DISASTER TYPES AND IMPACTS

This chapter presents a range of data and a brief discussion on the nature, distribution, and impact of disaster events. It also covers the emerging understanding of the nexus between disaster risk and poverty. This information is provided to help policy makers and World Bank task managers who may need data, concepts, or policy arguments to justify attention to disaster risk reduction (DRR) in reconstruction or to define DRR policy objectives in the context of public investment planning in general.

Data collection on disasters has improved markedly in recent years and several authoritative sources are listed in the resources section below. The International Strategy for Disaster Reduction (ISDR) was launched in 2000 as a framework to coordinate actions to address disaster risks at the local, national, regional, and international levels. The Hyogo Framework for Action 2005–2015 (HFA), endorsed by 168 United Nations (UN) member states at the World Conference on Disaster Reduction in Kobe, Hyogo, Japan, in 2005, urges all countries to make major efforts to reduce their disaster risk by 2015.

In 2009, the United Nations International Strategy for Disaster Reduction Secretariat (UNISDR) published the *2009 Global Assessment Report on Disaster Risk Reduction*, the first biennial global assessment of disaster risk reduction, prepared in context of the implementation of the ISDR. The report, entitled *Risk and Poverty in a Changing Climate: Invest Today for a Safer Tomorrow*, urges a radical shift in development practices, and a major new emphasis on resilience and disaster planning. The report's authors express the concern that response mechanisms after the event are never enough.[1]

This chapter summarizes a number of points from the *Global Assessment Report*, as well as data from the ISDR's Disaster Statistics, 1991–2005 and from the Centre for Research on the Epidemiology of Disasters (CRED) 2008 Annual Disaster Statistical Review.[2] (See sidebar for a description of CRED.)

The Centre for Research on the Epidemiology of Disasters (CRED)

CRED is a nonprofit institution with international status under Belgian law, located in Brussels at the School of Public Health of the Université Catholique de Louvain (UCL). CRED has been active for more than 30 years in the fields of international disaster and conflict health studies, with research and training activities linking relief, rehabilitation, and development, and in1980 became a World Health Organization (WHO) Collaborating Centre as part of WHO's Global Program for Emergency Preparedness and Response.

Since 1988, with support from the United States Agency for International Development's (USAID) Office of U.S. Foreign Disaster Assistance (OFDA), CRED has maintained the Emergency Events Database (EM-DAT), a worldwide database on disasters. The database contains data on the occurrence and effects of almost 16,000 natural and technological disasters in the world from 1900 to the present. Its main objective is to assist humanitarian action at both national and international levels and aims at rationalizing decision making for disaster preparedness and at providing a more objective base for vulnerability assessment and priority setting. The database is compiled from various sources, including UN agencies, nongovernmental organizations (NGOs), insurance companies, research institutions, and press agencies. CRED consolidates and updates data on a daily basis, checks it at 3-month intervals, and conducts annual revisions at the end of each calendar year.

EM-DAT data are used by a range of international agencies, including ISDR and the World Bank, for reporting and analyzing disaster statistics.

Natural Disaster Definitions, Frequencies, and Impacts

CRED defines a disaster as "a situation or event [which] overwhelms local capacity, necessitating a request to a national or international level for external assistance; an unforeseen and often sudden event that causes great damage, destruction and human suffering."

Disasters are the convergence of hazards with vulnerabilities. As such, an increase in physical, social, economic, or environmental vulnerability can mean an increase in the frequency of disasters. The complete EM-DAT divides disasters into 2 categories (natural and technological), and further divides the natural disaster category into 5 subcategories, which in turn cover 12 disaster types and more than 30 subtypes. The principal categories and subcategories are shown below.

1. UNISDR, 2009, *Risk and Poverty in a Changing Climate: Invest Today for a Safer Tomorrow. 2009 Global Assessment Report on Disaster Risk Reduction,* (Geneva: United Nations), http://www.preventionweb.net/gar09.
2. Jose Rodriguez et al., 2009, *Annual Disaster Statistical Review 2008: The numbers and trends,* (Brussels: CRED), http://www.cred.be/publication/annual-disaster-statistical-review-numbers-and-trends-2008.

