

Project Summary

Dengue, caused by four viral serotypes (DENV-1–4), is a major public health concern in Puerto Rico, where all serotypes are endemic. Symptoms appear 4–10 days after infection and range from fever and rash to severe forms causing organ failure or shock. During the 2024 outbreak (>3,000 cases, twice 2023), this study assessed IgG (past exposure) and IgM (recent infection) seroprevalence in southern PR using de-identified ELISA-tested serum samples. IgM was higher in younger individuals (≤ 50 yrs) and IgG in older (>50 yrs), with no geographic or sex differences. Results highlight the need for age-based surveillance to guide dengue control.

Problem Statement

Puerto Rico is a dengue-endemic region where the population is continuously exposed to the virus. Monitoring seroprevalence helps monitor immunity levels and estimate the proportion of individuals previously exposed to dengue, providing insights into the overall disease burden, which is important for public health planning and allocating resources to combat dengue outbreaks effectively. Studying dengue seroprevalence in Puerto Rico is, therefore, an important step for reducing the disease’s impact, protecting public health, and improving dengue management strategies.

Rationale

This study provides a snapshot of dengue virus IgM and IgG seroprevalence by age and municipality in Puerto Rico, during the current outbreak, thus offering valuable insights into both historical exposure and current transmission patterns.

Hypothesis

If dengue virus transmission is endemic in Puerto Rico, then we expect that IgG seroprevalence will be higher across older age groups (indicating historical exposure), while IgM seroprevalence will be higher in certain municipalities or younger age groups (indicating recent infections and potential transmission hotspots).

Study Design and Methodology

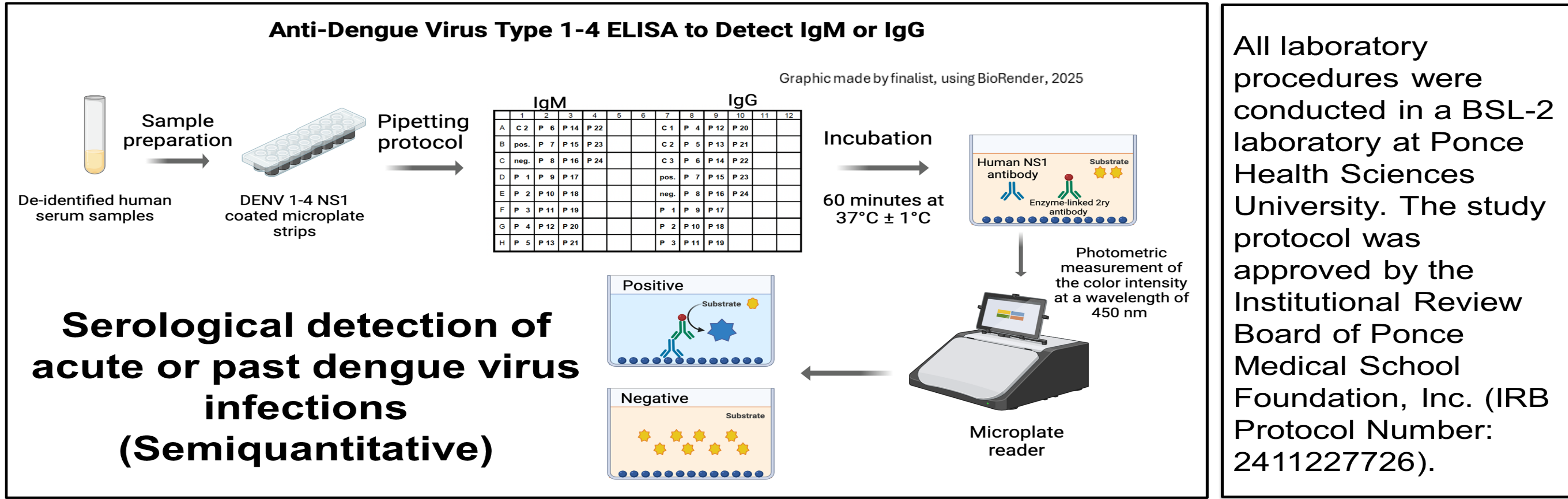
Type: Cross-sectional seroprevalence study

