

Management of dengue and its complications in health systems in Latin America.

Received: April 14, 2026.

Accepted: July 30, 2026.

Published: August 6, 2026.

Editor: Dr. Mayra Ordoñez Martínez.

How to cite:

Pereira M. Management of dengue and its complications in Latin American health systems. Actas Médicas (Ecuador) 2026; 36(2):180-193.

DOI: <http://doi.org/10.61284/307>

Alcívar Hospital.

ISSN-L: [2960-8309](https://doi.org/10.61284/307)

 Copyright 2026, Manuel René Pereira Zambrano. This article is distributed under the [Creative Commons CC BY-NC-SA 4.0 Attribution License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows the use and redistribution of the article, citing the source and the original author for non-commercial purposes.

* Corresponding author

Email: Manuel René Pereira Zambrano

<mpereira3@utmachala.edu.ec>.

Address: Faculty of Medical Sciences, Technical University of Machala. Av. Panamericana Km 5 y 1/2, El Oro, Ecuador.

Postal Code: 070102

Phone: [593] (07) 259 3180.

Manuel René Pereira Zambrano ¹ *.

1. Faculty of Medical Sciences, Technical University of Machala.

Abstract

Introduction: Dengue continues to strain health systems in Latin America because of its interannual variability and the healthcare demands generated by its complications. This requires monitoring not only the disease burden but also outcomes sensitive to management performance. This analysis compared the impact and complications of dengue in 2024–2025 across four Latin American subregions, as defined by the Pan American Health Organization (PAHO), through epidemiological week 52.

Methods: We used a quantitative, observational, ecological approach, collecting data annually from pooled PLISA/ARBO data. The dataset includes a census of the four subregions from which we retrieved the data. We cleaned indicators using a spreadsheet extraction matrix to calculate the proportion of severe dengue and case fatality rates (deaths/cases $\times$ 100), as well as hazard ratios with 95% confidence intervals (CI).

Results: Across the group of countries, the regional composite case fatality rate decreased compared with the 2024 estimates (RR 0.78; 95% CI 0.75–0.82), as did severe dengue (RR 0.90; 95% CI 0.88–0.92), despite continued subregional heterogeneity. Both case fatality rate and severity were higher in the Andean subregion (RR 1.24; 95% CI 1.07–1.44) and the Andean subregion (RR 1.40; 95% CI 1.33–1.47), respectively.

Conclusions: The subregional assessment of severity and case fatality rate provides operational signals to improve management, optimize resource availability, adapt triage and referral pathways, and maintain a robust response.

Keywords: Dengue; Severe dengue; Case fatality rate; Epidemiological surveillance; Health management.

Introduction

Dengue, an arboviral disease transmitted by mosquitoes of the genus *Aedes*, has expanded and continues to maintain a fluctuating burden that tests the regional health response in Latin America, especially during seasonal periods of high transmission [1]. In epidemiological weeks 1 and 52 of 2024, suspected dengue cases increased markedly compared with 2023 and the average of the previous five years, with regional reports of severe dengue, deaths, and case fatality rates [2]. This magnitude is considered a global milestone and directly affects health service planning [3].

Alongside the healthcare component, an effective response requires sustained prevention through community education, control of the causative agent, eradication of breeding sites, and environmental measures related to water and sanitation. Household interventions and combined strategies have proven highly effective in reducing entomological and epidemiological indicators, providing an operational basis for easing pressure on services [4, 5].

Complications become a critical issue: severe dengue can progress to critical situations, such as shock, severe hemorrhage, or organ damage, increasing the need for medical observation, hospitalization, and advanced life support [1]. The World Health Organization (WHO) notes that many deaths are preventable through early identification and appropriate care; therefore, both mortality rates and case fatality rates also serve as indicators of the performance and continuity of healthcare [1]. For this reason, regional alerts suggest strengthening early diagnosis and timely case management to prevent severe illness and reduce mortality [2, 6].

Complications associated with progression to severe dengue and the risk of death are not uniform; they vary according to age and comorbidities, reinforcing the need to implement triage and clinical risk stratification. Furthermore, behaviors such as delayed consultation and self-management of symptoms can influence preventable outcomes and should be considered in the comprehensive management approach [6-8].