Disaster subcategory definitions

Geophysical:	Events originating from solid earth
Meteorological:	Events caused by short-lived/small to meso-scale atmospheric processes (in the spectrum from minutes to days)
Hydrological:	Events caused by deviations in the normal water cycle and/or overflow of bodies of water caused by wind set-up
Climatological:	Events caused by long-lived/meso- to macro-scale processes (in the spectrum from intraseasonal to multi-decadal climate variability)
Biological:	Disaster caused by the exposure of living organisms to germs and toxic substances

Natural Disaster Categories, Types, and Subtypes

Biological	Geophysical	Hydrometeorological: Hydrological	Hydrometeorological: Meteorological
Epidemic	**Earthquake**	**Flood**	**Storm**
■ Viral infectious disease	**Volcano**	■ General flood	■ Tropical cyclone
■ Bacterial infectious disease	**Mass movement (dry)**	■ Storm surge/coastal flood	■ Extra-tropical cyclone
■ Parasitic infectious disease	■ Rockfall	**Mass movement (wet)**	■ Local storm
■ Fungal infectious disease	■ Landslide	■ Rockfall	**Climatological**
■ Prion infectious disease	■ Avalanche	■ Landslide	**Extreme temperature**
Insect infestation	■ Subsidence	■ Avalanche	■ Heat wave
Animal stampede		■ Subsidence	■ Cold wave
			■ Extreme winter condition
			Drought/wildfire
			■ Forest fire
			■ Land fire

Source: UCL, "EM-DAT: The OFDA/CRED International Disaster Database," UCL, http://www.emdat.be.

Disaster victims in CRED data include both those killed and those otherwise affected. Using a different set of data to separate only those killed provides another striking indicator of the impact of disasters in recent years.

Disaster Fatalities by Type of Disaster and Level of Development, 1991–2005

Country type	Hydrometeorological			Geophysical			Biological	Total
	Flood	Windstorm	Drought*	Slide	Earthquake & tsunami	Volcano	Epidemic	
Organisation for Economic Co-operation and Development member country	2,150	5,430	47,516	426	5,910	44	442	**61,918**
Central and Eastern Europe and Commonwealth of Independent States	2,635	512	3,109	1,176	2,412	-	568	**10,412**
Developing countries	97,061	65,258	12,599	9,369	397,303	900	47,616	**630,106**
Least developed countries	20,127	149,517	3,320	1,739	9,247	201	70,588	**254,739**
Countries not classified	99	767	57	23	2,277	-	104	**3,327**
Total	**122,072**	**221,484**	**66,601**	**12,733**	**417,149**	**1,145**	**119,318**	**960,502**

Source: ISDR Disaster Statistics, http://www.unisdr.org. *Drought-related disaster category includes extreme temperatures.

Disasters are frequently classified according to their frequency and their impact, as measured by number of victims and economic damage. The following tables show disaster data for 2008 and averages for the 2000–2007 time period.

Natural Disasters: Frequency by Region

No. of natural disasters	Africa	Americas	Asia	Europe	Oceania	Global
Climatological						
2008	10	4	9	9	0	32
2000-07 (Average)	9	14	13	19	2	57
Geophysical						
2008	3	8	18	2	1	32
2000-07 (Average)	3	7	22	3	2	37
Hydrological						
2008	48	39	73	9	9	178
Avg. 2000-07	42	39	82	28	5	196
Meteorological						
2008	10	44	43	13	2	112
Avg. 2000-07	9	34	42	15	7	107
Total						
2008	71	95	143	33	12	354
Avg. 2000-07	63	94	160	65	16	397
No. of victims (in millions)	**Africa**	**Americas**	**Asia**	**Europe**	**Oceania**	**Global**
Climatological						
2008	14.5	0.1	91.1	0.0	0.0	105.6
Avg. 2000-07	9.6	1.1	68.4	0.3	0.0	79.5
Geophysical						
2008	0.0	0.1	47.6	0.0	0.0	47.8
Avg. 2000-07	0.1	0.4	3.6	0.0	0.0	4.2
Hydrological						
2008	1.0	15.9	27.7	0.2	0.1	44.9
Avg. 2000-07	2.5	1.3	101.7	0.4	0.0	105.9
Meteorological						
2008	0.8	3.7	11.4	0.0	0.0	15.9
Avg. 2000-07	0.4	2.8	38.0	0.4	0.0	41.7
Total						
2008	16.2	19.9	177.8	0.3	0.1	214.3
Avg. 2000-07	12.6	5.6	211.8	1.1	0.1	231.2
Damages (billions of 2008 US$)	**Africa**	**Americas**	**Asia**	**Europe**	**Oceania**	**Global**
Climatological						
2008	0.4	2.0	21.9	0.0	0.0	24.4
Avg. 2000-07	0.0	2.4	1.1	3.5	0.4	7.4
Geophysical						
2008	0.0	0.0	85.8	0.0	0.0	85.8
Avg. 2000-07	0.8	1.0	9.5	0.3	0.0	11.6
Hydrological						
2008	0.3	12.1	3.7	1.3	2.1	19.5
Avg. 2000-07	0.4	1.9	9.7	7.7	0.3	19.9
Meteorological						
2008	0.1	50.0	6.8	3.4	0.5	60.7
Avg. 2000-07	0.1	38.6	10.7	3.0	0.3	52.6
Total						
2008	0.9	64.0	118.2	4.7	2.5	190.3
Avg. 2000-07	1.3	43.8	31.0	14.5	1.0	91.6

Source: UCL, "EM-DAT: The OFDA/CRED International Disaster Database," http://www.emdat.be. [Original tables contain rounding errors.]

