

AGE, POVERTY AND INEQUITY ARE KEY SOCIAL DETERMINANTS OF DENGUE SEVERITY IN COLOMBIA

Doménica Acevedo-López (1,2)*, Mia Colton (3), Diana M. Rojas-Gallardo (2), Valeria Álvarez-Amaya (2), William Díaz-Henao (2), Alfonso J Rodríguez-Morales (2), Eva Harris (4), Matthew H. Collins (5), Jaime A. Cardona-Ospina (2,4,6)
 1. Semillero de Investigación en Infecciones Emergentes y Medicina Tropical; 2. Grupo de Investigación Biomedicina, Facultad de Medicina, Fundación Universitaria Autónoma de las Américas, Pereira, Risaralda, Colombia; 3. Rollins School of Public Health, Emory University, Atlanta, Georgia, USA; 4. School of Public Health, University of California, Berkeley, USA; 5. Division of Infectious Diseases, School of Medicine, Emory University, Atlanta, Georgia, USA

INTRODUCTION

Dengue is a major burden of disease in children in tropical countries, where they are at higher risk of complications and death. Observational studies have shown a bimodal distribution of severe dengue among children and antibody-dependent enhancement has been proposed as an explanation. However, the risk of severe disease can vary across age groups, and data from epidemiologic surveillance could provide insights into the role of age as a risk factor for complications and lethality.

OBJECTIVE

To analyze the risk of severe dengue across different age groups using routine epidemiologic surveillance from Colombia

METHODS

This is an observational retrospective study. We use data obtained from the National Surveillance System of Colombia between 2012 and 2017 to analyze cumulative incidence (cases/100,000pop), mortality rate (deaths/100,000pop), case fatality rate (CFR), and complication rate (CF) across different age groups. Odds ratios were calculated across the life-span and adjusted by year of infection, geographical area and index of poverty (monetary poverty and extreme poverty) and inequity (GINI index). DALYs loss was also assessed. The effect of age, department, year of infection, monetary poverty, extreme poverty, and GINI on CR and CFR was evaluated by using a generalized additive model (GAM).

RESULTS

Disease burden was **concentrated in children** and varied importantly across different epidemic years

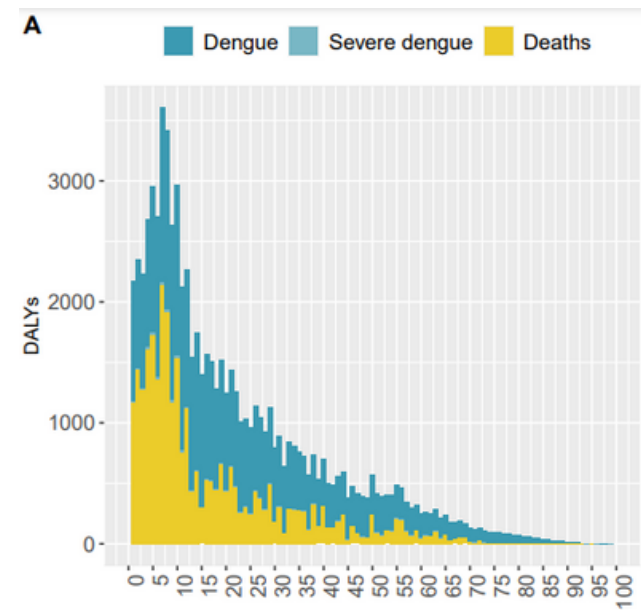
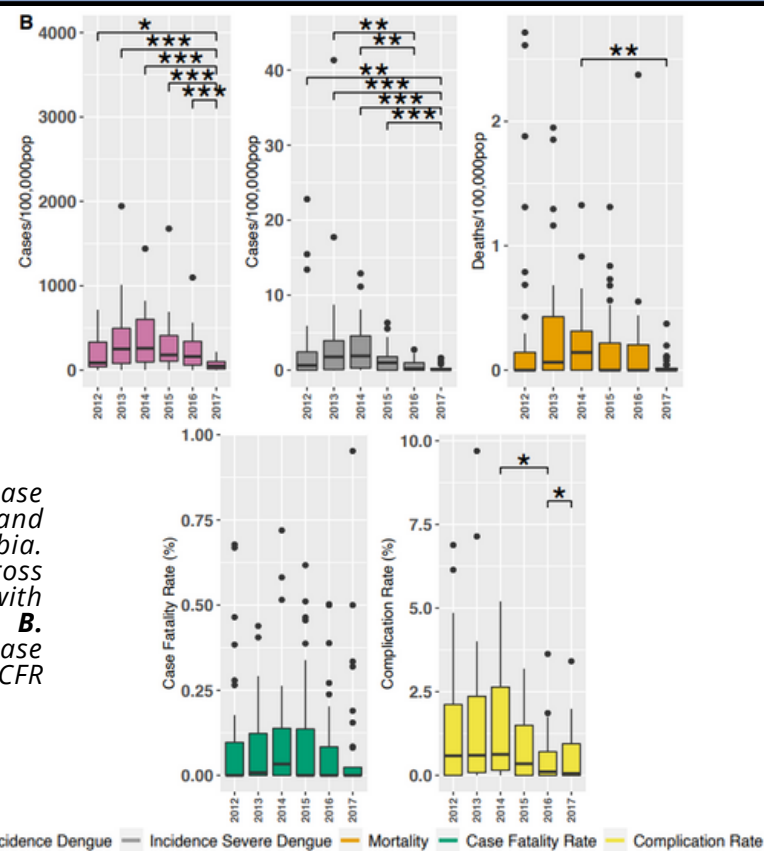


