Measuring the short and long-term effects of climate-related disasters

Human development is about expanding freedoms and capabilities. Yet, as explained in chapter 2, this process can be derailed by climate-related disasters. Besides their immediate costs in terms of lives lost and livelihoods disrupted, climate-related shocks carry substantial intrinsic costs that are likely to follow people throughout their lives, locking them into low human development traps. Climate change promises to raise these stakes for billions of vulnerable people.

To capture the extent of the threat to human development that is embedded in climate-related shocks, the short and long-term effects of being born in a disaster-affected area were measured. More specifically, some critical determinants of human development outcomes were examined for children under five years of age and adult women between the ages of 15 and 30, and those who were affected by a disaster were compared with those who were not.

Data

Data for the research were derived from Demographic and Health Surveys (DHS) and the international disasters database EM-DAT maintained by the University of Louvain.

Demographic and Health Surveys (DHS)
The DHS are household and community surveys administered by Macro International and partly financed by the United States Agency for International Development (USAID). These surveys collect information on a wide range of socio-economic variables at individual, household and community levels, and are usually conducted every five years to allow comparisons over time. DHS generally consist of a sample of 5,000–30,000 households but are not longitudinal in design. The survey design is representative at national, urban and rural levels.

Although their primary focus is on women aged 15–49, DHS also collect information on demographic indicators for all members of the household. For children under five years of age, these surveys also collect such monitoring and impact evaluation variables as health and nutrition indicators.

International disasters database EM-DAT
The EM-DAT is an international disasters database that presents core data on the occurrence of disasters worldwide from 1900 to the present. Disasters in EM-DAT are defined as: "a situation or event which overwhelms local capacity, necessitating a request to the national or international level for external assistance, or is recognized as such by a multilateral agency or at least by two sources, such as national, regional or international assistance groups and the media". For a disaster to be recorded in the database, it has to meet one or more of the following criteria:

- 10 or more people are killed;
- 100 people or more are reported affected;
- A state of emergency is declared;
- An international call for assistance is issued.

A key feature of this database is that it records both the date of occurrence of a disaster—relatively recent ones—its location, and the extent of its severity through the number of people affected, the number of casualties and the financial damage.[1]

Country selection criteria
For the purposes of this study, only countries where over 1,000,000 people were reported affected by a disaster were selected. For children

under the age of five countries that had a DHS with a geographic positioning system (GPS) module two to three years following a disaster were selected. The selection of countries with GPS modules was necessary, especially for countries where some administrative districts were more affected than others. For adult women selection was limited to major disasters that had occurred during the 1970s and 1980s; with the requirement that the disaster in question occurred at least 15 years prior to the first DHS. See table for country coverage and sample characteristics.

Methodology

This approach borrows from impact evaluation techniques widely used in the social sciences. For children under the age of five, the outcome indicators used were: stunting (low height for age), wasting (low weight for height) and malnourishment (low weight for age). For adult women 15–30, the outcome indicator was educational outcome. In the absence of longitudinal data, a set of synthetic before and after cohorts were constructed and their outcomes compared using logit regressions with a difference-in-difference approach, controlling for individual, household and community characteristics.

To construct the cohorts, children and adult women in DHS were identified and their birth dates tracked. The subject's birth date and birth location were then crosschecked against the occurrence of a natural disaster as indicated in EM-DAT. The following groups were identified:

- Subjects born before a disaster in an area that was subsequently affected (born before, affected—group 1, affected).
- Subjects born before a disaster in an area that was not subsequently affected (born before, not affected—group 1, not affected).
- Subjects born during a disaster in an area that was affected (born during, affected—group 2, affected).

- Subjects born during a disaster in an area that was not affected (born during, not affected—group 2, not affected).

Using these different groups, the following model was estimated:

$$\hat{\phi} = \frac{1}{N}\sum_{i=1}^{n}[(y_{i2}^{a} - y_{i1}^{a}) - (y_{i2}^{na} - y_{i2}^{na})]$$ where y_i is the outcome in question for the ith person.[2]

At each step, a set of control variables were used to identify the effects of specific characteristics on children's nutritional outcomes. These included individual variables (the sex of the child, birth intervals and such maternal characteristics as mother's age and education) and community-level variables (e.g., urban/rural location). A regression analysis was then conducted to isolate the specific risks associated with being affected by a disaster.

For adults, if it is assumed that disasters are a deterministic process, then virtually every indicator including household socio-economic characteristics is determined by early exposure to a disaster, and is therefore endogenous. As a result, only variables that can reasonably be assumed exogenous, such as religion, were included.

Most of the results are shown and discussed in chapter 2 and in Fuentes and Seck 2007.

Notes

1 Guha-Sapir et al. 2004
2 Cameron and Trivedi 2005

Table	Country coverage and sample characteristics				
Country	**Year of survey**	**Sample size**	**Stunted (%)**	**Malnourished (%)**	**Wasted (%)**
Children					
Ethiopia	2005	9,861	43.4	37.8	11.1
Kenya	2003	5,949	32.5	20.2	6.7
Niger	1992	6,899	38.2	38.9	14.5
Adults	**Year of survey**	**Sample size**	**No education (%)**	**At least primary education (%)**	**At least secondary education (%)**
India	1998	90,303	35.3	50.5	33.6