The following table shows that disasters affect people—as well as regions—unequally.

Average Number of People Affected by Continent and Disaster Origin, 1991–2005 (per million inhabitants)

	Hydrometerological	Geological	Biological
Africa	22,803	81	951
Americas	5,186	374	149
Asia	56,486	794	63
Europe	2,404	46	17
Oceania	39,817	585	16

Source: "ISDR Disaster Statistics," http://www.unisdr.org.

Understanding Intensive versus Extensive Disaster Risks

The 2009 *Global Assessment Report on Disaster Risk Reduction* points out the distinction between intensive and extensive disaster risks. Intensive risks are those that produce high mortality disaster events. The report notes that between January 1975 and October 2008, 0.26 percent of the 8,866 disaster events recorded accounted for 78.2 percent of the mortality. These included the 1983 drought in Ethiopia; the 1976 earthquake in Tanshan, China; and, more recently, the Indian Ocean tsunami in 2004 and Cyclone Nargis in Myanmar in 2008.

At the same time, losses from low-intensity, but more extensive disaster events continue to affect housing, local infrastructure, and large numbers of people. The report states that "99.3% of local loss reports in 12 Asian and Latin American countries that were sampled accounted for only 16% of the mortality but 51% of housing damage. These losses caused by 'extensive risk' are pervasive in both space and time…"

ISDR states that the drivers of both types of risk are similar: locally specific increases in exposure, vulnerability, and hazard due to broader urbanization, economic and territorial development, and ecosystem decline, exacerbated by poor urban governance and the vulnerability of rural livelihoods.

Poverty and Exposure to Risk

The correlation between poverty and risk is becoming clearer as disaster data collection and analysis improves. Empirical evidence from all regions of the world shows that disasters produce measureable declines in income, consumption, and human development indicators, and that these effects are disproportionally concentrated in poor households and communities. The effects of disasters are especially pronounced in some of the indicators of human development most important to poverty reduction: productivity, health, and education.

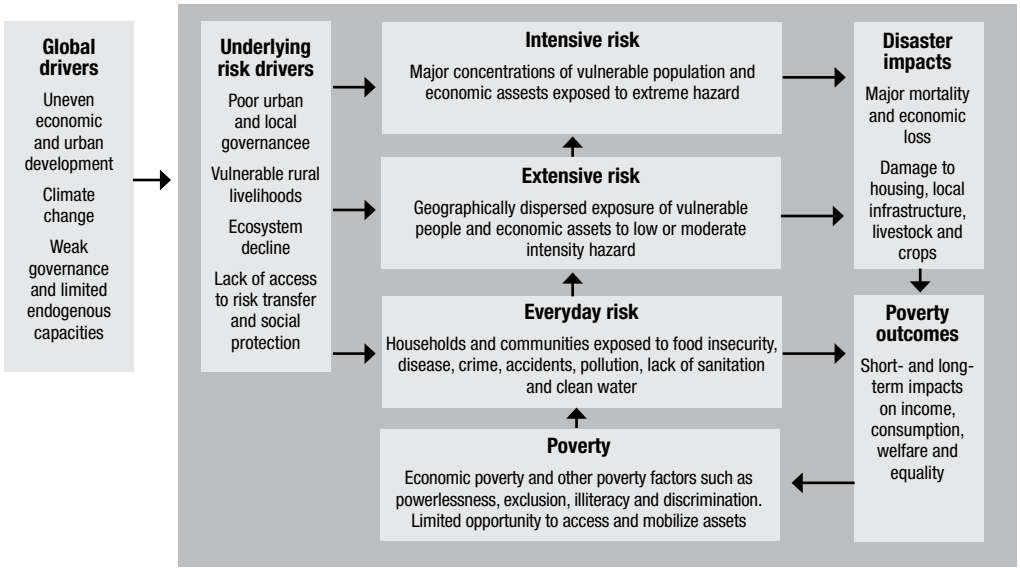
Poor households have a limited capacity to buffer themselves against disaster losses, whether the risks are intensive or extensive. They may also have limited social protection, depending largely on whatever public measures are available during disaster recovery.

This discussion points out the importance of investment in measures to prevent and reduce disaster risk. By the time a disaster strikes, it may seem too late to interrupt the negative feedback loop between poverty and disaster risk. But this is not the case; there are numerous opportunities for users of this handbook to contribute to the effort of reducing poverty by addressing disaster risk factors in reconstruction. These include:

- Ensuring that financial assistance for housing and community reconstruction reaches the poor
- Insisting that investments are made in disaster risk reduction in the reconstruction of housing, infrastructure, and other community assets
- Involving local professionals (builders, architects, engineers) in training and post-disaster planning oriented toward risk reduction
- Making permanent improvements in instruments such as planning guidelines, building codes, and housing designs that will continue to be used after reconstruction
- During reconstruction, encouraging government, academic institutions, the private sector, and civil society to think proactively about measures they can take to reduce future community exposure to hazards
- Working with government to establish social protection mechanisms that help different social groups prepare for and recover from disasters

The following figure attempts to capture some of the interactions of poverty and disaster risk.

