

## THE HAITI EARTHQUAKE 2010 – A STUDY OF VULNERABILITY

On 12 January 2010 an earthquake measuring 7 on the Richter scale of magnitude struck the country of Haiti, killing over 200,000 people. Television footage and journalism immediately after the quake and for the next 12 months showed a country that was not only devastated by the disaster, but even one year on was only just emerging from the emergency phase and after two years is just verging on reconstruction. Why was this?

Haiti is located in the Caribbean and forms the western part of the island of Hispaniola, with the Dominican Republic on the eastern side (Figure 1). Being in the western hemisphere, one might expect it to have a certain amount of wealth, but in fact Haiti is one of the poorest countries in the world. It has a population of 9.8 million but a gross national income (GNI) of only \$660 per person per annum, has high levels of infant mortality and a high incidence of HIV/AIDS (2.2% of the population aged 15-49, which is a very high level). The country is heavily dependent on the remittances sent

home from family members abroad, which in 2008 formed 32% of the country's GDP.

In 2004 3,000 people were killed in Haiti due to the impact of Tropical Storm Jeanne. Four years later in 2008 Haiti suffered four damaging hurricanes which left a death toll of 800 and huge amounts of damage. 60% of the harvests were destroyed, and there were many landslides which destroyed lives, homes and roads. Haiti only has 2% of its land forested (due to deforestation for charcoal manufacture, the main fuel of the poor) so is susceptible to landslides when the heavy rains come with hurricanes.

### Haiti and plate margins

As well as being in the direct path of hurricanes, Haiti sits amongst a complex set of plate margins (Figure 1). Although it can be affected by movements of destructive plate margins within the Caribbean, it is the two conservative strike-slip faults on the island itself that cause most impact. In January 2010 it

was movement in the Enriquillo-Plantain Garden fault system, in the south of the country, that caused the earthquake which destroyed 60% of the country's capital, Port-au-Prince. The fault had been locked for over 250 years, but in January 2010 its energy was released along 65 km of the fault, causing land movement of 1.8 metres. The epicentre was south west of the capital on the peninsula and affected several other towns (Figure 1).

### Why was Haiti so vulnerable?

Although a Richter Scale 7 earthquake can cause much damage, it is not only the magnitude of the hazard that impacts on the outcome within a country. There is a Risk Equation, set out below:

$$R = \frac{H \times V}{C}$$

R=Risk                      H=Hazard  
V=Vulnerability        C=Capacity to cope

Figure 1: Location of Haiti and main plate boundaries; inset shows location of Port au Prince and other towns affected by the earthquake

