

Reported Dengue in the Americas, 2025

Technical Methods for the Experimental Cumulative USU Pilot Estimate | WSI-DEN-AMR-2025 | Release v1.1

WSI TECHNICAL RELEASE v1.1 | Cumulative p=1 model | No overlap | P2 evidence-informed mappings | No country ranking

1. Purpose and status

This note documents the evidence, approved state mappings, deterministic calculations, interpretation, and reproducibility of the regional dengue USU pilot. It implements the WSI Experimental USU Pilot Modeling Standard v0.1. The results are experimental and do not establish a validated universal scale or country-level burden ranking.

2. Source evidence and mutually exclusive counts

Source item	Value	Use
Reported suspected cases	4,459,521	Parent episode count
Reported confirmed cases	1,682,588	Context only
Reported severe cases	8,966	Severe state count
Derived non-severe cases	4,450,555	Suspected minus severe
Deaths	2,207	Reported separately

Severe cases are treated as a subset of suspected cases. The model fails if severe cases exceed total suspected cases. Fatal episodes may already be included among severe episodes before death, but death itself is not assigned a USU value.

3. Locked pilot specification

Component	Decision
Model type	Cumulative episode model
Exponent	p=1 only
Overlap	None
Reference burden	R1 = 1.96875 intensity-days
States	Two mutually exclusive states
Scenarios	Deterministic low, central, and high
Mapping maturity	P2 - evidence-informed; approved for this experimental pilot
Mortality	Reported separately

$$B1 = \sum_s N_s \times I_s \times D_s \quad U1 = B1 / R1$$

B1 is raw linear intensity-time burden in episode-intensity-days. U1 is the same burden expressed relative to the declared renal-colic reference. Normalization changes the reporting unit, not the underlying information.

4. Approved state mappings

State	Intensity low / central / high	Duration low / central / high	Maturity	Status
Non-severe symptomatic dengue	4 / 5 / 6	2 / 4 / 7 days	P2 - evidence-informed	Approved for pilot release
Severe dengue	6 / 7 / 8	4 / 7 / 14 days	P2 - evidence-informed	Approved for pilot release

4.1 Non-severe symptomatic dengue

WHO and CDC describe symptomatic dengue as an acute febrile illness commonly lasting 2-7 days. Symptoms include fever, headache, retro-orbital pain, myalgia, arthralgia, nausea, vomiting, weakness, and rash. [5,6] A prospective adult cohort reported a median pain score of 5 on an 11-point numerical scale and no clear difference in pain score across dengue severity categories. [8] These findings support the 2/4/7 day duration envelope and a central intensity of 5, while leaving the overall experiential mapping provisional.

4.2 Severe dengue

WHO and PAHO define severe dengue by severe plasma leakage or shock, respiratory distress, severe bleeding, or severe organ involvement. [5,7] CDC describes a 24-48 hour critical phase, but the full acute episode includes the preceding febrile phase and early recovery. [6] Hospitalized cohorts commonly report stays of several days. [9] The 4/7/14 day envelope therefore represents a time-averaged full acute episode. The intensity range 6/7/8 is an author-defined overall experiential mapping, not a direct patient-elicited suffering score.