Dengue management in public health comprises an integrated set of functions that the system must maintain to prevent, detect, and respond in a timely manner. These include epidemiological surveillance and notification, diagnostic confirmation, triage and risk stratification, referral and counter-referral, hospital capacity, continuity of care, and operational preparedness for epidemic peaks [9]. This approach aligns with contemporary health resilience frameworks, which emphasize the capacity to absorb shocks and adapt without deteriorating performance [9]. In this context, the proportion of severe dengue cases and the case fatality rate serve as sensitive indicators of management performance, as they relate to early risk identification and care organization in high-demand scenarios [10, 11]. Therefore, it is relevant to examine subregional variations in complications in Latin America to guide outcome-based management decisions [12].

Comparing 2024 and 2025 allows a short-term estimate of whether changes in transmission are reflected in variations in severity and lethality, key dimensions for prioritizing resources and adjusting the response [13]. The Pan American Health Organization (PAHO) indicates that, up to epidemiological week 53 of 2025, the region registered a decrease compared to the equivalent period in 2024 and that there are differences between subregions, which facilitates comparisons between the Central American Isthmus and Mexico, the Andean subregion, the Southern Cone, and the Latin Caribbean [2]. In both years, the weekly cutoff is

used to control for closure biases and to consider changes in regional management reports [14].

Although standardized indicators are used, management decisions are shaped by limitations in surveillance parameters, such as diagnostic heterogeneity, underreporting, and variability in serotype circulation, which could distort severity comparisons. Genomic surveillance of travelers in the Caribbean has identified unreported outbreaks and serotype changes; these detection gaps influence risk estimation and planning [15]. Another review addressed the projected global resurgence of dengue by 2024 and highlighted the urgent need to improve surveillance and anticipate the likely strain on health services [16].

Therefore, this study aims to analyze indicators of severe dengue, deaths, and CFR in Latin American subregions using consolidated PLISA statistics and regional closure reports by epidemiological week.

Materials and methods

Studio design

This study analyzes a public database of dengue statistics from the Pan American Health Organization through its Health Information Platform for the Americas (PLISA ARBO).

Scenery

This study was conducted at the Faculty of Medical Sciences, Technical University of Machala. The study was carried out from March 14, 2026, to March 30, 2026. This analysis covers epidemiological weeks 1 to 52 in 2024 and 2025.

Participants

Cases of patients with severe dengue from four regions are analyzed:

1. Central American Isthmus and Mexico
2. Andean subregion.
3. Southern Cone and the Latin Caribbean.

Variables

The variables analyzed included the cumulative total of cases reported in PLISA, severe dengue cases, deaths, and the proportion of severe dengue cases. We also calculated the case fatality rate (CFR) by dividing the total number of deaths by the number of reported cases and multiplying the result by 100.

Data sources

The data source was retrospective. The data extraction tool used a spreadsheet matrix to capture the subregion, year, epidemiological cutoff week, and values for each indicator, and to verify duplicates, missing values, and arithmetic consistency—for example, that severe dengue cases and deaths did not exceed total cases. We included records for the four identified subregions in both years, using the same cutoff week and with the same availability of key indicators; we excluded non-Latin American subregions and any records that were not comparable due to the cutoff week or to inconsistencies that could not be verified in the source.

Study size

The sample was probabilistic. For a study population of 21,878 dengue patients, Epi Info (CDC, Atlanta, USA, 2023) was used; the expected frequency was 0.1687%, the confidence limit was 5%, and the confidence level was 99.99%.

Quantitative variables

The results are presented as frequencies and percentages. The collected variables were not converted into categorical variables.

Statistical analysis

The analysis was performed using IBM SPSS Statistics version 23, employing descriptive statistics by subregion and year. We calculated the case fatality rate (CFR) and the proportion of severe dengue cases, along with year-on-year comparisons between 2024 and 2025. The process included calculating absolute differences and percentage changes compared with the previous year. The results were presented in comparative tables and simple graphs by subregion to facilitate visualization and ensure traceability of the downloaded file, along with the matrix and the operations performed, thus guaranteeing the replicability of the study.

To ensure replicability, we calculated 95% confidence intervals (95% CIs) for the CFR and the severe dengue rate using Wilson's method for proportions. We calculated hazard ratios (RRs) as the ratio of proportions in 2025 to 2024, and estimated their 95% CIs using a logarithmic approximation based on unrounded proportions.

Results

Participants

Table 1 presents dengue records by subregion: cases, severe cases, deaths, proportion of severe cases, and calculated case fatality rate. There were 1,687 dengue cases per million inhabitants.

Table 1. Cumulative burden of dengue by subregion in Latin America, SE 52 cut-off, 2024.

