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Short article

Social representations of dengue among schoolchildren in the Colombian Caribbean region, 2023: A descriptive study

Representaciones sociales del dengue en escolares de la región Caribe colombiana, 2023: Un estudio descriptivo

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ABSTRACT

Introduction: Dengue is an arboviral disease transmitted by the *Aedes aegypti* mosquito, which is common in urban areas of the Colombian Caribbean region. Effective control depends on social, environmental, and educational factors. **Objective**: To examine the social representations (SR) associated with dengue among students from an educational institution in the Colombian Caribbean region. **Method**: A descriptive study was conducted with seventh-grade students from an educational institution in Barranquilla. Semi-structured surveys containing 17 questions (14 closed/3 open-ended) assessed students' SR regarding dengue. **Results**: Sixty students participated in the study; 83.33% of students reported never having had dengue, but all identified *A. aegypti* as the vector. Some misconceptions about transmission and prevention persisted. The most frequently reported conditions were uncontrolled water storage (30%) and stagnant water near homes (36.67%). **Conclusions**: Students' knowledge of dengue was fragmented, highlighting the need for ongoing educational efforts to improve understanding in this population.

Keywords: Colombian Caribbean region; Atlántico department; Dengue; Mosquitoes; Social representations.

RESUMEN

Introducción: el dengue es una arbovirosis transmitida por *Aedes aegypti*, frecuente en áreas urbanas del Caribe colombiano. Su control efectivo depende de factores sociales, ambientales y educativos. **Objetivo:** examinar las representaciones sociales (RS) asociadas al dengue en estudiantes de una institución educativa del Caribe colombiano. **Método:** estudio descriptivo con estudiantes de séptimo grado de una institución educativa en Barranquilla. Se aplicaron encuestas semiestructuradas con 17 preguntas (14 cerradas/tres abiertas) para evaluar las RS de los estudiantes sobre dengue. **Resultados:** un total de 60 estudiantes participaron en el estudio; el 83,33% reportó no haber tenido dengue, todos identificaron a *A. aegypti* como vector. Persistieron errores conceptuales sobre transmisión y prevención. Las condiciones más mencionadas fueron almacenamiento inadecuado de agua (30%) y agua estancada cerca de viviendas (36,67%). **Conclusiones:** el conocimiento estudiantil sobre el dengue fue fragmentado, destacando la necesidad de continuar las acciones educativas para mejorar la comprensión en esta población.

Palabras clave: región Caribe colombiana; departamento del Atlántico; dengue; mosquitos; representación social.

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INTRODUCTION

Dengue is a major global public health challenge with significant epidemiological, economic, and social consequences.[1,2] Over the past two decades, reported dengue cases have surged from 505,430 in 2000 to more than 5.2 million in 2019, making the disease endemic in more than 100 countries, particularly in the Americas, Southeast Asia, and the Western Pacific.[3] The *Aedes aegypti* (Diptera: Culicidae) mosquito transmits the infection,[4] which thrives in urban environments and breeds in stagnant water.[5] Social, demographic, and environmental factors, such as poor housing quality, unplanned urbanization, climate change, and low educational levels, promote the spread and proliferation of *A. aegypti*.[6,7]

In Colombia, the Integrated Management Strategy for the Prevention and Control of Dengue (*Estrategia de Gestión Integrada para la Prevención y Control del Dengue*) was implemented to reduce morbidity and mortality via epidemiological surveillance, early diagnosis, comprehensive care, case management, vector control, community education, and prevention. As there is currently no widely effective dengue vaccine, control strategies primarily focus on prevention and community participation.[8-12]

Traditional control efforts, such as fumigation and mass campaigns, often fail to achieve lasting behavioral change, limiting their impact. It is therefore crucial to analyze the social representations, shared beliefs, and practices that shape populations' perceptions of dengue to guide more effective interventions.[13,14] In educational contexts, these representations influence how students understand and act upon information about dengue.

From a constructivist perspective, individuals learn through interacting with their environment, thereby transform it.[15] Students are a strategic population in this regard, as their receptiveness to knowledge and ability to reproduce it in school and at home facilitate the internalisation of scientific understanding and the development of social representations (SR) that are more consistent with reality. These characteristics mean they are well-placed to promote sustainable preventive practices against dengue.[16]

This study examines the SR associated with dengue among seventh-grade students in Barranquilla, Colombia, in the Caribbean region.

