The Impact of Natural Disasters on Child Mortality and Early Childhood Health Investments in India

Ashlesha Datar, RAND

Sebastian Linnemayr, RAND

Chad Stecher, UCLA

Natural disasters perennially exact a serious toll on the world's populations. Between 1994 and 2003, more than 255 million people were affected by natural disasters globally each year (Guha-Sapir, Hargitt and Hoyois, 2004). In addition to the immediate deaths, natural disasters may have longer-term health impacts, especially on vulnerable populations such as children and the elderly. By destroying, damaging or straining health infrastructure, natural disasters might affect critical health investments in children, such as immunizations and prenatal care, which might in turn make them vulnerable to otherwise preventable diseases. Shocks to household income from loss of property and lives could in turn affect health investments in children. Moreover, the increased mortality risk in disaster areas might lower parents' incentive to make health investments in their children.

Existing work on the impacts of natural disasters on child health primarily consists of case-studies of specific disaster events. For e.g., the 1994-1995 drought in Zimbabwe slowed the growth of children under two (Hoddinott and Kinsey 2001), forest fires in Southeast Asia adversely affected child mortality (Frankenberg et al., 2004; Sastry, 2002; Jayachandran, 2006), and post-traumatic stress disorder in children increased both after Hurricane Mitch (1998) in Nicaragua (Armen et al., 2000) and the earthquake in Ano Liosia, Greece, in 1999 (Roussos et al., 2005). Moreover, to our knowledge, no studies have examined how disasters influence early childhood investments.

In this paper, we estimate the impact of natural disasters on childhood mortality and morbidity, and early-life health investments by combining household data from three waves of the Indian National Family and Health Survey (NFHS, 1992-93, 1998-99, 2005-06) with an international natural disaster database (Emergency Events Database, EM-DAT) containing detailed information on the date, location, death toll and other details for a variety of natural disasters such as droughts, earthquakes, epidemics, wind storms and many others. We estimate econometric models with area (state) and time fixed effects to examine the effect of natural disasters during the child's in-utero through fifth year of life on child mortality. We also examine effects on stunting and wasting, as well as incidence of other morbidities such as

anemia, diarrhea, and acute respiratory illness in the years following the disaster. Next, using the same fixed effect models, we test whether natural disasters affect health investments in children such as immunizations, breastfeeding, and prenatal care. Such effects might operate through income shocks, damage to health infrastructure that these investments are dependent upon, and/or behavioral responses of households to increased mortality risk. We examine the relative impact of natural disasters on infrastructure-dependent health investments (e.g., immunizations, prenatal care) compared to other investments that do not rely on health infrastructure (e.g., breastfeeding). We also separately examine the effects of disasters that are likely to damage infrastructure (e.g., earthquakes) versus those that primarily lead to income shocks (e.g., droughts). We examine whether these effects vary by child's age and gender.

Preliminary results show that areas with greater frequency and severity of natural disasters are associated with significantly higher childhood mortality and significantly lower likelihood of immunizations. For e.g. exposure to a severe disaster (i.e. disasters where the size of the affected population was in the top quartile in the distribution of all disasters) in the first year of life increases the likelihood of dying before the age of 5 by 0.7 percentage points (or, 9 percent) and decreases the likelihood of polio, BCG and DPT vaccinations by 3-4 percentage points (or 5-8 percent). These results are robust to inclusion of controls for gender, birth order, wave fixed effects, and household socio-economic characteristics. The addition of area fixed effects (basically, a difference in difference analysis) reduces the estimated impact of disasters on mortality, but the negative effect on immunizations remains strong.

Findings from this study will be important for several reasons. First, there is a global trend in increased frequency and severity of natural disasters (Global Environment Outlook, 1999). Second, poor households worldwide are disproportionately affected by natural disasters because the communities they live in lack resources, infrastructure, and disaster-preparedness systems. Moreover, children in these households are particularly vulnerable, and adverse shocks early in life might permanently alter lifetime trajectories. Finally, for disaster aid to be effective it is important to understand the mechanisms through which disasters impact mortality, morbidity and health investments in early childhood.

References

Guha-Sapir., D. Hargitt, D. Hoyois, P. (2004). *Thirthy Years Of Natural Disasters 1974-2003: The Numbers,* Center for Research on the Epidemiology of Disasters, Presses Universitaires De Louvain: Louvain-La Neuve. [Id N202]

Hoddinott J and Kinsey B. (2001): "Child growth in the time of drought." *Oxford Bulletin of Economics and Statistics*, 63(4):409–436.

Jayachandran, S. (2006): "Air Quality and Early-Life Mortality: Evidence from Indonesia's Wildfires." Stanford economics department, unpublished manuscript.

Frankenberg, E., D. McKee, and D. Thomas (2004): "Health Consequences of Forest Fires in Indonesia," Demography, 42(1), 109–129.

Sastry, N. (2002): "Forest Fires, Air Pollution, and Mortality in Southeast Asia," *Demography*, 39(1), 1–23.

Roussos A, Goenjian AK, Steinberg AM, Sotiropoulou C, Kakaki M, Kabakos C, Karagianni S, and Manouras V. (2005): "Posttraumatic Stress and Depressive Reactions Among Children and Adolescents After the 1999 Earthquake in Ano Liosia, Greece." *Am J Psychiatry*, 162(3):530–537.

Global Environment Outlook (GEO)-2000 (1999). United Nations Environment Programme (UNEP). Nairobi: Kenya. Available at http://www.unep.org/geo2000/ov-e/ov-e.pdf [accessed on July 12, 2007].