Paraná, 2024

Variable	N	%
Symptoms	-	-
Fever	18,727	85.3
Myalgia	18,114	82.5
Headache	17,710	80.7
Rash	2,027	9.2
Vomiting	6,126	27.9
Nausea	11,909	54.2
Lower back pain	9,172	41.8
Arthritis	4,054	18.4
Arthralgia	5,378	24.5
Petechiae	861	3.9
Retro-orbital pain	8,710	39.6
Past disease history	-	-
Diabetes	582	2.6
Hematological Diseases	73	0.3
Liver Diseases	98	0.4
Chronic Kidney Disease	98	0.4
Hypertension	1,652	7.5
Acid Peptic Disease	69	0.3
Autoimmune Diseases	122	0.5

Source: Information System on Notifiable Diseases - SINAN (2024).

The laboratory data reveal a low rate of IgM serology, with 90.8% of cases without test performed, which points to a high dependence on the clinical-epidemiological criterion (38.1%) for confirmation of cases. Still, 61.8% of the cases were confirmed by laboratory criteria, which may include rapid tests, whose positivity index was 46.7%.

The serotype identified was DENV-1 (0.4%), while DENV-2 appeared in only 3 cases. However, 99.5% of the records did not present serotype identification, compromising viral surveillance and understanding of circulation of different strains. Regarding the severity of cases, only 0.9% of patients required hospitalization. The absolute majority of cases were classified as classical dengue (79.2%), while the clinical evolution was highly positive, with 99.8% of patients progressing to cure, and a low lethality rate (0.1%), with 27 deaths directly attributed to the disease (Table 3).

Table 3. Diagnosis, classification and outcome of dengue cases in Francisco Beltrão, Southwest Paraná, 2024

Variable	N	%
Serology (IgM)	-	-
Reactive	412	1.8
Non-reactive	402	1.8
Inconclusive	16	0.0
Not performed	19,939	90.8
Ignored	1,174	5.3
Rapid test	-	-
Positive	10,258	46.7
Negative	4,681	21.3
Inconclusive	9	0.0
Not performed	6,813	31.0
Ignored	182	0.8
Serotype	-	-
DENV 1	94	0.4
DENV 2	3	0.0
Ignored	21,846	99.5
Hospitalization	-	-
Yes	216	0.9
No	21,161	96.4
Ignored	566	2.5
Autochthonous Cases	-	-
Yes	17,339	79.0
No	93	0.4
Ignored	4511	20.5
Classification	-	-
Discarded	4,509	20.5
Dengue	17,390	79.2
Dengue with warning signs	20	0.0
Severe dengue	24	0.1
Confirmation criteria	-	-
Laboratory	13,569	61.8
Clinical epidemiological	8,373	38.1
Ignored	1	0.0
Evolution	-	-
Cure	21,902	99.8
Death due to the disease	27	0.1
Death due to other causes	11	0.0
Ignored	3	0.0

Source: Information System on Notifiable Diseases - SINAN (2024).

DISCUSSION

The concentration of 87.4% of dengue cases in the first quarter of 2024 reflects the seasonal pattern of the disease in the southern and southeastern regions of Brazil, where the hottest and rainiest months, January, February and March, favor mosquito proliferation. A national study[7] that analyzed data from 2015 to 2024, identified that more than 70% of dengue cases occurred between January and May,

with a concentration of up to 45% only in the first three months of 2024, which shows the direct influence of climatic conditions on the seasonality of the disease.

When analyzing the reporting unit of the municipality, the data indicate that the 24h UPA (40.9%) and the Health Center (14.9%) were the main reporting units, revealing a strong pattern of centralization of notifications in emergency services and immediate moving away from the ideal of primary surveillance.

This phenomenon is also observed in other scenarios. In 2024, the UPAS of the Federal District recorded an increase of almost 300% in dengue care, where the number of hospitalized patients also increased significantly, jumping from 2% to 7% of suspected cases[8]. This scenario suggests overload of medium complexity units and reinforces the secondary role that has been occupied by FHS in the front line of the fight against disease.

The Pan American Health Organization (PAHO) reinforces that Primary Health Care (PHC) should be the main mediator in response to dengue, being responsible for prevention actions, community orientation and notification[9]. However, in the evaluated scenario, the low proportion of notifications made by FHS may indicate weaknesses in the integration between PHC services and the epidemiological surveillance system, which compromises the effectiveness of vector control and the tracking of outbreaks and epidemics.