Location: Selected municipalities in South-West Puerto Rico

Population: Individuals from all age groups residing in selected municipalities

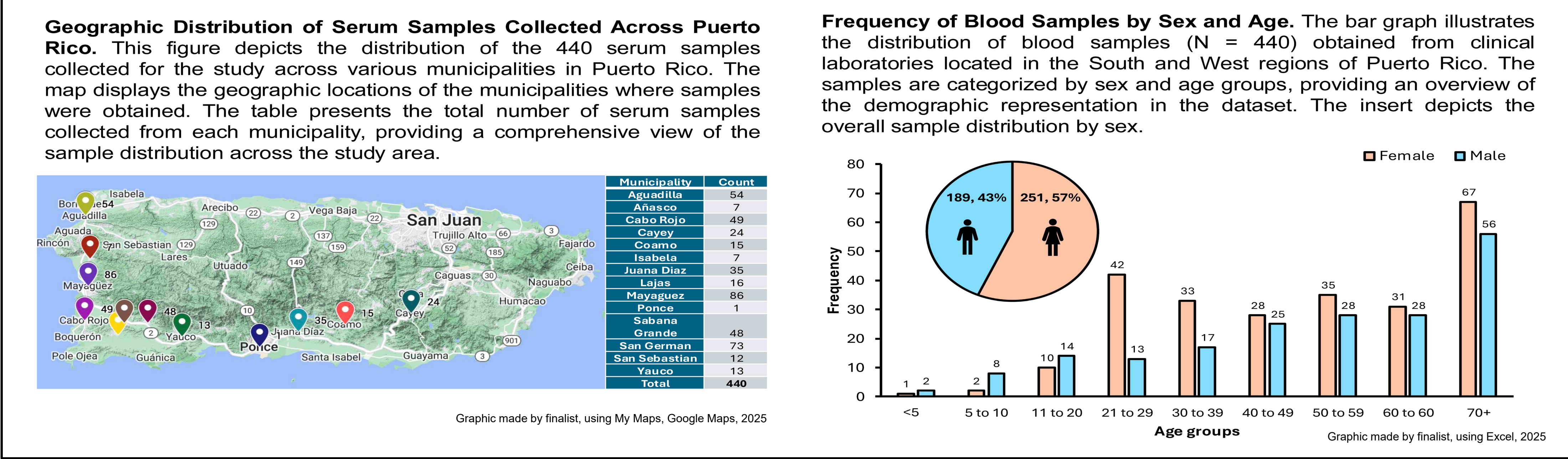
Sampling Strategy: This study analyzed 440 de-identified serum samples, originally excess from diagnostic testing, collected from 14 clinical laboratories in southwestern Puerto Rico, each with basic demographic data (age, municipality, sex).

Understanding IgG and IgM Seroprevalence of Dengue Virus in Southern Puerto Rico: A Key Step to Reduce Disease Burden



All laboratory procedures were conducted in a BSL-2 laboratory at Ponce Health Sciences University. The study protocol was approved by the Institutional Review Board of Ponce Medical School Foundation, Inc. (IRB Protocol Number: 2411227726).

Data Collected



Analyses and Results

Calculation of Results
Semiquantitative analysis for the presence of DENV 1-4 NS1 IgM and IgG antibodies: Results were evaluated semiquantitatively by calculating the ratio of the extinction of the control or patient sample over the extinction of the calibrator 2 according to the following formula:

$$\frac{\text{Extinction of the control or patient sample}}{\text{Extinction of calibrator 2}} = \text{ratio}$$