METHOD

Study design and sample

A descriptive study with a mixed-methods approach was conducted in 2023 at an educational institution in Barranquilla. The educational institution has 890 students enrolled. The sample consisted of 60 seventh-grade students from classes 7C and 7D. They were selected using a non-probability sampling strategy based on accessibility, pedagogical feasibility and relevance to their age group. These groups were chosen because they had the same science teacher supporting the intervention and because participation could be integrated into regular school activities without disrupting the academic schedule. Seventh grade was chosen because it aligns with the Basic Learning Rights (*Derechos Básicos de Aprendizaje*, DBA) established by the *Ministerio de Educación de Colombia*,[17] which include understanding energy and matter flow in ecological relationships, concepts that connect to dengue transmission and environmental health pedagogically. The sample size corresponded to all students who voluntarily agreed to participate, which was considered sufficient for descriptive analysis and thematic saturation in the qualitative component.

Data collection instruments and procedures

A semi-structured survey comprising 14 closed-ended questions and three open-ended questions were administered. Experts from the Universidad del Atlántico have previously validated this instrument, and the addressed students' sociodemographic data, household environmental conditions, and dengue illness and symptoms have been considered. Open-ended items also explored perceptions of dengue, modes of transmission, and prevention practices. Although the instrument was reviewed for clarity and relevance, it was not subjected to formal statistical validation. This is recognized as a methodological limitation, given the descriptive and exploratory nature of the study. The survey was conducted in person during school hours, and participation was voluntary. Informed consent was obtained.

Statistical analysis

Quantitative data were entered into Microsoft Excel and summarized in tables that described socioeconomic status, household practices, and students' prior knowledge of dengue. Qualitative content analysis was conducted on open-ended responses, grouping frequently mentioned terms related to dengue, its transmission, and prevention into thematic categories that reflected their symbolic centrality. The codes were generated from the data inductively, and the coding process was carried out manually by two researchers to ensure consistency and thematic agreement.

Ethical considerations

This study was approved by the *Comité de Ética* of the Universidad del Atlántico (protocol 02-III-2021). The study adhered to the principles outlined in the Declaration of Helsinki[18] and Colombian regulations governing research involving minors. Informed consent was obtained from parents or legal guardians, and student assent was requested. Confidentiality and voluntary participation were ensured. To protect participants' privacy, all questionnaires were anonymous and identified only by alphanumeric codes. No names or other personal identifiers were collected. Data files were stored in folders that were accessible only to the research team. Participation was entirely voluntary, and students could withdraw at any time without any academic consequences.

RESULTS

Characterization of the population

A sample of 60 students participated in the study, with 75% aged between 12 and 14 years old (M = 13.80, SD = 1.30). Most households (95%) had full access to public services, with 45% reporting a monthly family income level between COP 950,000 and 1,200,000 (approximately USD 213 to 269). Additionally, 46.67% of the students' guardians completed higher education. In terms of household conditions, 63.33% of students had pets, which were sometimes allowed in bedrooms. Water was stored in tanks or containers by 30% of families, and the frequency of cleaning varied. Sixty-five percent of families reported daily cleaning habits inside and outside the home. In terms of health history, 16.67% of students have previously been diagnosed with dengue, whereas 83.33% had not. All students identified at least one symptom of dengue (e.g., fever, body aches, vomiting) and recognized mosquitoes as the primary vector for dengue transmission. See Table 1.

Description of students' social representations related to dengue

When asked to name words associated with dengue, the most common responses were "mosquito" (28.79%), "disease" (15.91%), and "stagnant/dirty water" (14.39%). Regarding transmission, 38.80% of people referred

to mosquito bites, 29.85% to infected mosquitoes, and 23.88% to physical contact. Fewer people associated dengue with stagnant water, poor hygiene, or rubbish. Preventive strategies included cleaning water containers (39.06%), fumigation (20.31%), general cleaning (18.75%), confinement (15.62%), wearing masks (4.69%), and eating a healthy diet (1.56%).

Table 1. Socioeconomic characterization of 60 students.

Variable	Frequency (%)
Sex	
Female	31 (51.67)
Male	29 (48.33)
Age (years)	
12-14	45 (75.00)
15-17	15 (25.00)
Public services	
Complete, with all services	57 (95.00)
Complete (water, electricity, gas)	2 (3.33)
Incomplete, only water and electricity	1 (1.67)
Incomplete (only electricity or water)	0 (0.00)
Family economic income level	
Between COP 350,000-650,000*	4 (6.67)
Between COP 650,000-950,000*	16 (26.67)
Between COP 950,000-1,200,000*	27 (45.00)
More than COP 1,250,000*	13 (21.67)
Educational level of guardians	
Professional or higher education	28 (46.67)
Technical or technological level	13 (21.67)
Completed secondary education	17 (28.33)
Incompleted secondary education	1 (1.67)
Completed primary education	1 (1.67)
Incomplete primary education	0 (0.00)
Do you have pets?	
Yes	38 (63.33)
No	22 (36.67)
How many?	
Not applicable	22 (36.67)
1	20 (33.33)
2	13 (21.67)
3	0 (0.00)
4	1 (1.67)
5	2 (3.33)
6	2 (3.33)
What kind?	
Not aplicable	22 (36.67)