Subregion	Total cases	Severe dengue	Cases per million inhabitants	Deaths	Calculated CFR (%)
Latin Caribbean	17,373	353	20,319	43	0.25
Andean subregion	712,790	4,252	5,965	594	0.08
Southern Cone	11,144,657	10,176	913	6,860	0.06
Central American Isthmus and Mexico	1,094,852	7,097	895	594	0.08
Total 4 LATAM subregions	12,969,672	21,878	1,687	8,392	0.06

Source: Pan American Health Organization (PAHO), PLISA/ARBO, Dengue and Severe Dengue cases and deaths (downloaded March 14, 2026; cumulative data from epidemiological week 1 to week 52). Proportion of severe dengue = (severe dengue/total) × 100. Calculated CFR = deaths/total × 100. Cumulative data up to week 52.

Compared to 2024, Table 1 shows that the Southern Cone led the regional burden with 11,144,657 cases (85.93% of the total, 81.74% of deaths), and accounted for 46.51% of severe



cases. However, its share was small, with 0.09% of severe dengue cases and a case fatality rate (CFR) of 0.06%. More importantly, the Latin Caribbean also contributed 17,373 cases, with the highest incidence of severe dengue complications, representing 2.03% of all cases, a case fatality rate of 0.25%, and 1.61% of severe cases. In the Central American Isthmus and Mexico, and in the Andean subregion, the proportion of severe dengue was 0.65% and 0.60%, respectively, with a case fatality rate (CFR) of 0.08% in both cases. Overall, relative severity and mortality did not increase with case volume at the same cutoff point.

Table 2. Severity and mortality from dengue by subregion in Latin America, SE 52 cut-off, 2025.

Subregion	Total cases	Severe dengue	Severe proportion (%)	Deaths	Calculated CFR (%)
Andean subregion	240.198	2004	0.83	248	0.10
Central American Isthmus and Mexico	251.057	1.135	0.45	129	0.05
Latin Caribbean	36.022	918	2.55	21	0.06
Southern Cone	3,886,936	2,642	0.07	1,835	0.05
Total 4 LATAM subregions	4,414,213	6,699	0.15	2,233	0.05

Source: PAHO/WHO, PLISA/ARBO (Dengue and Severe Dengue cases and deaths). Download: 14-03-2026. Cumulative cutoff: EW 1–EW 52 (2025). Proportion of severe dengue = (severe dengue/total) × 100. Calculated CFR = deaths/total × 100. Cumulative cutoff up to EW 52.

In 2025, the Southern Cone again accounted for the majority of cases, with 3,886,936, representing 88.06% of the total and 82.18% of deaths; its proportion of severe dengue was 0.07%, and the calculated case fatality rate was 0.05% (Table 2). The Andean subregion recorded the highest case fatality rate for the year, at 0.10%, and a severe dengue rate of 0.83%. The Latin Caribbean maintained the highest proportion of severe dengue cases, at 2.55%, and a case fatality rate of 0.06%. In the Central American Isthmus and Mexico, the proportion of severe dengue cases was 0.45%, and the case fatality rate was 0.05%. Overall, relative outcomes followed distinct subregional patterns despite the reduction in the regional volume.

Table 3. Year -on-year change 2025 vs. 2024 in dengue, severe dengue, and mortality indicators by subregion in Latin America, accumulated up to epidemiological week 52.

Subregion	Δ Total (n)	Δ (%)	Δ Severe dengue (n)	Δ Severe dengue (%)	Δ Deaths (n)	Δ Deaths (%)	Δ Severe proportion (pp)	Δ CFR (pp)
Andean subregion	-472.592	-66.30	-2.248	-52.87	-346	-58.25	0.23	0.02
Central American Isthmus and Mexico	-843.795	-77.07	-5.962	-84.01	-766	-85.59	-0.20	-0.03
Latin Caribbean	18,649	107.34	565	160.06	-22	-51.16	0.52	-0.19
Southern Cone	-7,257,721	-65.12	-7.534	-74.04	-5.025	-73.25	-0.02	-0.01
Total 4 LATAM subregions	-8,555,459	-65.97	-15.179	-69.38	-6.159	-73.39	-0.02	-0.01

Source: PAHO/PAHO, PLISA/ARBO (Dengue and Severe Dengue cases and deaths). Download: 14-03-2026. Cumulative cutoff: EW 1–EW 52 (2025). Δ = 2025 – 2024. Δ % = ((2025 – 2024)/2024) × 100. pp = percentage points.