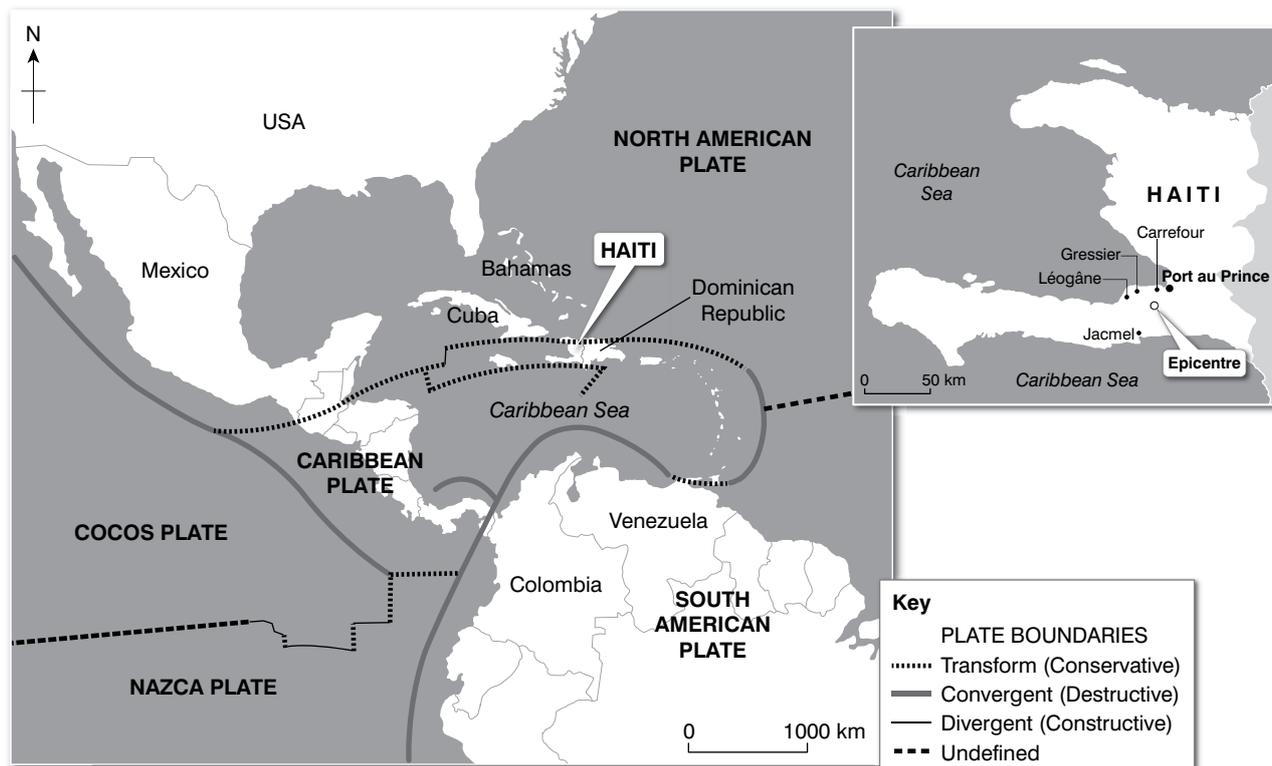


Figure 2: Some of the factors affecting Haiti’s vulnerability and capacity to cope

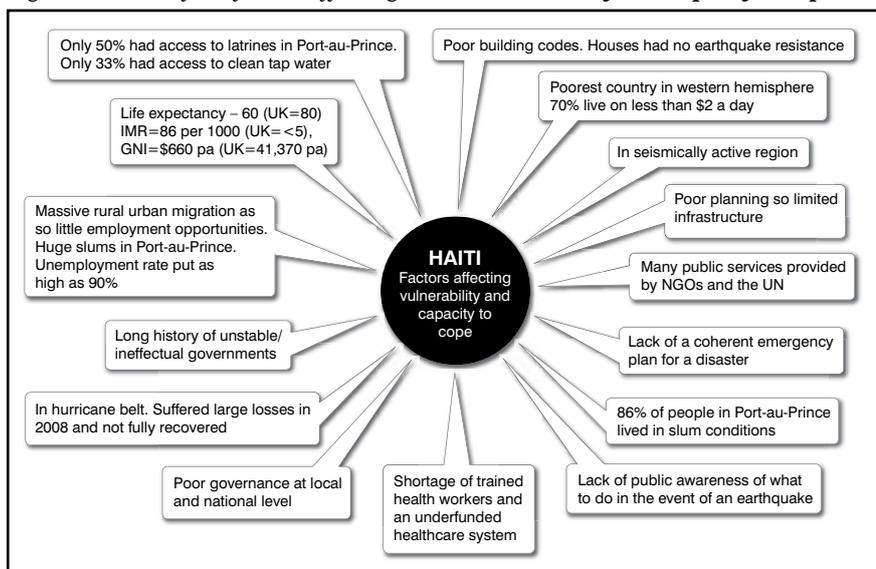


Figure 3: The impacts of the earthquake

Figures	Details
Magnitude 7	Richter scale of magnitude. Highly damaging earthquake
Mercalli Scale of earthquake intensity level 9	Description of effect 'ruinous'
65 km rupture	Of the Enriquillo -Plantain Garden fault with a slip of 1.8 metres
52 aftershocks	Of 4.5 or greater. Largest was on 20/01/10 of 5.9 which caused more building collapse.
230,000 deaths	Due to earthquake or immediate aftermath. Includes nearly 100 UN personnel and 25% of the country's civil servants.
6,900 deaths	As of November 2011, the number that died from the cholera epidemic that followed the earthquake.
1.5 million homeless	Having to live in tented camps
60% of infrastructure destroyed	Area in and around Port-au-Prince
70% buildings collapsed	In capital Port-au-Prince. 8 hospitals, 9 health centres, 10 Ministry of Health buildings, 19 university buildings and training institutes destroyed.
4,000 amputees	The rough estimate of how many earthquake survivors lost limbs
4,000 prisoners	The number who escaped to freedom from the Prison Civile when it was destroyed
\$8 billion	Cost of damage and losses

