INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

PROGRAMA DE PÓS-GRADUAÇÃO EM

SENSORIAMENTO REMOTO

Disciplina: População, Espaço e Ambiente

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Rerolle, F., Arnold, B. F., & Benmarhnia, T. (2023). Excess risk in infant mortality among populations living in flood-prone areas in Bangladesh: A cluster-matched cohort study over three decades, 1988 to 2017**. Proceedings of the National Academy of Sciences of the United States of America**, 120(50), e2218789120. https://doi.org/10.1073/pnas.2218789120.

JUSTIFICATIVA

The article aims to understand the impact of living in flood-prone areas on infant mortality in Bangladesh over a period of 30 years (1988-2017). The authors seek to determine how floods influence infant mortality and whether the effects are immediate, following the event, or also happens in long-term.

To achieve this, the authors identify flood-prone areas using data from the Global Flood Database, which globally mapped 913 flood events using MODIS data resampled to 30m and field information on both flooded areas and affected communities. The study focuses on data from 7 floods that occurred between 2002 and 2017.

The population data were obtained from the Demographic and Health Surveys (DHS) (1999, 2004, 2007, 2011, 2014, 2017). These are composed by surveys that included GPS-referenced data from random cluster surveys of households, where birth and death dates of children from women under 49 years old were collected. Based on these data, an estimate of infant mortality over the previous 30 years, from 1987 to 2017, was made.

Propensity score matching was employed to compare mothers who gave birth in flood-prone areas with mothers who gave birth in non-flood-prone areas and had similar socioeconomics and environment. The aim was to reduce selection bias and improve comparability between the groups.

Firstly, variables that could influence both flood exposure and infant mortality were selected. These variables included region, residential location (urban or rural), mother's date of birth, mother's age at first birth, total number of children, highest education level attained, wealth index, drinking water source, sanitation conditions, flooring, ceiling, and wall materials of residences, and whether toilets were shared with other households.

The next step involved estimating the propensity score for living in a flood-prone area. This was done using a logistic regression model that utilized the matching variables as predictors. The propensity score was defined as the reciprocal of the predicted odds of a mother living in a flood-prone area.

With the estimated propensity scores, mothers were matched within each wave of the Demographic and Health Survey (DHS) using the nearest neighbor matching method without replacement. This means that for each mother in a flood-prone area, a mother in a non-flood-prone area with a similar propensity score was found. This matching resulted in very good balance in measurable characteristics between the groups.

After matching, it was verified whether there was good balance in measurable characteristics between the matched groups. This ensured that observed differences in infant mortality between the groups could be attributed to flood exposure rather than differences in matching characteristics.

After this process, the authors calculated the excess mortality using adjusted mortality estimates and high-resolution population data. They assessed the stability of the population proportion in flood-prone areas over time and used WorldPop estimates at a resolution of 1 km² from 2003 (the median year of the study). Considering an average annual birth rate of 25 per 1000 people, they calculated excess mortality using the formula: excess mortality = population x birth rate x study period length x risk difference.

The results indicate an excess risk of infant mortality associated with living in flood-prone areas in Bangladesh. There's an excess risk at 5.3 additional deaths per 1000 births, with differences between the rainy (7,9 additional deaths per 1000 births) and dry seasons (3,1 additional deaths per 1000 births).

Furthermore, the study found heterogeneity in excess risk over time and seasons. The risk decreases between 1988-1997 and 1998-2007, increasing from 2008 to 2017, suggesting a progress in reducing infant mortality in the past three decades, threatened by flood-prone areas.

Although the article does not directly address what I am proposing, it provides a cross-sectional perspective on sanitation, water properties, and infant mortality rate, demonstrating how remote sensing can be used to reveal the relationships between these dimensions, with a focus on water.