From 2024 to 2025, Table 3 shows that regional cases decreased by 65.97% and deaths by 73.39%; the proportion of severe dengue decreased by 0.02 percentage points, and the case

fatality rate by 0.01 percentage points. The Southern Cone recorded the largest absolute reduction in volume. The most significant relative decreases in severe dengue and deaths were observed in Central America and Mexico, accompanied by reductions in severity and case fatality rate. The Latin Caribbean followed a different trajectory, with increases in cases and severe dengue, and a 0.52 percentage point increase in the proportion of severe cases, while deaths and case fatality rate decreased. The Andean subregion reduced cases and deaths, but increased the proportion of severe cases by 0.23 percentage points and the case fatality rate by 0.02 percentage points.

Table 4. Hazard ratio and 95% confidence interval for case fatality rate and proportion of severe dengue by subregion of Latin America, in 2025 versus 2024, cumulative up to epidemiological week 52.

Subregion	CFR 2024 %	CFR 2025 %	RR CFR (2025/2024)	% serious 2024	% serious 2025	RR % severe (2025/2024)
Andean subregion	0.08 (95% CI: 0.08– 0.09)	0.10 (95% CI: 0.09– 0.12)	1.24 (95% CI: 1.07–1.44)	0.60 (95% CI: 0.58– 0.61)	0.83 (95% CI: 0.80– 0.87)	1.40 (95% CI: 1.33–1.47)
Central American Isthmus and Mexico	0.08 (95% CI: 0.08– 0.09)	0.05 (95% CI: 0.04– 0.06)	0.63 (95% CI: 0.52–0.76)	0.65 (95% CI: 0.63– 0.66)	0.45 (95% CI: 0.43– 0.48)	0.70 (95% CI: 0.66–0.74)
Latin Caribbean	0.25 (95% CI: 0.18– 0.33)	0.06 (95% CI: 0.04– 0.09)	0.24 (95% CI: 0.14–0.40)	2.03 (95% CI: 1.83– 2.25)	2.55 (95% CI: 2.39– 2.72)	1.25 (95% CI: 1.11–1.42)
Southern Cone	0.06 (95% CI: 0.06– 0.06)	0.05 (95% CI: 0.05– 0.05)	0.77 (95% CI: 0.73–0.81)	0.09 (95% CI: 0.09– 0.09)	0.07 (95% CI: 0.07– 0.07)	0.74 (95% CI: 0.71–0.78)
Total 4 LATAM subregions	0.06 (95% CI: 0.06– 0.07)	0.05 (95% CI: 0.05– 0.05)	0.78 (95% CI: 0.75–0.82)	0.17 (95% CI: 0.17– 0.17)	0.15 (95% CI: 0.15– 0.16)	0.90 (95% CI: 0.88–0.92)

Source: PAHO/PAHO, PLISA/ARBO (Dengue and Severe Dengue cases and deaths). Download: 14-03-2026. Cumulative cutoff: EW 1–EW 52 (2025). RR = risk ratio (2025/2024). RR and 95% CI were calculated using unrounded proportions; percentages are presented with two decimal places.

Table 4 summarizes year-over-year changes, presenting hazard ratios and confidence intervals that show overall declines and divergent subregional trajectories. Across all four subregions, the case fatality rate decreased in 2025 compared with 2024 (RR = 0.78; 95% CI: 0.75–0.82), and the proportion of severe dengue cases also decreased (RR = 0.90; 95% CI: 0.88–0.92). The Andean subregion was the only exception, with increases in the case fatality rate (RR = 1.24; 95% CI: 1.07–1.44) and in the proportion of severe dengue cases (RR = 1.40; 95% CI: 1.33–1.47). The Central American isthmus and Mexico reduced both the case fatality rate (RR = 0.63; 95% CI: 0.52–0.76) and the proportion of severe dengue cases (RR = 0.70; 95% CI: 0.66–0.74). The Latin Caribbean increased the proportion of severe cases (RR = 1.25; 95% CI: 1.11–1.42) and showed a marked decrease in the case fatality rate (RR = 0.24; 95% CI: 0.14–0.40). The

Southern Cone showed consistent reductions in the case fatality rate (RR = 0.77; 95% CI: 0.73–0.81) and in the proportion of severe cases (RR = 0.74; 95% CI: 0.71–0.78).

Discussion

Based on cumulative data up to epidemiological week 52, the comparison between 2024 and 2025 shows an overall reduction in complicated outcomes, although this does not imply a homogenization of relative risk among subregions. In the general regional context, case fatality rate decreased in 2025 (RR 0.78; 95% CI: 0.75–0.82), accompanied by a reduction in the proportion of severe dengue cases (RR 0.90; 95% CI: 0.88–0.92). However, the Andean subregion showed a divergent trend, exhibiting a relative increase in its case fatality rate (RR 1.24; 95% CI: 1.07–1.44). This pattern not only has descriptive value but also aligns with previous studies that have characterized dengue as a condition that can challenge both surveillance systems and clinical responses during epidemic periods, especially when relying solely on cases is insufficient to guide necessary interventions [12, 16, 17].