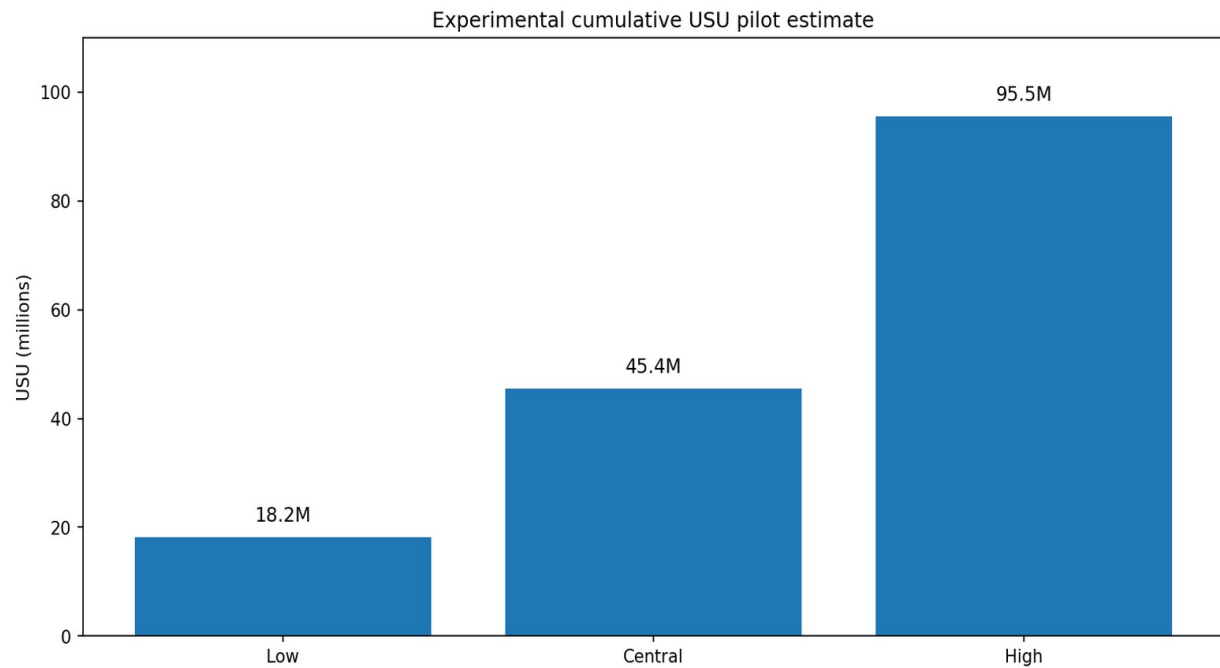
4.3 Excluded burden

Persistent fatigue, pain, and other post-acute symptoms are excluded because the regional source does not identify affected cases or durations. [10] Caregiver burden, health-system burden, financial loss, and mortality are also outside the pilot USU total.

5. Deterministic scenario results

Scenario	Episode-days	Non-severe B1	Severe B1	Total B1	U1	Severe share
Low	8,936,974	35,604,440	215,184	35,819,624	18,194,095	0.60%
Central	17,864,982	89,011,100	439,334	89,450,434	45,435,141	0.49%
High	31,279,409	186,923,310	1,004,192	187,927,502	95,455,239	0.53%

The central scenario yields approximately 17.9 million modeled episode-days, 89.5 million intensity-days of raw burden, and 45.4 million USU. The public result is rounded to two or three significant figures. The deterministic deterministic mapping range is a mapping scenario range, not an uncertainty or confidence interval.



Deterministic low, central, and high mapping scenarios; not a confidence interval.

Figure 1. Deterministic experimental USU pilot scenarios.

6. What the model adds

Layer	Central value	Added assumption	Interpretation
Source count	4,459,521 episodes	None	Observed surveillance evidence
Modeled exposure	17,864,982 episode-days	Duration	Cumulative time in modeled episode states
Raw B1	89,450,434 intensity-days	Intensity	Linear intensity-time burden
Normalized U1	45,435,141 USU	Reference scaling	Same B1 in a common reporting unit
Severity contribution	0.49% from severe episodes	State decomposition	Severe cases do not materially drive the regional total

The largest analytical changes occur when duration and intensity are added. Dividing by R1 does not add information. Because severe episodes are rare, the total is driven predominantly by the non-severe count and mapping. The pilot therefore demonstrates the common-scale workflow more than it changes the substantive regional conclusion supplied by the episode count.