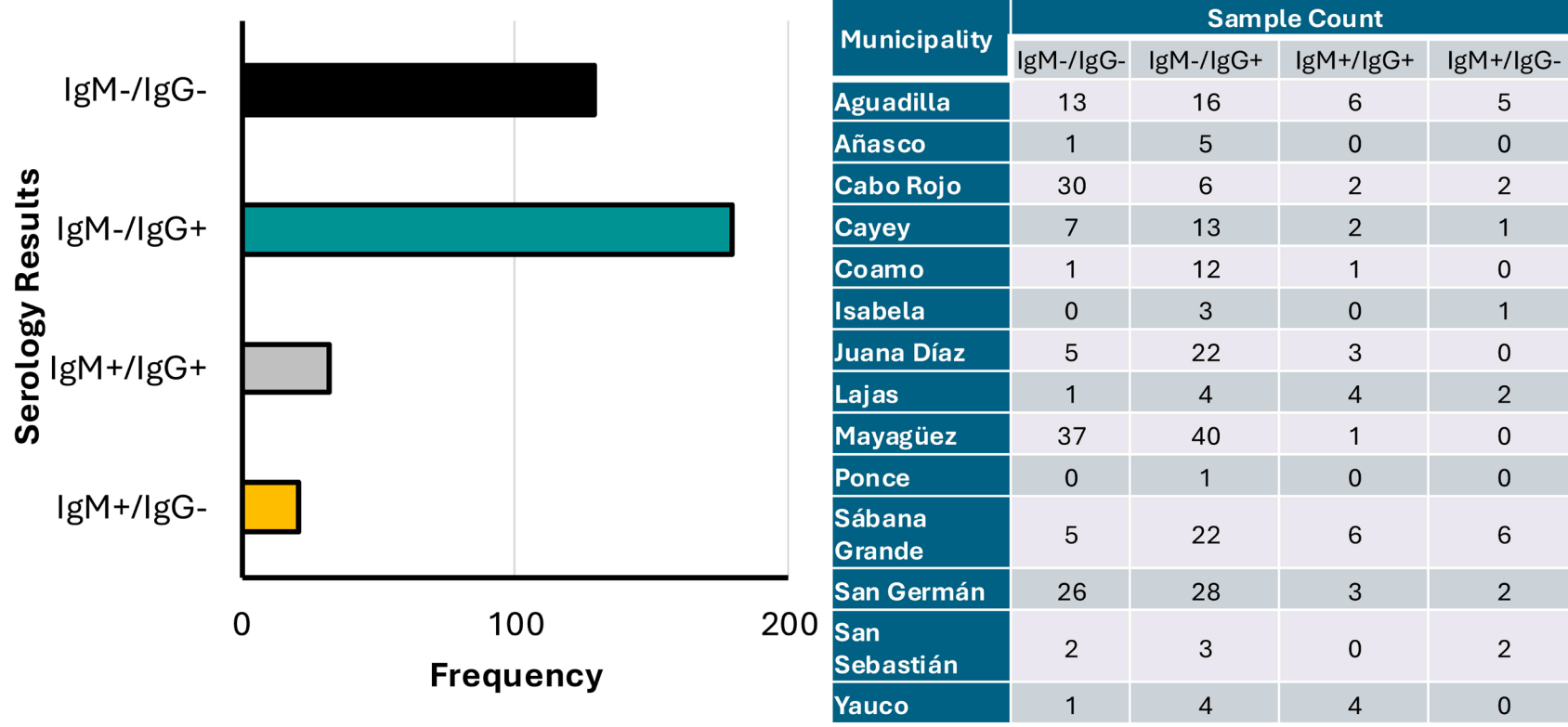
The interpretation of the results was as follows:
Ratio <0.8: negative
Ratio ≥ 0.8 to <1.1: borderline
Ratio ≥ 1.1 : positive

Binary Logistic Regression Evaluating Age and Seroprevalence Status. The tables illustrates the results of a binary logistic regression analysis evaluating the relationship between age and dengue seroprevalence status. The analysis includes age as the independent variable and seroprevalence status (IgM+, IgG+, or IgM+/IgG+) as the dependent variable. The regression model quantifies the odds of seroprevalence as a function of increasing age, highlighting trends in historical and recent dengue exposure across age groups. P-values are presented to indicate statistical significance.

Classification Table ^a				Variables in the Equation ^a							
Observed	Predicted			Step 1 ^a	B	S.E.	Wald	df	value	Exp(B)	
	Age_A	<50	>50								
Step 1	Age_A	<50	28	167	14.4						
		>50	13	232	94.7						
		Overall Percentage					58.1				
		a. The cut value is: .500				b. Variables(s) entered on step 1: IgM+, IgM+/IgG+, IgG.					
					B: Coefficient indicating the effect size and direction of the predictor on the outcome; S.E.: Standard error of the estimated coefficient; Wald: Test statistic to assess the significance; df: Degrees of freedom for the Wald test, often 1 for a single predictor.						