Haiti, being such a poor country and with limited developed infrastructure and health services, was always going to have poor capacity to cope. It had not yet recovered from the damaging hurricanes of 2008, and many of the public services in the country were being run by aid charities and the United Nations. It was always going to find it difficult to respond resiliently to the disaster and to recover from it. Haiti was extremely vulnerable to any disaster. Figure

2 illustrates many of the reasons for the country’s vulnerability and also why its capacity to cope was so limited. A month after Haiti’s earthquake, one of 8.8 on the Richter scale occurred in Chile, and yet only 800 were killed. While Chile had international aid, the Chilean government moved quickly from the emergency phase through the recovery stage to the transition planning and implementation phase, because it had a clear disaster response plan and the emergency

systems were in place. Chile is a much more prosperous country than Haiti, and has a greater capacity to cope with disasters and emergencies, also being less vulnerable because of a more stable system of government and better disaster planning.

### The immediate impacts of the earthquake

The Haiti earthquake struck at 4.53pm. Its epicentre was 25km south west of the capital causing widespread devastation, although its greatest impact was felt in Port-au-Prince itself. Here there had been a massive increase in the population due to rural-urban migration, with the majority of people living in poorly constructed squatter settlements. These were no match for the earthquake, and many lost their lives or were seriously injured when their homes collapsed. 70% of buildings in Port-au-Prince collapsed and most roads were blocked by debris. The final death toll was 230,000, including nearly 100 UN personnel, many trained health workers and a quarter of civil service staff. This meant it took even longer to get help co-ordinated. Figure 3 summarises some of the major impacts of the earthquake.

### Early aid

Neighbouring Dominican Republic was amongst the first to give aid, sending in supplies of water, food and heavy lifting machinery to help rescue people from beneath collapsed buildings. They also made their own hospitals available and permitted people to cross the border to receive help. Iceland had an emergency response team in the country within 24 hours. As days passed it became difficult for relief planes to land, as only part of the airport was usable and there were queues in the skies above Port-au-Prince. Aid ships had to be turned away from the devastated port, where the docks were unable to function. A lack of co-ordination made the situation worse and initially priority was given to the arrival of security troops rather than emergency aid.

Many survivors fled to their family homes in rural areas, putting extra strain on the villages. However, most remained in the city and were camping out on any spare open ground, including in front of the destroyed presidential palace.

Eventually tents were flown in and up to 1500 camps were set up all over Port-au-Prince. Sanitation arrangements were hopelessly inadequate, and the encampments were soon awash with excrement. There was only one delivery of drinking water a week and so people were forced to consume untreated water, which had a disastrous impact later on in the crisis. Cholera spread rapidly.

Communications, including roads, and electricity were severely damaged which hampered attempts to distribute aid. After a few days the unretrieved corpses trapped in the rubble of buildings began to decay in the high heat and humidity and with thousands of corpses stored in overcrowded morgues there was a need for drastic action if disease was to be avoided. Most bodies were buried in mass graves using earth-moving machinery, usually before they could be identified, such was the urgency.

## The NGO problem

As the country did not have an emergency plan in place and the UN had lost so many personnel, there was a lack of co-ordination in the first few weeks and it was three weeks before the aid organisations could meet up with the Humanitarian Co-ordinator of the UN (who was a replacement as the original post-holder had died in the earthquake). Many NGOs flew in to help but most had not investigated what the needs were of the survivors. Very few spoke French so it was difficult to know what people wanted. There was no linkage and so projects were left half-done; there was duplication of aid in some areas, while others received no aid at all. With so many NGOs there was a replication of their needs too. Lots of money was spent on buying transport vehicles and arranging accommodation for the aid workers so operational costs were sometimes higher than the amount of help that eventually got to the population. Most NGOs tended to be operating in a top-down way, delivering what they felt was needed. An overall co-ordinator was needed to determine the 'three Ws': Who? (which NGO), What? (what they are offering) and Where? (their location), to avoid duplication and to provide a focus on actual needs. It

should be stressed that some NGOs were very well run with minimal operating costs and servicing a definite need (see Merlin website at end of unit).