A case study[10] conducted at UPA Jaçanã, in São Paulo, highlighted the importance of creating internal surveillance centers in emergency and emergency units, which are crucial for improving quality and agility in notification, especially during periods of high seasonality, as in the outbreak of 2024.

In addition, a retrospective analysis[11] of dengue notifications in Brazil between 2019 and 2023 showed that, although the number of registrations increased, there were inconsistencies in the completion of variables related to the reporting unit, with frequent use of the "ignored" category. This gap makes it difficult to evaluate the performance of different levels of care in coping with the disease.

Concerning the age group, the most affected was adults between 19 and 60 years old, with 56.6% of cases. This profile corroborates with a national study[10] carried out between 2018 and 2024, which evidenced higher incidence of dengue in the age group from 20 to 39 years, followed by the population from 40 to 59 years, indicating that the economically active population has greater vulnerability to the disease, presumably due to increased exposure to outdoor environments and lower adherence to preventive measures, such as the use of repellents.

The gender distribution is balanced, with a slight incidence among men (51.8%). A study carried out in the years 2017 to 2024 showed that in the South the female sex was the most affected (54.3%). Despite the low rate of affected pregnant women (0.8%), this data requires attention because pregnancy is considered a risk factor for severe dengue. A study[12] observed that dengue infection during pregnancy is strongly associated with unfavorable maternal and neonatal outcomes, such as bleeding, premature

birth, intrauterine growth restriction, stillbirths and severe neonatal infection due to vertical transmission of the virus.

Regarding the race/color variable, this research indicated that 76.1% of the records belong to white individuals, a number compatible with the population composition of southwest Paraná. However, 19.3% of the cases were without recorded information, which compromises the analysis of possible racial inequalities. A similar result was identified in a survey[13] that highlighted the lack of completion of the race/color field in most notifications, making it difficult to analyze the racial impacts of dengue at the national level.

Education data are compromised due to a serious underreporting problem, with 84.1% of the records marked as "not informed", which makes it impossible to establish relationships between educational level and risk of contracting the disease. The completion of the education variable in dengue notification forms was considered unsatisfactory in several capitals of the Northeast and Southeast regions of Brazil, being less than 30% in eight of them[14].

The neighborhoods with the highest incidence of dengue in Francisco Beltrão in 2024 were Padre Ulrico (10.2%), Pinheirão (6.7%) and São Miguel (6.0%), which reflects a pattern of high urban density and socioeconomic and socio-environmental vulnerability. Approximate data were identified in a study6 carried out in the same municipality in 2023, indicating greater vulnerability for the neighborhood of Padre Ulrico, which obtained a result similar to this analysis (10.1%). This profile is similar to those found in large Brazilian urban centers, where the high incidence of dengue fever is associated with areas with low social development index, as demonstrated by studies in Rio de Janeiro[15].

In relation to the place of residence, 88.4% of the cases occurred in the urban area. This confirms the urban nature of the disease, since *Aedes aegypti* reproduces in environments with stagnant water, common in areas with inadequate sanitation and accumulation of waste. The research[16] that corroborates this finding points out that the accelerated and disorganized urbanization, added to the absence of basic sanitation and inadequate garbage collection, creates favorable conditions for the proliferation of the vector in urban regions with high population density.

Regarding the clinical evolution of the disease, most dengue cases are mild, often with asymptomatic infections or discrete symptoms. Among the most frequent clinical signs are high fever (around 40 °C), headache, muscle, joint and retro-orbital pain, nausea, vomiting, skin rash and enlarged lymph nodes. When the disease progresses to more severe forms, it is common the appearance of intense abdominal pain, persistent vomiting, dyspnea, bleeding gums or nose, presence of blood in vomiting or stool, as well as signs of shock such as restlessness, skin paleness, cold extremities, excessive thirst and prostration[17].

Overall, the clinical and symptomatological picture of patients showed a high incidence of classical dengue symptoms: fever (85.3%), myalgia (82.5%) and headache (80.7%), as well as nausea (54.2%), lumbago (41.8%) and retro-orbital pain (39.6%), corroborating a study conducted in the municipality of Francisco Beltrão whose data are similar. Such prevalent symptomatology can be explained by considering a typical clinical pattern of classical dengue, which causes a common systemic inflammatory response, as well as the circulation of similar serotypes and similar environmental conditions in the Southwest region of Paraná[6].

Concerning comorbidities, hypertension was present in 7.5% of the cases and diabetes in 2.6%. Similarly, a research[18] conducted in 2023 in Brazil highlights arterial hypertension as one of the most prevalent comorbidities among patients with severe dengue, and highlights diabetes as an important risk factor for complications and the need for hospital admissions, suggesting that chronic conditions favor endothelial dysfunctions and inflammatory processes, which may aggravate the course of the disease.

