The Interplay between Maternal Resources and Environmental Stressors: The Effects of an Earthquake on Birth Outcomes

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Extended abstract:

In this paper we focus on birth weight, which is extensively used in medicine, epidemiology and demography as a very powerful indicator of perinatal and infant health. Birth weight is strongly correlated with later health and cognitive outcomes in the short-, mid- and long-term. In particular, the impact of low birth weight (LBW), defined as the weight below 2,500 grams regardless of gestational age, has been found to increase the risk of infant morbidity and mortality and to worsen health status (Johnson & Schoeni, 2011). LBW has been also confirmed in the literature as a significant determinant of educational outcomes (Conley & Bennett, 2000; Hack, Klein & Taylor, 1995; McCormick, Gortmaker & Sobol, 1990; Reichman, 2005) and even earnings in adult ages (Black, Devereux & Salvanes, 2005). Recent research on babies born with extremely low weights proves neurobehavioral impairment at the age of 8 years to be a persistent pattern (Hutchinson et al., 2013).

On the one hand, medical research has extensively analyzed the determinants of birth weight due to genetic factors (foetal chromosomal abnormalities), problems in the placenta (intra-amniotic infection, placental abruption and placental insufficiency), several conditions experienced by the mother during pregnancy (high blood pressure, or heart or kidney disease), and mother's lifestyle (incorrect nutrition during gestation, smoking, other substances). On the other hand, demographers and sociologists have tended to focus on the influence of socioeconomic resources of the family (Boardman, Powers, Padilla & Hummer, 2002; Pattenden, Dolk & Vrijheid, 1999), migrant status (Cebolla-Boado & Salazar, 2016) or emotional status (Hohmann-Marriott, 2009) on LBW. The evidence supports the notion that children born to mothers/families with more resources of various kinds tend to avoid to a greater extent both LBW and macrosomia (unhealthily high weight at birth).

Significantly less is known about environmental influences on birth weight and especially about the interplay between mothers' characteristics and exogenous factors, partly because the data required for this type of approach is less abundant. There is evidence on external shocks such as natural disasters or terrorist attacks (that are often treated as natural experiments), but the findings are mixed. For instance, the earthquake occurred in Chile in 2011 reduced birth weight and increased LBW in the first trimester, not in the others (Torche, 2011). However, the effects of severe storms and hurricanes in Texas linking the Weather Underground Hurricane Archive and Texas birth registers for several years produced no proof of any relationship with birth weight, but an association with complications during delivery and abnormal conditions (Currie &

Rossin-Slater, 2012). Mixed results have been reported as regards the impact of air pollution on different birth outcomes (Panasevich et al, 2016).

In this paper we exploit a similar exogenous shock, an earthquake that took place in the municipality of Lorca (region of Murcia, Spain) in 2011, and the availability of the universe of birth certificates in the country in that year, to test its effects on the weight of newborns that were exposed to the event, and to evaluate the potential buffering role of maternal characteristics on these negative effects. Using various methods such as difference in difference and spatial regression we answer two specific questions:

(1) Is there is an association between (degrees of) exposure to the earthquake and lower birth weight, whether this comes via reduced gestational age or restricted intrauterine growth? In order to address this question we compare children exposed to the earthquake to different extents, using the various intensities experienced by Lorca and surrounding municipalities as registered in official records and linking them to birth certificates at the local level.

(2) Is this adverse impact homogeneously distributed across social classes? The main mechanism by which this event is expected to affect birth outcomes (in our case, birth weight) is stress. Stress during pregnancy is associated with preterm births and inferior infant health outcomes (Lauderdale, 2006; Dole et al, 2003). We therefore wonder whether socioeconomic resources (in our data, level of education, migrant status and marital status of the mother) play any protective role against the adverse effects of the disaster.

Conclusions would add evidence to a growing corpus of literature that however offers inconclusive results and would prove important to deepen our understanding of early childhood conditions influencing later outcomes, and inequalities that are generated very early in life.