

## Briefing | Target 4

# Disaster damage to critical infrastructure and basic service provision

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This note provides information relevant to the agreement of target (iv) of the draft Post-2015 Framework for Disaster Risk Reduction (DRR), which reads: *[Substantially] reduce disaster damage to critical infrastructure, including health and educational facilities [by a given percentage] by 2030.* Its variant (iv alt bis.) also covers basic services and points to developing their resilience.

### Background

Disasters can damage critical infrastructure and basic services:

- The 2010 Haiti earthquake damaged or destroyed 4,000 schools.<sup>1</sup> The 2008 Sichuan earthquake damaged or destroyed 11,000 hospitals.<sup>2</sup> The 2010 flood in Pakistan resulted in infrastructural losses and damages of \$4 billion.<sup>3</sup> Such impacts can result in death and injury as well as disrupting access to education and health care. Damage to infrastructure can also hamper access to disaster relief and post-disaster recovery.
- The Japan earthquake and tsunami in 2011 left 4.4 million people without electricity.<sup>4</sup> The Lothar and Martin storms in France in 1999 caused widespread devastation to the electricity supply network.<sup>5</sup>
- Drought in the Horn of Africa led to illegal logging and higher levels of charcoal burning, causing deforestation. Sand mining, as a livelihood substitution, led to soil erosion.<sup>6</sup>

- There is currently no systematic database on, or detailed assessment of, trends in disaster damage to critical infrastructure and basic services. Few countries, especially in the developing world, have comprehensive multi-hazard assessments of disaster risk to critical infrastructure.

### Education facilities <sup>7</sup>

If a school is not built and maintained to withstand a disaster, it can cause irreplaceable losses to families, communities and countries – not to mention lifelong injuries. It can also have a big impact on a child's education:

- Worldwide, 875 million school children live in areas of high seismic activity. Hundreds of millions more face danger from regular flooding, landslides, extreme winds and fire hazards.
- With children spending up to 50% of their waking hours in school, there is a real need for them to be prepared to deal with a disaster during school time.
- In some countries, schools are used as emergency shelters, and damage to them reduces the capacity for effective emergency response.

### Health facilities

Protecting human health is a key imperative in managing disaster-related risks and reducing the impacts of hazards on communities. However, disasters can have severe impacts on

### Definitions:

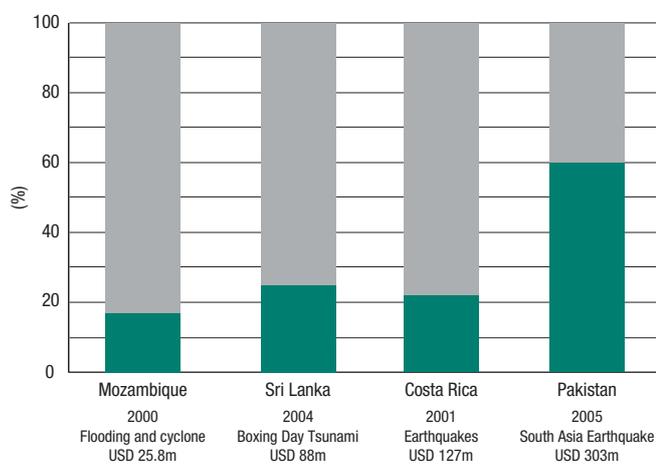
**Critical infrastructure:** Physical assets that play an essential role in the functioning of society and economies, including facilities for electricity generation, accessing water and food, public health, telecommunication, education and transport. Soft infrastructure includes non-physical assets, such as the rules and regulations governing systems, means of financial support, skills and specialisation in the workforce and ecosystem services.

**Basic services:** State or private services that citizens pay for through taxes or other contributions. These may include sanitation, water, schools, emergency services, transportation and health services.

health care systems, including hospitals. Destruction of health facilities hampers the treatment of the sick and the saving of victims during catastrophes:

- The December 2004 Indian Ocean tsunami affected entire national health care systems and millions of people, particularly the poor, at an untold cost. It damaged 61% of health facilities in northern Aceh province, Indonesia, and killed approximately 7% of the area's health workers and 30% of its midwives.
- Figure 1 shows disaster impacts on health sectors compared with annual health sector expenditure.
- While it is important to protect hospitals, it is also vital to ensure health systems more widely are working to reduce disaster risk, are resilient to multiple hazards and are prepared when disasters strike.