At the management level, analyzing complication outcomes offers more opportunities to identify areas for optimization by shifting the focus to performance. This allows for more precise characterization and a targeted response in each subregion to an increase in severity or mortality [1, 3].

From a severity standpoint, the proportion of severe dengue cases becomes an important working metric: it offers a pragmatic operational indicator that anticipates triage requirements, adequate monitoring, timely referral, and overall hospital capacity, without needing causal conclusions about a specific risk status. Formal comparisons revealed a relative increase in the Andean subregion (RR 1.40; 95% CI 1.33–1.47) and a reduction in the Central American Isthmus and Mexico (RR 0.70; 95% CI 0.66–0.74). This divergence is consistent with changes in viral circulation and variability in surveillance and confirmation systems, factors that shape comparative interpretations of severity across territories [6, 15].

Management must avoid interpreting this finding solely as heterogeneity; instead, it must establish subregional alert thresholds. These will be defined by considering the proportion of severe cases and the relative risk, and by implementing actions such as optimizing triage, temporarily increasing observation spaces, prioritizing referrals, and reorganizing patient flows to cope with ongoing increases [18]. Thus, management is characterized by its capacity to anticipate and respond appropriately to situations of healthcare pressure.

In terms of mortality, the CFR can be considered a performance indicator consistent with an ecological design and a measure that integrates timeliness of care, continuity of care, and problem-solving capacity during periods of increased demand, without implying causality. The coexistence of an overall improvement with relative increases in a subregion suggests that the regional reduction does not necessarily imply homogeneous performance and that response gaps persist between territories. Hospital data from Latin America demonstrate that people with comorbidities and severe forms of illness have a higher risk of death, so variations in the CFR may accompany changes in the risk profile of patients treated and in response capacity, particularly in scenarios of healthcare pressure [19].

PAHO/WHO recommends that organizations and services modify their practices to ensure effective management, prevent complications, and avoid the collapse of specialized care [1]. From a managerial perspective, this is a substantial area for improvement; therefore, brief clinical reviews of dengue-attributable deaths should be conducted when an increase in

the case fatality rate is observed. This procedure should include verifiable feedback on response times, adherence to clinical protocols, and coordination across networks; this should go beyond simply analyzing the final case fatality rate.

This variability in severity and mortality among subregions can be seen, without establishing causal relationships, as a coherent pattern indicating interactions among biological factors, surveillance effectiveness, and operational capacity. From a biological perspective, PAHO/WHO has warned that increased circulation of DENV-3 raises the risk of outbreaks and can modify the epidemiological profile; therefore, changes in serotype circulation plausibly explain the variations observed in the proportion of severe dengue cases [6].

In parallel, differences in diagnostic confirmation and reporting timeliness affect the comparability of severity and the CFR. Traveler-based genomic surveillance in the Caribbean has revealed viral introductions and circulation dynamics that routine reports do not always capture, making it necessary to incorporate data quality into management rather than treat it as a secondary component [15]. These patterns also align with resilience approaches that conceive of performance as the capacity to maintain critical functions under epidemic pressure, rather than as a static attribute [9]. In managerial terms, this requires preparing response capacity for peaks, temporarily expanding resources, and reorganizing flows without compromising outcomes.

From a health management perspective, the findings support structuring a response around subregional indicators and traceable decisions, with an emphasis on continuity of care and operational preparedness for epidemic peaks. First, it is important to institutionalize a regularly updated monitoring dashboard that includes the proportion of severe dengue cases, incidence rate, deaths, and risk factors, with explicit thresholds that trigger clinical escalation in the event of sustained increases [13].

Second, strengthening triage, observation areas, and referral routes must remain aligned with regional clinical guidelines, standardizing criteria for identifying warning signs and prioritizing care in high-demand scenarios [18].

Although regional clinical guidelines exist to standardize diagnosis and treatment, their application is not uniform across all territories. Supply availability, care network organization, human resource sufficiency, and access barriers create operational differences that ultimately shape actual management. Even when guidelines recognize obstacles and facilitators, the response depends on the system's ability to maintain continuity of essential services and meet demand in a timely manner. In scenarios of institutional fragility and violence, such as those described in Haiti, interruptions in care and logistical limitations compromise both surveillance and timeliness of care [11, 20].