When analyzing the laboratory data, it is highlighted that IgM serology was not performed in 90.8% of cases, showing dependence on clinical epidemiological criteria for confirmation. The absence of serotype identification in the records prevents the evaluation of the risk of epidemics by different strains. Only 0.4% of the cases were identified as DENV-1 and 3 cases as DENV-2. This scenario compromises the monitoring of viral circulation, which is essential to predict outbreaks and epidemics, as well as to adapt the response of the health system.

These results corroborate those identified in data obtained from a research[19] in Rio Grande do Sul between 2019 and 2024, which pointed out that most of the confirmed cases did not have the serotype identified, despite the predominance of DENV-1. Although serological tests such as IgM and ELISA are widely used, the performance of RT-PCR (essential for viral typing) still face limitations because it requires specialized laboratory structure. This reality demonstrates the fragility of laboratory surveillance systems that is repeated in different regions, limiting the capacity of the health system to act preventively against dengue virus variants.

The hospitalization rate in the municipality of Francisco Beltrão was only 0.9% among reported dengue cases in 2024, considerably lower than the national average recorded in the same year. Epidemiological data show that, between January and June 2024, Brazil recorded 129,127 hospitalizations due to dengue fever, representing about 2.5% of the total cases in the period[20]. A study[21] on the Brazilian epidemiological situation shows that this increase in hospitalizations is associated with the simultaneous circulation of multiple serotypes and the delay in identifying cases with warning signs.

In relation to the origin of the cases, about 79% of the notifications were considered autochthonous, that is, with transmission occurred within the municipality itself. This percentage is

consistent with the nationally observed pattern, in which sustained local transmission has been fueled by the presence of urban breeding sites and simultaneous circulation of serotypes DENV-1, DENV-2 and DENV-3[21]. This scenario reinforces the need to intensify entomological surveillance and vector control actions, especially in periods of high seasonality. As highlighted by the research[22] carried out in Brazil, the increase of autochthonous cases may be directly related to the lack of urban infrastructure, basic sanitation deficiency and the accumulation of solid waste in cities.

The final classification of cases in the municipality showed prevalence of dengue without alarm signs (79.2%), followed by discarded cases (20.5%), and a minimum proportion of severe cases or with alarm signs. This profile contrasts with the national outlook in 2024, which recorded more than 80,000 cases with warning signs and 6,791 serious cases19. Finally, it should be noted that the lack of local records of severe forms may indicate underdiagnosis or failures in notification flows, since hospitalized patients may have been erroneously classified as mild cases[23].

Study Limitations

This study has some limitations that should be considered. Since it is a descriptive study, it is not possible to establish cause and effect relationships between the analyzed variables. In addition, some data are not representative because they present a response linked to the term "ignored", such as the education variable, which makes it impossible to establish relationships between educational level and risk of contracting the disease.

Finally, since the data used came from secondary records, there may still be inconsistencies, underreporting or incomplete information, inferring on the presentation of results.

Contributions to the Fields of Nursing, Health, or Public Policy

This study will contribute to a better understanding of the clinical and epidemiological profile of dengue in a municipality in southwest Paraná, allowing the identification of incidence patterns, most affected population groups and factors associated with the increase in cases in 2024.

These data may assist managers and health professionals in the implementation of more effective strategies for prevention, vector control and clinical management of the disease, as other studies have contributed so far. Moreover, the research can serve as a basis for future health education actions, promoting greater awareness of the population about preventive measures and reducing the impact of dengue in the region, besides provoking reflections and new studies on the subject.

CONCLUSION

The present study identified a profile composed of men, adults, white, economically active, residents in urban areas, with classic dengue symptoms, low hospitalization rate and high cure rate, reflecting a typical pattern of classical dengue. The epidemiological panorama showed the urgency of an

integrated and effective response, which includes constant monitoring, clear prevention strategies. In addition, considering that the "ignored" fields restrict the analysis, it is important to invest in the training of health professionals, to improve the completeness of the information on the research forms.

Also considering the current health emergency in Brazil due to the increase of dengue cases, the information examined highlights the relevance of specific preventive actions aimed at the eradication of breeding sites of the mosquito *Aedes aegypti* and the intensification of educational campaigns, especially in relation to the most vulnerable communities. Furthermore, it is essential to strengthen the health network, stimulate new research on the subject and provoke reflections to the population so as to make them aware of their role in combating dengue.

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