**Figure 1: Health sector damage costs of one disaster compared to annual government health spending<sup>8</sup>**



## Protecting critical infrastructure and reducing damage

Critical infrastructure, particularly physical assets, can be protected through a combination of:

- Land use zoning that takes account of detailed multi-hazard risk assessments;
- Strict enforcement of locally appropriate multi-hazard building codes;
- Revising and revisiting building codes as disaster risks change;
- Investment in maintenance;
- Retrofitting of existing facilities that are not compliant with building codes;

- Use of locally appropriate resilient-design aspects and modern technologies.

## Future projections<sup>9</sup>

Exposure of critical infrastructure to disasters will continue to increase as population growth and urbanisation continue in hazard-prone areas. In addition, climate change will affect some extreme events commonly associated with infrastructure damage:

- Climate-related extremes are expected to produce large impacts on infrastructure, although detailed analysis of potential and projected damage is limited to a few countries, infrastructure types and sectors.
- Transport infrastructure (roads, railways, airports, ports) is vulnerable to rising temperatures and precipitation and river floods, as well as storm surges. Some regions will experience an increase in the number of extreme events, as a result of climate change.
- Climate extremes and disasters are projected to further affect developing countries vulnerable to food insecurity, including through impacts on food banks, food production and wider food supply systems.

## Challenges in data and setting baselines

- Setting global or national baselines on the basis of considering average losses from a decade-long period is not statistically reliable, given the infrequency and randomness of some extreme events. For example, the 2011 Japan earthquake, tsunami and technological accident is unlikely to happen again with the same severity for decades if not centuries, meaning any comparison with a short period containing this event is likely to be favourable for the country in question.
- Baselines should be established using all available information sources at the global and national level, including observed losses in 2005-2015, as well as longer periods of observed losses where available, risk models and scenario analysis. This will improve statistical reliability. Baselines should include data on levels of infrastructure resilience, as well as monitoring changes to the risk of infrastructure losses, thereby giving an insight into the potential for a hazard to translate into a disaster.
- Data on damage to infrastructure, including schools and hospitals, is currently not collected systematically. Consistent approaches need to be agreed upon, in terms of how damage is assessed, as well as on whether to record numbers of facilities damaged, replacement values, numbers of lost days of operation or severed access to basic services.

1. <http://bit.ly/18GpcRo>, accessed 11 February 2015.  
 2. <http://bit.ly/1K8Gdry>, accessed 11 February 2015.  
 3. ADB and World Bank (2010) 'Pakistan Floods 2010: Preliminary Damage and Needs Assessment'. Islamabad: ADB and World Bank.  
 4. Inajima, T. and Okada, Y. (2011) 'Japanese Quake Forces Evacuation Near Nuclear Reactor; Oil Refinery Burns', *Bloomberg.com*, 11 March, <http://bloom.bg/1K8GfQm>, accessed 11 February 2015.

5. Abraham, J., Bendimerad, F., Berger, A., Boissonnade, A., Collignon, O., Couchmann, E., Grandjean, F., McKay, S., Miller, C., Mortgat, C., Muir-Wood, R., Page, B., Shah, T., Smith, S., Wiart, P., and Xien, Y. (2000) *Windstorms Lothar and Martin*. December 26-28, 1999. Newark, CA: Risk Management Solutions.  
 6. UNEP (2001) 'Devastating Drought In Kenya: Environmental impacts and Responses'. Nairobi: UNEP.  
 7. <http://bit.ly/TNmAwz>, accessed 11 February 2015.

8. Source: UNISDR, WHO and World Bank (2009) *Hospitals Safe from Disasters Reduce Risk, Protect Health Facilities, Save Lives*. 2008- 2009 World Disaster Reduction Campaign. Geneva: UN.  
 9. Drawn from IPCC (2012) *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX)*. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. Cambridge, UK, and New York: Cambridge University Press.

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