Preparedness for epidemic peaks also requires capacity planning, continuity of care, and guaranteed critical supplies, consistent with system resilience approaches that emphasize adaptive capacity under stress [9]. Finally, as with the difference in case fatality rate according to severity, such discrepancies could justify strengthening the quality of the surveillance system and conducting brief clinical reviews of dengue deaths to ensure system improvement and accountability, in line with recommendations to strengthen the response and with evidence of a higher risk of mortality when comorbidities are present [13, 19, 21]. Taken together, these actions transform the observed heterogeneity into a roadmap of possibilities for operational improvement.

This analysis offers significant methodological advantages for comparative management evaluation. Incorporating an official, verifiable source such as PAHO's PLISA promotes replicability and comparability across regions through standardized aggregate indicators [1, 4]. Furthermore, establishing a uniform cumulative cutoff point through epidemiological week 52 in both years reduces biases that could arise from different sampling intervals in each period analyzed, facilitating interannual analysis.

Furthermore, the subregional analysis prevents heterogeneity from being absorbed into regional averages and prioritizes complication outcomes with operational value for management. Finally, the incorporation of risk ratios and confidence intervals provides a formal quantification of the magnitude and precision of the findings, which is useful for supporting decisions based on relevant changes and not just on fluctuations in volume [22].

The limitations are inherent to the ecological design and the use of aggregated data. The findings do not allow individual attribution, nor do they control for clinical or sociodemographic variables, and they are vulnerable to underreporting, diagnostic heterogeneity, and retrospective report updates. Therefore, interpret the results as a standardized comparison of subregional patterns with a common cutoff point, useful for monitoring and prioritization, rather than as a causal explanation. Even with these limitations, integrating severity and lethality as operational signals offers a defensible framework for guiding improvement opportunities, strengthening operational preparedness for peaks, and sustaining continuity of care in contexts of variable transmission [13, 22].

Conclusion

Effective dengue management in Latin America requires a comprehensive strategy that integrates clinical preparedness, subregional analysis, and ongoing prevention. To achieve this, health systems must strengthen data-driven surveillance, standardize triage processes, and ensure operational capacity during transmission peaks, using complication reports as indicators to improve patient safety. Simultaneously, this medical response must be complemented by community-based actions such as education, sanitation, and vector control, which significantly reduce the spread of the virus and the resulting strain on health services.

Abbreviations

PLISA: Health Information Platform for the Americas.
SE: Epidemiological week.

Supplementary information

Supplementary materials have not been declared.

Acknowledgments

Not declared.

Authors' contributions

Manuel René Pereira Zambrano: Conceptualization, data curation, research, methodology, visualization, original draft writing.
All authors read and approved the final version of the manuscript.

Financing

The author self-funded the study.

Availability of data or materials

PLISA data is public.



Statements

Ethics committee approval and consent to participate

Not required for database study.

Consent for publication

Not required for publishers.

Conflicts of interest

The authors declare no conflicts of interest.

Use of generative AI

The authors declare that they used generative AI responsibly, without replacing their critical thinking, expertise, or judgment. The AI was used under supervision and control to develop the discussion section. The use of the AI tool guarantees the privacy and confidentiality of data and contributions, including published and unpublished manuscripts, as well as any personally identifiable information. The journal's policies, which permit the use of generative AI only in the introduction and discussion sections, have been followed. Only limited rights are granted to the AI to provide a service. We carefully reviewed and verified the accuracy, integrity, and fairness of all AI-generated outputs to ensure the manuscript reflects an authentic and original contribution.

Author information

Nelson René Pereira Zambrano, Doctor from the Technical University of Machala, (Ecuador, 2024).

