

Extreme Rainfall, Flooding Events and Leptospirosis Incidence: A Decade-Long Ecological Analysis in Southern Brazil

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INTRODUCTION & AIM

Leptospirosis is a zoonotic disease caused by bacteria of the genus *Leptospira*, prevalent in tropical regions. Transmission is facilitated by heavy rainfall, inundation, and poor sanitation. In 2024, Rio Grande do Sul experienced widespread flooding. Therefore, this study aimed to evaluate socio-demographic distribution and temporal trend of leptospirosis in southern Brazil, with particular attention to the 2024 event.

METHOD

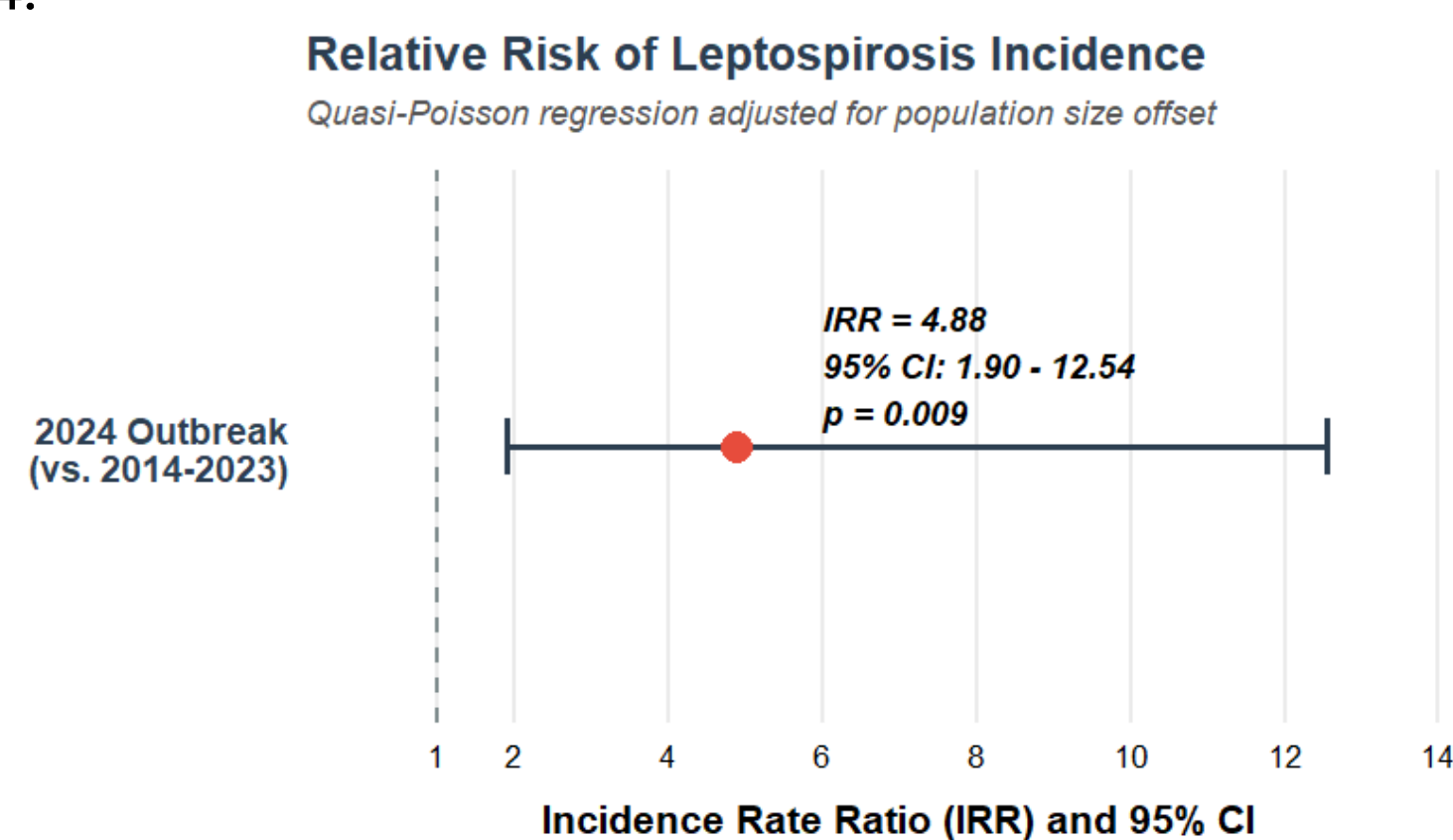
A retrospective ecological study was conducted including all confirmed leptospirosis cases in Rio Grande do Sul from January 2014 to December 2024, obtained from TABNET/DATASUS. Analyses were performed in R (v.4.4.2) and RStudio. To compare 2024 with the 2014–2023 period, quasi-Poisson regression with population offset was applied due to overdispersion. Cases were further stratified by educational attainment as a proxy for socioeconomic position. As an ecological study, causal inferences at the individual level cannot be established.