(Table generated by finalist using SPSS, 2025)

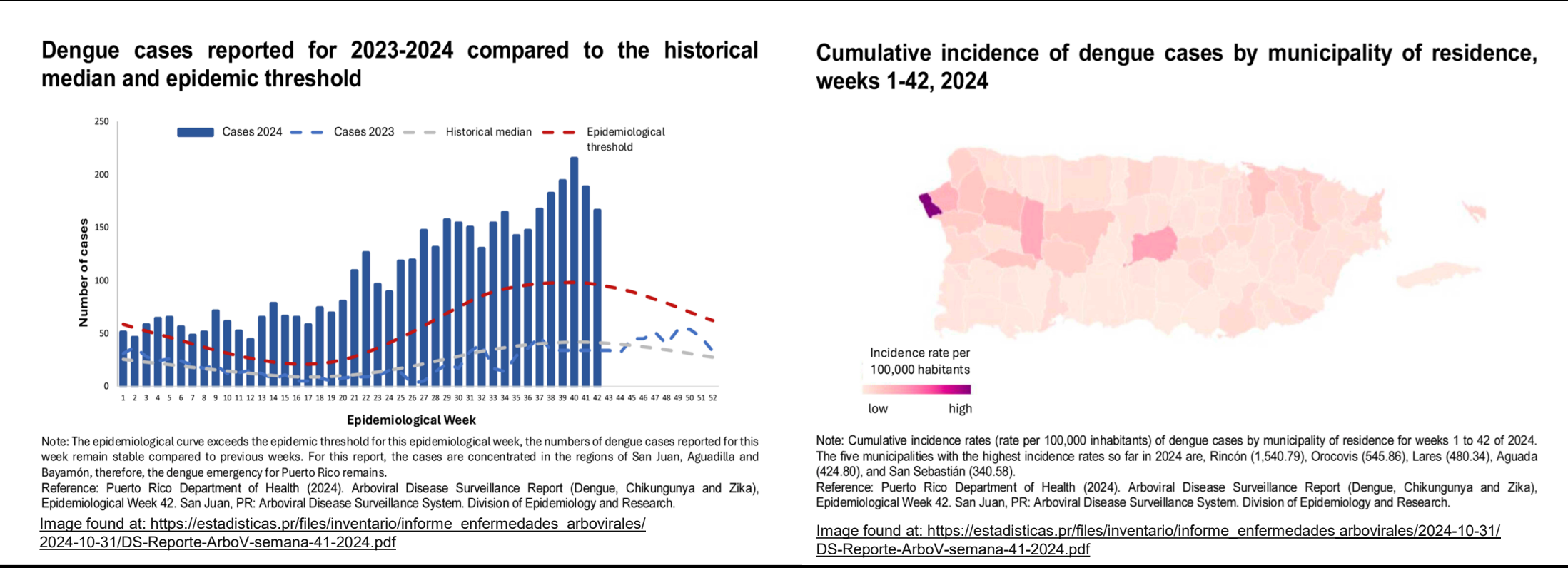
Frequency of Dengue Virus Serology. The graph presents the distribution of IgM and IgG antibodies detected in blood samples obtained from clinical laboratories in the South and West regions of Puerto Rico. The table indicates the number of samples under each serology status per municipality. The data provide insights into the serological prevalence and patterns of Dengue virus exposure in the studied population.



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IBM SPSS Statistics

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Conclusions

- These results show a significant correlation between age and dengue seroprevalence.
- IgM higher in individuals <50 years → recent infections
- IgG higher in individuals ≥ 50 years → historical exposure.
- No association with geography or gender (limited sample).
- Findings may guide dengue management, especially for older adults at higher risk of severe disease.
- This study strengthens U.S. arboviral outbreak response by improving understanding, preparedness, and prevention (monitoring in Puerto Rico is critical due to high tourist traffic with the mainland).
- These findings enhance knowledge of disease patterns, support efforts to reduce morbidity/mortality, and reinforce national health security.

Projections

Future studies should include larger, more geographically diverse samples across the full year to better validate results and guide dengue control in Puerto Rico and the US mainland.

Acknowledgments

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References

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