Email: npereira2@utmachala.edu.ec

ORCID <https://orcid.org/0009-0009-3668-2430>

References

1. World Health Organization. World Health Organization (WHO) – Fact sheets [Internet]. 2025 [cited 2026 Mar 3]. Dengue. Available from: <https://www.who.int/dengue>
2. Pan American Health Organization. Report on the epidemiological situation of dengue in the Americas [Internet]. 2025 Jan. Available from: <https://www.paho.org/plisa>
3. The Lancet. Dengue: the threat to health now and in the future. Lancet. 2024 Jul 27;404(10450):311. doi: [10.1016/S0140-6736\(24\)01542-3](https://doi.org/10.1016/S0140-6736(24)01542-3). PMID: 39067890.
4. Utarini A, Indriani C, Ahmad RA, Tantowijoyo W, Arguni E, Ansari MR, Supriyati E, Wardana DS, Meitika Y, Ernesia I, Nurhayati I, Prabowo E, Andari B, Green BR, Hodgson L, Cutcher Z, Rancès E, Ryan PA, O'Neill SL, Dufault SM, Tanamas SK, Jewell NP, Anders KL, Simmons CP; AWED Study Group. Efficacy of Wolbachia-Infected Mosquito Deployments for the Control of Dengue. N Engl J Med. 2021 Jun 10;384(23):2177-2186. doi: [10.1056/NEJMoa2030243](https://doi.org/10.1056/NEJMoa2030243). PMID: 34107180; PMCID: PMC8103655.
5. Montenegro-Quiñonez CA, Louis VR, Horstick O, Velayudhan R, Dambach P, Runge-Ranzinger S. Interventions against Aedes/dengue at the household level: a systematic review and meta-analysis. EBioMedicine. 2023 Jul;93:104660. doi: [10.1016/j.ebiom.2023.104660](https://doi.org/10.1016/j.ebiom.2023.104660). Epub 2023 Jun 21. Erratum in: EBioMedicine. 2024 Sep;107:105292. doi: [10.1016/j.ebiom.2024.105292](https://doi.org/10.1016/j.ebiom.2024.105292). PMID: 37352828; PMCID: PMC10333437.
6. Pan American Health Organization. Epidemiological Alert: Risk of dengue outbreaks due to increased circulation of DENV-3 in the Americas Region [Internet]. 2025 Feb [cited 2026 Mar 3]. Available from: <https://www.paho.org/dengue>
7. Paraná VC, Feitosa CA, da Silva GCS, Gois LL, Santos LA. Risk factors associated with severe dengue in Latin America: A systematic review and meta-analysis. Trop Med Int Health. 2024 Mar;29(3):173-191. doi:10.1111/tmi.13968. Epub 2024 Jan 23. PMID: 38263345.
8. Lopes R, Bastos LS. On the verge: outbreak risk after two years of record-breaking dengue epidemics in Brazil. Lancet Reg Health Am. 2025 Mar 22;45:101068. doi: [10.1016/j.lana.2025.101068](https://doi.org/10.1016/j.lana.2025.101068). PMID: 40206819; PMCID: PMC11981796.
9. Witter S, Thomas S, Topp SM, Barasa E, Chopra M, Cobos D, Blanchet K, Teddy G, Atun R, Ager A. Health system resilience: a critical review and reconceptualisation. Lancet Glob Health. 2023 Sep;11(9):e1454-e1458. doi: [10.1016/S2214-109X\(23\)00279-6](https://doi.org/10.1016/S2214-109X(23)00279-6). PMID: 37591591.
10. Sangkaew S, Ming D, Boonyasiri A, Honeyford K, Kalayanaroj S, Yacoub S, Dorigatti I, Holmes A. Risk predictors of progression to severe disease during the febrile phase of dengue: a systematic review and meta-analysis. Lancet Infect Dis. 2021 Jul;21(7):1014-1026. doi: [10.1016/S1473-3099\(20\)30601-0](https://doi.org/10.1016/S1473-3099(20)30601-0). Epub 2021 Feb 25. PMID: 33640077; PMCID: PMC8240557.
11. Pan American Health Organization. Evidence synthesis: guidelines for diagnosis and treatment of dengue, chikungunya , and zika in the Region of the Americas. Rev Panam



