

Weather Shocks and Health at Birth in Colombia

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Motivation

Poor health at birth:

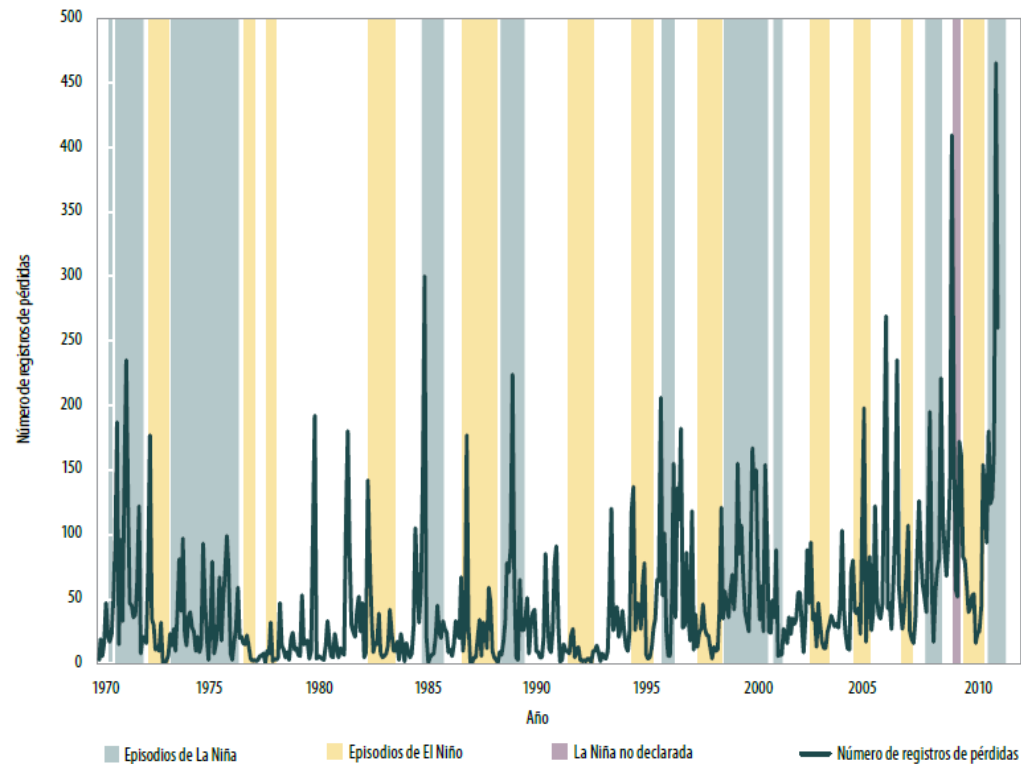
- has large long-run effects on individual well-being.
- adversely affects health in childhood and adulthood (Almond et al., 2005; Black et al., 2007, Alderman et al., 2006; Almond, 2006) and educational outcomes (Behrman and Rosenzweig 2004; Glewwe et al., 2001).
- is also detrimental for intergenerational mobility because its impact on health and educational outcomes lead to reduced earnings (Case and Paxson, 2008; Duflo, 2001), and low-income parents are more likely to have health-ill children (Case and Paxson, 2006).

Health outcomes at birth can be affected by extreme weather events, which are often cited as the most important risk factor faced by rural household (Giné, Townsend and Vickers, 2008).

Motivation (2)

- Colombia is one of the countries with the highest incidence of extreme weather events, which have also increased considerably in the last three decades.
- According to the Global Climate Risk Index, in 2010 Colombia was the third most affected country by the impacts of weather-related loss events (storms, flood, heat waves, etc.) (Germanwatch, 2012).
- Increasing climate variability, often linked to the occurrence of El Niño/La Niña phenomena, have led to significant losses in Colombia.
- Massive flooding during the 2010-2011 rainy season (*ola invernal*) alone impacted 4 million people causing 423 deaths and large economic losses—(2 percent of Colombia's GDP).

Episodes of La Niña/El Niño and registered deaths from hydrometeorological phenomena