Dog	15 (25.00)
Cat	9 (15.00)
Bird	1 (1.67)
Dog/Cat	7 (11.67)
Dog/Turtle	1 (1.67)
Dog/Bird	3 (3.33)
Dog/Cat/Bird	3 (3.33)
Dog/Cat/Bird/Monkey	1 (1.67)
Do pets enter the bedroom?**	
Yes	23 (60.53)
No	15 (39.47)
Do you live near places where rainwater collects?	
Yes	22 (36.67)
No	38 (63.33)
Do you have pools or containers where you collect water?	
Yes	18 (30.00)
No	42 (70.00)
If YES, how often do you clean them?	
Not aplicable	42 (70.00)
Every day	2 (3.33)
Once a week	3 (5.00)
Once every two weeks	5 (8.33)
Once every three weeks	1 (1.66)
Four times a week	1 (1.66)
Once a month	2 (3.33)
Once every three months	2 (3.33)
Every two days	1 (1.66)
Every three days	1 (1.66)
What type of flooring does your house have?	
Tile	55 (91.67)
Cement	5 (8.33)
How often do you clean and organize inside and outside your home?	
Daily	39 (65.00)
Every other day	3 (5.00)
Every two days	7 (11.67)
Every three days	2 (3.33)
Every five days	1 (1.67)
Once a week	8 (13.33)
Have you had dengue?	
Yes	10 (16.67)
No	50 (83.33)

What symptoms did you experience?***	
Fever	2
Fever/rash/body pain	1
Fever/rash	1
Fever/body pain	1
Fever/body pain/headache	1
Fever/body pain/vomiting	2
Vomiting/body pain	1
Fever/body pain/headache/vomiting	1

(%) = percentage of the total sample; COP = Colombian Peso; * = Approximate equivalent of COP 4,463 per USD, based on the average exchange rate at the time of the study; ** = Percentages are calculated only among participants who reported having pets (n = 38); *** = Percentages refer only to participants who reported having had dengue (n = 10).

Students' comments revealed a clear association between dengue and mosquitoes, which was often connected to home cleanliness. Some students said, "Dengue happens when there are too many mosquitoes around" (*El dengue sale cuando hay muchos mosquitos*), while others mentioned "My mom says we have to cover the water tank so mosquitoes don't get in" (*Mi mama dice que hay que tapar el tanque para que no entren los mosquitos*). Others linked prevention to school hygiene, saying, "We should clean the school yard so there's no dirty water" (*Debemos limpiar el patio del colegio para que no haya agua sucia*).

Some students also demonstrated misconceptions, such as believing that "you can get dengue if someone sick touches you" (*se puede contagiar si una persona enferma te toca*) or that "wearing a mask helps you not get dengue" (*usar mascarilla evita el dengue*). These answers reflected partial understandings of transmission mechanisms.

DISCUSSION

This study found that most students correctly identified the mosquito as the vector and recognized some symptoms of dengue; however, some misconceptions about transmission persisted, such as the belief that dengue can be spread through physical contact, or that wearing a face mask can prevent infection. These misconceptions highlight the need for clearer educational strategies that distinguish between contagious and vector-borne diseases.

Dengue remains one of the primary vector-borne diseases in urban and peri-urban contexts of LA and the Caribbean.[3] In this study, the identified household environmental conditions reflect structural conditions that favor dengue transmission in vulnerable urban contexts, such as inadequate water storage (30%) and the proximity to areas with stagnant water (36.67%). These findings are consistent with Benavides-Céspedes *et al*.,[7] who identified inadequate water storage as a key factor explaining the continued presence of the vector in Barranquilla. More broadly, unplanned urban growth, forced migration, and extreme weather events have also contributed to the sustained transmission of dengue in Colombia.[19,20]

This limitation is also evident in Restrepo (Meta, Colombia), where Jaramillo-Ramírez *et al*.[12] found that, despite control measures, weak community organization and misconceptions about prevention were associated with the presence of mosquitoes, mainly due to the inability of these measures to induce sustained behavioral changes and community participation. Addressing the dengue problem requires not only monitoring but also interventions that consider the specific SR of each community.[21] These representations, as collective constructions of meaning, directly influence how people perceive the disease and adopt or reject the preventive measures.[5,22]