Figure 1. Distribution of disease burden across the lifespan and different epidemic years in Colombia. **A.** Distribution of DALYs loss across the lifespan due to Years Lived with Disability and Years of Life Loss. **B.** Variation in incidence, severe disease incidence, mortality, CR and CFR across different epidemic years.



RESULTS

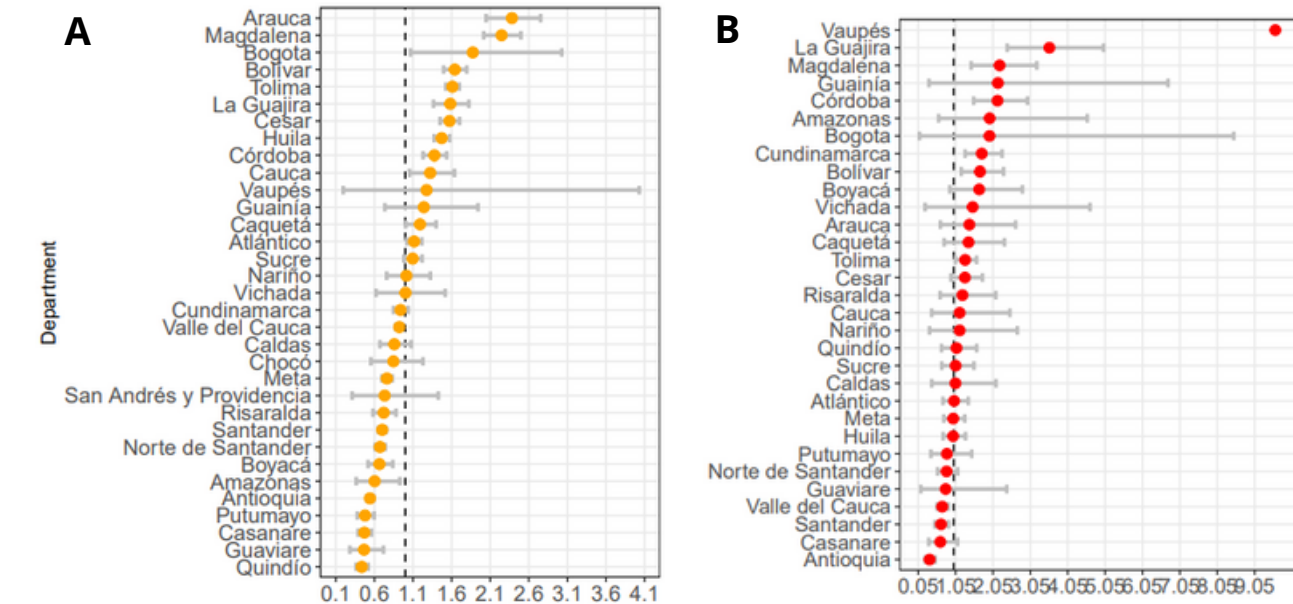


Figure 2. Odds ratio for complication (A) or death (B) among departments (First administrative level) of Colombia, 2012 to 2017. Each department was compared with the Odds of complication or death at the national level.