RESULTS & DISCUSSION

A total of 5,569 cases were analyzed.

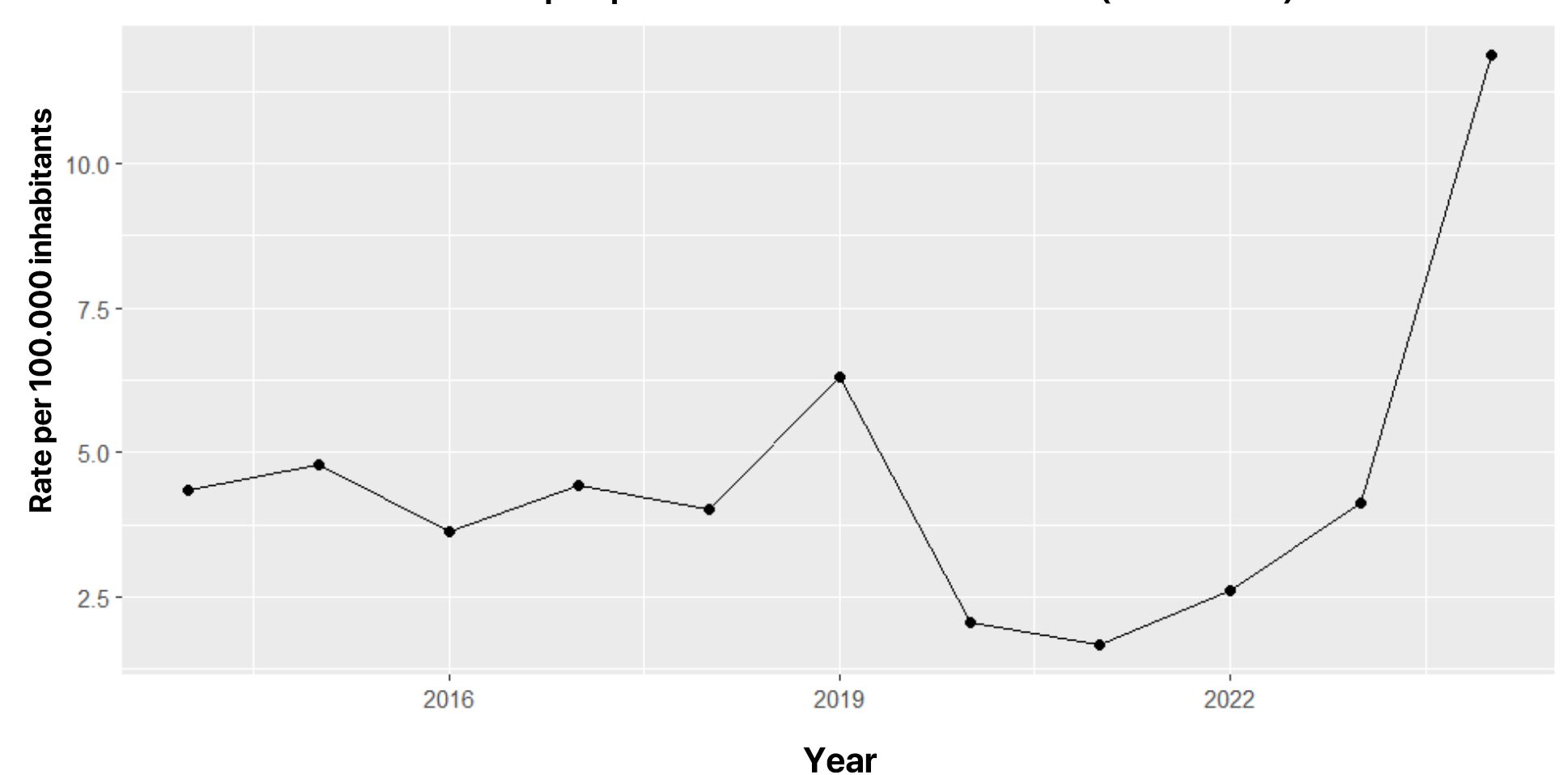
Annual incidence rates remained stable between 2 and 6 cases/100,000 inhabitants from 2014 to 2023, but increased in 2024, exceeding 10 cases per 100,000.