The Disaster Risk-Poverty Nexus



Source: ISDR, 2009, *Risk and Poverty in a Changing Climate: Invest Today for a Safer Tomorrow*, Global Assessment Report on Disaster Risk Reduction, (Geneva: United Nations), http://www.preventionweb.net/gar09.

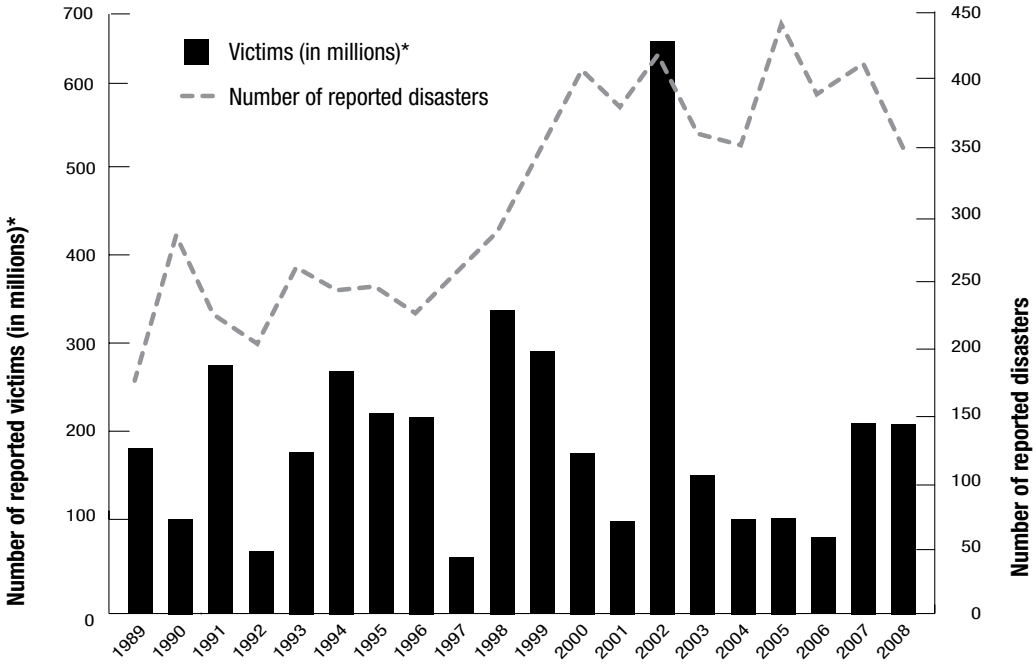
A Note on the Interpretation of Disaster Data

Over the last 30 years, the development of telecommunications and the media and increased international cooperation have played a critical role in the number of disasters that are reported internationally. In addition, increases in humanitarian funds have encouraged reporting of more disasters, especially smaller events.

CRED has concluded that the increase in the number of disasters until about 1995 is explained partly by better reporting of disasters in general, partly due to active data collection efforts by CRED, and partly due to real increases in both the frequency and the impact of certain types of disasters. They estimate that the data in the most recent decade present the least bias and reflect a real change in numbers. This is especially true for floods and cyclones.

CRED has warned users of its data that although climate change could affect the severity, frequency, and spatial distribution of hydrometeorological events, users need to be cautious when interpreting disaster data and take into account the inherent complexity of climate and weather related processes—and remain objective scientific observers. The figure below shows trends in frequency and impact of disasters over the 1989–2008 time frame.

Trends in Occurrence of Disasters and Number of Victims, 1989–2008



*Victims: sum of killed and total affected

Source: EM-DAT, UCL: Brussels, http://www.emdat.be.

Resources

Center for Hazards and Risk Research (CHRR). "Hotspots." http://www.ldeo.columbia.edu/chrr/research/hotspots/.

Centre for Research on the Epidemiology of Diseases (CRED). Université Catholique de Louvain, Ecole de Santé Publique. Brussels. http://www.cred.be/.

ISDR. 2009. *Risk and Poverty in a Changing Climate: Invest Today for a Safer Tomorrow.* Global Assessment Report on Disaster Risk Reduction. Geneva: United Nations. http://www.preventionweb.net/gar09.

Rodriguez, Jose et al. 2009. *Annual Disaster Statistical Review 2008: The numbers and trends.* Brussels: CRED. http://www.cred.be/publication/annual-disaster-statistical-review-numbers-and-trends-2008.