Almost half of the caregivers (46.67%) reported having professional or higher level of education, while most of the rest had a technical or secondary level of education. This situation may limit their understanding of, and adherence to, preventive practices.[7] These results are consistent with studies conducted in Colombia and other LA regions, where overcrowding, low educational attainment, poverty, and deficient service infrastructure increase vulnerability to dengue.[19,20] The challenges posed by unplanned urban expansion and inadequate territorial planning exacerbate the situation, particularly when water storage is used as a strategy to mitigate interruptions. The accumulation of improvised water containers resulting from such changes favors the proliferation of immature stages of *A. aegypti*. It increases the risk of dengue, regardless of climatic and seasonal factors.[3]

As Garelli *et al*.[22] pointed out students' representations combine biomedical notions (mosquitoes/viruses), environmental factors (stagnant water), and misconceptions (physical contact/face masks), reflecting a fragmented understanding of dengue. Garelli *et al*.[5] observed that in high-transmission contexts, SR tend to be centered on biomedical notions, while sociocultural and political aspects remain peripheral. This pattern emerged among students whose SR combined technical elements with beliefs from their family and community environments.

The origin of these misconceptions appears to be multifactorial, involving family, social, and educational factors. Although there is still a lack of solid evidence to explain why these errors persist, previous studies suggest some disconnection between school curricula and public health education. There is also a perception among adults that the government is mainly responsible for dengue prevention.[23] Therefore, engaging students in prevention activities could be an effective approach, as they can motivate their mothers, who usually spend more time at home, and other family members and neighbors. Vesga-Gómez and Cáceres-Manrique[24] observed this dynamic, reporting that households with school leaders involved in dengue prevention exhibited fewer risk factors than those without, demonstrating the mobilizing role of children and adults alike. From an educational and policy perspective, these findings highlight the need to strengthen school-based health education within formal curricula and to promote intersectoral strategies between education and public health authorities. Integrating top on vector-borne disease into science and civic education programs, supported by community participation and teacher training, could foster a sustained culture of prevention in endemic regions.

Beyond the educational domain, understanding the dynamics of dengue requires an integrated perspective that considers how local practices and global structural factors interact. Locally, issues such as inadequate water storage or misconceptions about transmission must be addressed. Globally, issues such as social inequalities, unplanned urban growth, and forced migration must be considered.[19,20] These elements create a complex scenario requiring multidisciplinary and culturally adapted approaches.[21]

This pattern is not limited to school students. In a study with undergraduate natural sciences students, Calderón-Ariza *et al*.[25] demonstrated that, although all recognized dengue as an important disease, over 50% failed to identify the vector correctly. This finding underscores the importance of health education programs from an early age in preventing the development of misguided perceptions.[5,22]

Beyond its descriptive findings, this study makes a novel contribution by applying the SR framework to school populations in an endemic Caribbean context, a perspective that remains under-explored in dengue research. Integrating qualitative analysis within an educational setting adds methodological value compared to purely quantitative approaches often found in vector-borne disease.[12] This approach enables us to understand not only what students know about dengue, but also how they perceive and communicate information about prevention and transmission.[22] Such insights can strengthen participatory health education and community engagement strategies, promoting long-term behavioral change in endemic regions. Similar approaches have

been applied internationally to other health topics, demonstrating the potential of SR analysis to inform context-sensitive educational interventions.[26,27]

The main limitations of this study include the small sample size, which was restricted to two seventh-grade classes, and the fact that data were collected at a single point in time, which limits generalization and the analysis of changes over time. Furthermore, factors such as family influence or individual motivation were not considered.

CONCLUSIONS

Finally, while most students recognized the mosquito as the vector and some symptoms, misconceptions about transmission and prevention persist, and environmental conditions at home may favor the vector. These findings underscore the fragmented understanding of dengue and the need to enhance educational strategies and community engagement in vulnerable urban settings. Future studies are recommended to include larger and more diverse samples, as well as approaches that analyze the evolution of social representations of dengue and the role of family and community participation in the educational process.

CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest.

AUTHOR CONTRIBUTION

MMA was responsible for the conceptualization, study design, data collection, statistical analysis, literature review, drafting of the first version, and final approval of the manuscript.
DRT contributed to the study design, data collection, statistical analysis, writing, and final approval of the manuscript.
CGA contributed to the study design, data collection, statistical analysis, writing, and final approval of the manuscript.
MACS contributed to writing and final approval of the manuscript.
AS contributed to the literature review, writing, and final approval of the manuscript.
IBC contributed to statistical analysis, writing, and final approval of the manuscript.
LH contributed to the study design, instrument validation, writing, and final approval of the manuscript.

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