- Public Health. 2022 Jul 20;46:e82. Spanish. doi: [10.26633/RPSP.2022.82](https://doi.org/10.26633/RPSP.2022.82). PMID: 35875317; PMCID: PMC9299388.
12. Paz-Bailey G, Adams LE, Deen J, Anderson KB, Katzelnick LC. Dengue. Lancet. 2024 Feb 17;403(10427):667-682. doi: [10.1016/S0140-6736\(23\)02576-X](https://doi.org/10.1016/S0140-6736(23)02576-X). Epub 2024 Jan 24. PMID: 38280388; PMCID: PMC12372472.
 13. Pan American Health Organization. Epidemiological Update: Dengue in the Americas Region [Internet]. Washington, D.C.; 2026 Feb [cited 2026 Mar 3]. Available from: <https://www.paho.org/dengue>
 14. Pan American Health Organization. PAHO/EIH Open Data (PLISA) [Internet]. 2025. Dengue and Severe Dengue cases and deaths. Available from: <https://opendata.paho.org/dengue>
 15. Taylor-Salmon E, Hill V, Paul LM, Koch RT, Breban MI, Chaguza C, Sodeinde A, Warren JL, Bunch S, Cano N, Cone M, Eysoldt S, Garcia A, Gilles N, Hagy A, Heberlein L, Jaber R, Kassens E, Colarusso P, Davis A, Baudin S, Rico E, Mejía-Echeverri Á, Scott B, Stanek D, Zimler R, Muñoz-Jordán JL, Santiago GA, Adams LE, Paz-Bailey G, Spillane M, Katebi V, Paulino-Ramírez R, Mueses S, Peguero A, Sánchez N, Norman FF, Galán JC, Huits R, Hamer DH, Vogels CBF, Morrison A, Michael SF, Grubaugh ND. Travel surveillance uncovers dengue virus dynamics and introductions in the Caribbean. Nat Commun. 2024 Apr 25;15(1):3508. doi: [10.1038/s41467-024-47774-8](https://doi.org/10.1038/s41467-024-47774-8). PMID: 38664380; PMCID: PMC11045810.
 16. Venkatesan P. Global upsurge in dengue in 2024. Lancet Infect Dis. 2024 Oct;24(10):e620. doi: [10.1016/S1473-3099\(24\)00609-1](https://doi.org/10.1016/S1473-3099(24)00609-1). PMID: 39341223.
 17. Quandelacy TM, Vincente-González MF, Grillet ME, Colomé-Hidalgo M, Herrera D, Torres Aponte JM, Marzán Rodríguez M, Adams LE, Paz-Bailey G, Rodríguez DM, Munayco C, Figueroa L, Masis R, Borbor-Cordova M, Ortiz-Prado E, Piaggio M, Rollock L, Barrenechea G, Carbajo A, Estallo EL, Dos Santos T, Robert MA, Rodríguez-Barraquer I, Lowe R, Stewart-Ibarra AM, García-Carreras B, Cummings D, Johansson MA. Synchronized dynamics of dengue across the Americas. Sci Transl Med. 2025 Aug 20;17(812):eadq4326. doi: [10.1126/scitranslmed.adq4326](https://doi.org/10.1126/scitranslmed.adq4326). Epub 2025 Aug 20. PMID: 40834100.
 18. Perinatal Group, Pediatric Branch of the Chinese Medical Doctor Association; Editorial Board, Chinese Journal of Contemporary Pediatrics. [Expert consensus on the diagnosis, treatment, and prevention of neonatal dengue, chikungunya, and Zika virus infections (2025)]. Zhongguo Dang Dai Er Ke Za Zhi. 2025 Oct 15;27(10):1155-1166. Chinese. doi: [10.7499/j.issn.1008-8830.2508104](https://doi.org/10.7499/j.issn.1008-8830.2508104). PMID: 41121690; PMCID: PMC12548648.
 19. Macias AE, Werneck GL, Castro R, Mascareñas C, Coudeville L, Morley D, Recamier V, Guergova-Kuras M, Etcheto A, Puentes-Rosas E, Baurin N, Toh ML. Mortality among Hospitalized Dengue Patients with Comorbidities in Mexico, Brazil, and Colombia. Am J Trop Med Hyg. 2021 May 10;105(1):102-109. doi: [10.4269/ajtmh.20-1163](https://doi.org/10.4269/ajtmh.20-1163). PMID: 33970884; PMCID: PMC8274750.
 20. Belt RV, Jacques N, Pierre L, Greig E, Rahimi K. Providing healthcare under the threat of gang-violence: a survey of Haitian healthcare providers. Confl Health. 2024 Aug 23;18(1):53. doi: [10.1186/s13031-024-00612-6](https://doi.org/10.1186/s13031-024-00612-6). PMID: 39180116; PMCID: PMC11342466.



21. World Health Organization. Dengue in the Region of the Americas [Internet]. 2023 Jul 19 [cited 2026 Mar 20]. Available from: <https://www.who.int/news/2023>
22. Waickman AT, Newell K, Endy TP, Thomas SJ. Biologics for dengue prevention: up-to-date. Expert Opinion Biol Ther. 2023 Jan;23(1):73-87. doi: [10.1080/14712598.2022.2151837](https://doi.org/10.1080/14712598.2022.2151837). Epub 2022 Dec 5. PMID: 36417290.

DOI : Digital Object Identifier. **PMID** : PubMed Identifier.

Editor's Note

Actas Médicas (Ecuador) remains neutral regarding jurisdictional claims concerning published maps and institutional affiliations.