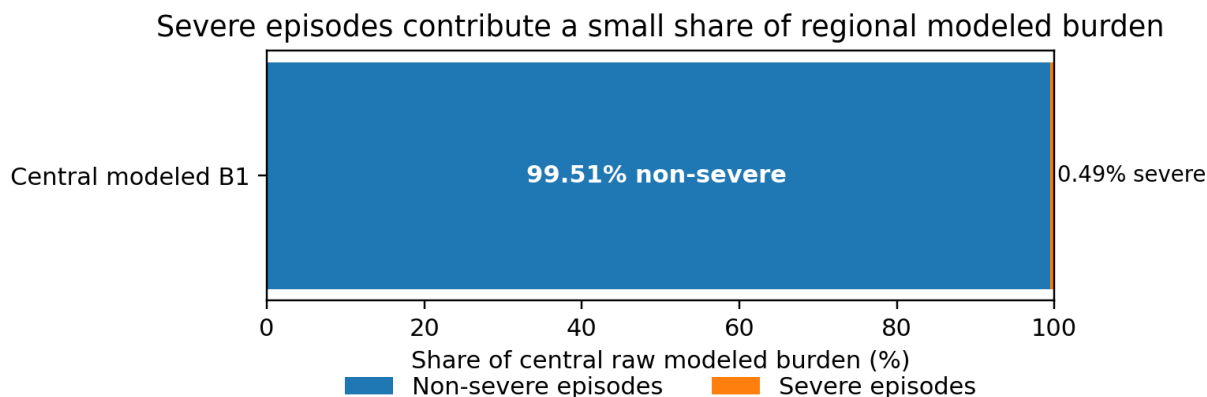


Figure 2. State contribution to central raw modeled burden.

7. Public disclosure and reporting rules

Required public disclosure

Experimental USU pilot estimate. PAHO directly reports the episodes in the stated categories. WSI applies provisional P2 intensity and duration mappings to estimate linear intensity-time burden and expresses that burden relative to the renal-colic reference. The deterministic mapping range reflects mapping scenarios, not a statistical confidence interval. Mortality is reported separately.

Public outputs use two or three significant figures. Exact values remain in the machine-readable files and workbook. Daily-equivalent and cumulative units are not mixed. This series uses a cumulative episode model.

8. Disposition of the previous probabilistic demonstration

The earlier 20,000-draw regional model is archived as a superseded technical demonstration. It used triangular probability distributions, $p=1.25$ and $p=1.5$ sensitivities, and a severe intensity envelope of 7/8/9. Those choices fall outside the simplified pilot standard. Its headline interval is not carried into the revised public report.

9. Scope boundaries

- No correction for under-ascertainment is applied.
- No post-acute burden is included.
- No overlap adjustment is used.
- No mortality-to-USU conversion is performed.
- No country ranking or per-capita country comparison is authorized.
- The mappings are approved for this experimental pilot but are not externally validated.

10. Reproducibility

The release includes the approved input JSON, machine-readable mapping table, scenario and state results, Excel workbook with formulas, Python reference implementation, source registry, mapping notes, validation checks, and SHA-256 checksums. The central arithmetic is reproducible from the formulas shown above.

Sources

1. Pan American Health Organization. PAHO updates dengue situation in the Americas, recommends strengthened surveillance and health system preparedness. 20 February 2026. <https://www.paho.org/en/news/20-2-2026-paho-updates-dengue-situation-americas-recommends-strengthened-surveillance-and>
2. Pan American Health Organization. PAHO Annual Report 2025 - Health security. <https://www.paho.org/pub/en/annual-report-2025/health-security.html>
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7. Pan American Health Organization. Dengue: Symptoms, Prevention and Treatments. <https://www.paho.org/en/topics/dengue>
8. Wong JGX, et al. Self-reported pain intensity with the numeric reporting scale in adult dengue. PLoS One. 2014;9:e96514. <https://doi.org/10.1371/journal.pone.0096514>
9. Ang LW, et al. A 15-year review of dengue hospitalizations in Singapore. PLoS Negl Trop Dis. 2019;13:e0007389. <https://doi.org/10.1371/journal.pntd.0007389>
10. Tiga-Loza DC, et al. Persistence of symptoms in dengue patients. Trans R Soc Trop Med Hyg. 2020;114:355-364. <https://doi.org/10.1093/trstmh/traa007>