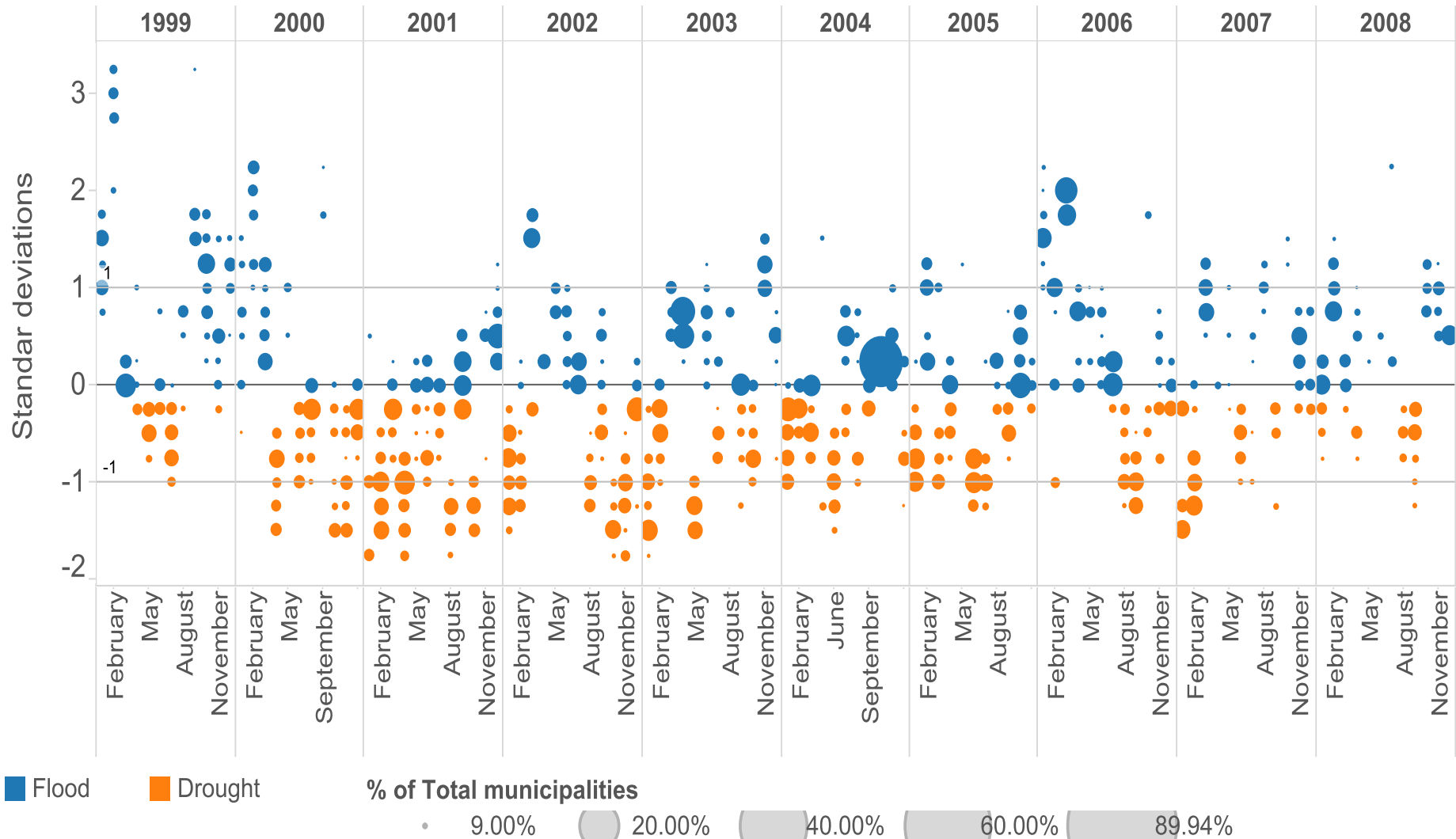
Research question

- **What is the impact of exposure to extreme weather events while *in utero* on birth outcomes in rural Colombia over the period 1999-2008?**
- This paper
 - Takes advantage from administrative data of vital statistics (birth records by GoC), and monthly temperature and rainfall data;
 - Relies on the fact that weather shocks are uncorrelated with any latent determinant of birth outcomes, and;
 - Identify the causal effect of weather shocks on weight at birth.