Odds of **complication** and **death** varied significantly across different departments in the country.

Arauca, Magdalena, and Bogotá were the departments with the highest odds of complication.

While **Vaupés, La Guajira, and Magdalena** were the departments with the highest odds of death.

We found a significant association between **incidence of severe DENV and monetary poverty** ($R = 0.168, p < 0.05$), **mortality and monetary poverty** ($R=0.170, p=0.04$), **CR and extreme poverty** ($R=0.192, p=0.02$) and **GINI** ($R=0.180, p=0.03$), and **extreme poverty and DALY loss** ($R=-0.172, p=0.04$).

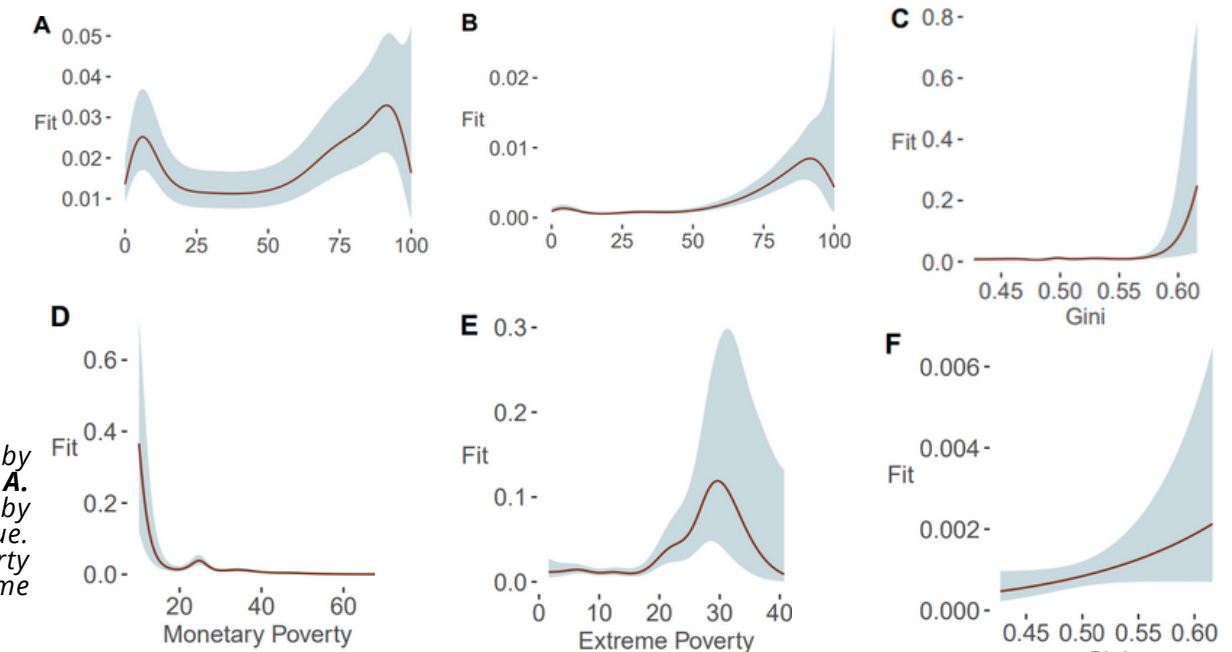


Figure 3. General additive model adjusting by age, department, year, and poverty indexes. **A.** Risk of complication by age. **B.** Risk of death by age. **C.** Risk of complication by GINI index value. **D.** Risk of complication by monetary poverty index value. **E.** Risk of complication by extreme poverty index value.

CONCLUSIONS

Children bear 40% of the dengue burden in Colombia. CFR were steady among them, but it increased in the elderly. We found that age, department, poverty, and inequity indexes were significantly associated with the development of severe DENV, but after adjusting by potential confounders only age was associated with the risk of death.