In regression analysis adjusted for population size, incidence in 2024 was higher compared to 2014–2023 (IRR = 4.88; 95% CI: 1.90–12.54; $p = 0.009$). The increase was temporally associated with extreme rainfall and flooding in May 2024.

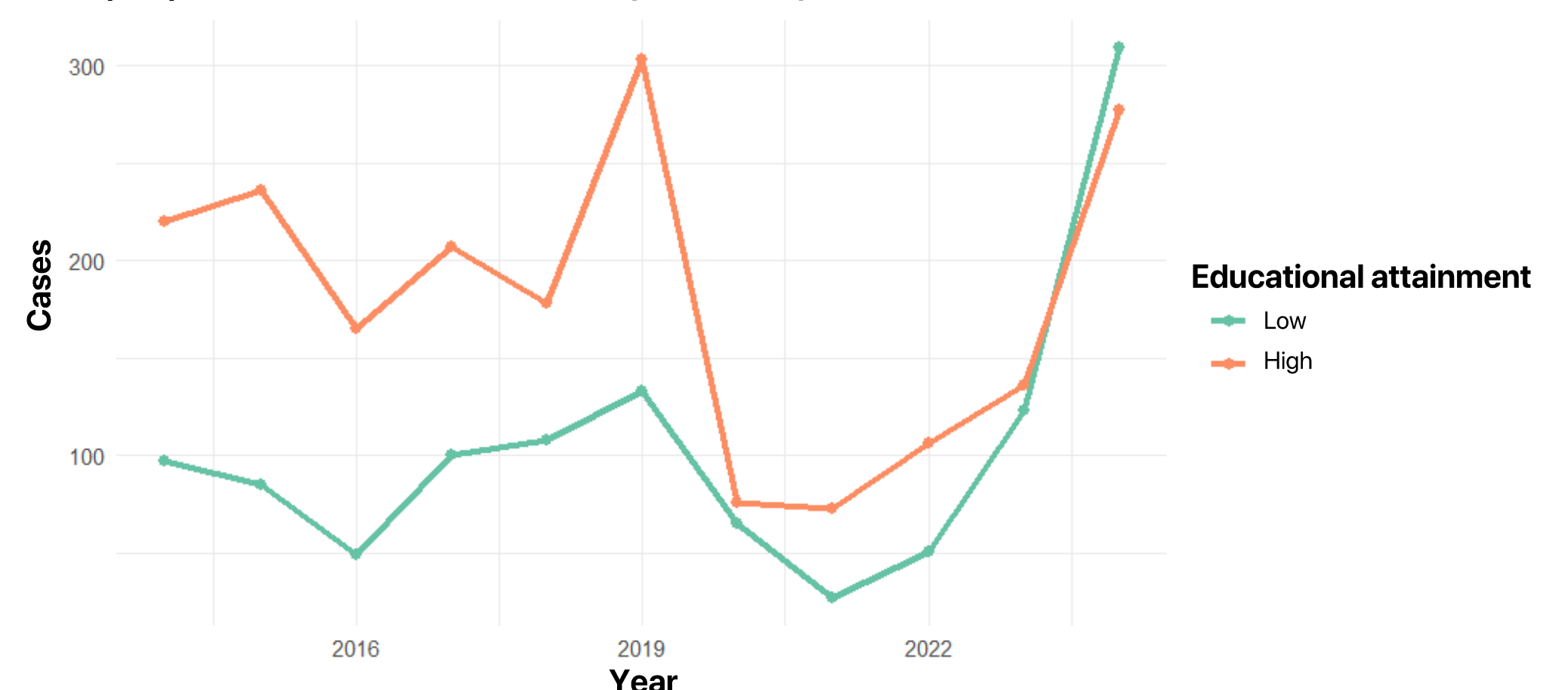


Regarding educational attainment, individuals with primary education consistently represented the majority of cases throughout the decade. Still, the 2024 outbreak was characterized by a substantial increase across all educational levels compared to preceding years.

Annual incidence rates of leptospirosis in Rio Grande do Sul state (2014–2024)



Leptospirosis cases and education level (2014–2024)



CONCLUSION

The increase in leptospirosis incidence in 2024 highlights its sensitivity to extreme flooding events. Although individuals with lower educational attainment accounted for a large proportion of cases, this likely reflects differences in exposure rather than intrinsic risk. Further analytical studies are needed to clarify social and environmental determinants.

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