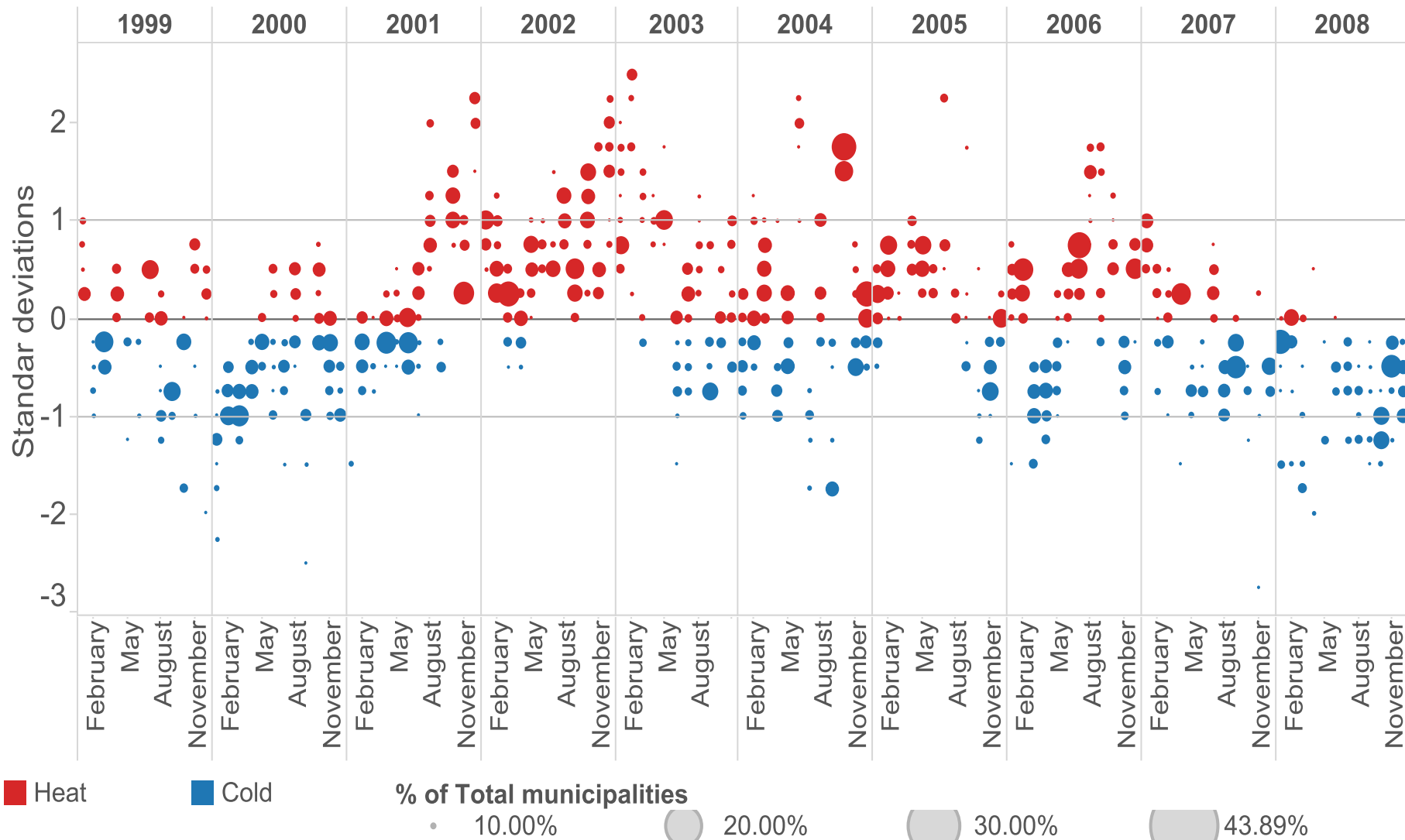
Data and method

- Merge monthly temperature and rainfall data with unique, nationally representative, administrative data on birth records in Colombia from 1999 to 2008.
- The paper identify extreme precipitation and temperature events based on the magnitude of the deviation from the historical average monthly rainfall level in a given municipality.
- To gauge the casual effect, the study relies on the exogenous variation in fetal exposure to shocks by municipality and date of birth using a fixed effects design.
- Identification strategy relies on the fact that temporary rainfall and temperature deviations from the historical average in the individual's region of birth while in utero are uncorrelated with latent determinants of health at birth.
- Detailed data also allows us to explore how the effect of weather shocks varies according to the timing during gestation.

Z-scores of rainfall by month over the period 1998-2008



Z-scores of temperature by month over the period 1998-2008



Main results

1. **Very limited effects of rainfall shocks on birth outcomes in Colombia, but robust effects of temperature shocks. These**
 2. **The effects of temperature shocks are small, but in line with what previous literature has found.**
 3. **The birth weight of girls and boys is affected differently by temperature shocks during *fetal* life**
- The above suggests that the coping strategies allowing pregnant women to protect their offspring in the event of weather shocks in Colombia are only partial.
 - What makes this last result so striking is that the incidence and frequency of hot shocks in Colombia and worldwide are increasing and will continue to increase as a result of climate change.

Detailed results

- (1) some health at birth outcomes improve with exposure to cold shocks and worsen with exposure to hot shocks, and
- (2) the timing of exposure to the shock while *in utero* matters, and it matters differently for different outcomes.
- (3) Exposure to cold shocks during the third trimester of the mother's pregnancy raises gestational length and the share of healthy newborns.
- (4) Exposure to a cold event during the first trimester also raises the probability of being classified as a healthy baby.
- (5) Exposure to hot waves at any point in pregnancy reduces the proportion of full term and healthy newborns, and it also decreases length when exposure occurs during the third trimester
- (6) The birth weight of girls and boys is affected differently by temperature shocks during *fetal* life: boys' are born slimmer when affected by a cold weather shock and heavier when exposed to a hot weather shocks.

Implications for policy

- Long-run effects of health at birth on later health, schooling, and income, and their implications for economic mobility should be factored into cost-benefit analyses of programs targeting this subpopulation.
- Our findings provide additional justification for interventions that shield infants from the health consequences of temporary environmental shocks, such as food security policies, weather insurance, social insurance schemes and public health investments.
- However, future research should aim to enhance our understanding of the mechanisms that lead weather shocks to affect health outcomes at birth and other measures of individual welfare, as this will aid policy makers to prioritize the interventions that are more likely to counteract the effects of weather shocks associated with climate change.