## Later actions

By July 2010 98% of the rubble from the earthquake remained uncleared and 1.6 million people were still living in temporary camps (although this fell to 1 million by September). By then many of the original tents supplied as shelter were falling apart and much of the funding that had been donated was not getting through to those most in need. The World Bank had cancelled half of Haiti's debt and given the country five years before it had to begin repayments of the remaining half. Cash for work programmes had been set up to enable some Haitians to support themselves. 20% of all jobs had disappeared due to the impact of the earthquake. Most buildings that had not collapsed in Port-au-Prince had been assessed as to the safety or otherwise of their structure. Some aid money was used to pay Haitian engineers and surveyors to carry out the work. Each building was colour tagged after assessment:

- Red (21%) meaning the building would have to be demolished
- Yellow (26%) for those requiring repairs before reoccupation
- Green (54%) that were safe to occupy

Community-driven development projects were started by the World Bank which worked with local people to provide the help they wanted in order to rebuild homes and communities. Homes had to comply with building codes and had to be constructed in a hazard resilient way. However, these projects were too few to make a large impact. In addition the World Bank funded supplementary food for 200,000 children aged 6-23 months as well as funding schools for 140,000 children within camps. New water supply systems were set up in six rural locations as part of the move to encourage people to stay in the countryside rather than add to the pressures in Port-au-Prince.

## Problems in the camps

Few of the camps had competent camp managers and the problems of water supply and sanitation

continued. Another serious problem was that of rape and other sexual attacks within the camps. Women and girls were vulnerable as they were still in tents which could be easily broken into, and they had little privacy at the latrines or washing facilities. Many women had lost their husbands and felt unprotected in the crowded conditions. The camps were badly lit at night and there was no policing, and gangs of youths and men were carrying out rapes knowing they would not be caught. Although Haiti had a poor record of protecting women and girls even before the earthquake, the situation in the camps was far worse, with girls as young as ten being attacked.

## The cholera outbreak

With such crowded and unsanitary conditions, doctors had been warning about the outbreak of serious disease since the quake occurred. In October 2010 the first case of cholera was identified. Haiti had been cholera-free for over 100 years. When it was announced that the particular strain was one found in south-east Asia, there was an uprising of bad feeling against the UN peacekeeping force from Nepal, from where the disease had allegedly been brought in. By November 2011 there had been over 6,900 deaths attributed to the disease and more than 500,000 cases reported. The young and the elderly are the most vulnerable to this water-borne disease, which is transmitted by bacteria found in the faeces of infected people. Vomiting and diarrhoea lead to dehydration and death can occur within four hours, yet cholera can be treated successfully with antibiotics and rehydration salts. However, there was neither enough expertise in the disease nor enough medical staff. The lack of clean drinking water and the problem of the disposal of human wastes meant that the disease really got a grip within the country, and it is now assessed as endemic. Although the number of cases is falling at present, it is thought that once the rainy season returns in 2012, there will be a resurgence of cholera cases.

## Haiti a year on

Gradually the country is beginning to recover; for example, health care in Port-au-Prince is of a

better quality now than before the earthquake, but what will happen when the NGOs leave? There is a need for a long-term strategy. Many of the survivors are traumatised by the events they have witnessed, and thousands of amputees are left without hope of a job or any other means of making a living. Some of the Haitian nurses who worked for the NGOs have opted to continue working for them elsewhere, or to leave the country to go to the USA where they will receive better pay. Haiti's brain drain continues at a time when it is most desperately in need of its skilled workers. As of January 2011 the relief appeal stood at over \$1 billion, 72% of what is required. 810,000 people are still in the camps but 700,000 have now left, 35,000 to move to transitional shelters before finally moving back into a house. 95% of the children in the earthquake zone have returned to school, which is one positive sign of recovery. Figure 4 shows Park's model adapted to show the situation in Haiti. Haiti is only now beginning to move into the reconstruction phase; it has a long way to go before it can get back even to any level of normality.

Figure 4: Park's model (or hazard response curve) adapted for Haiti

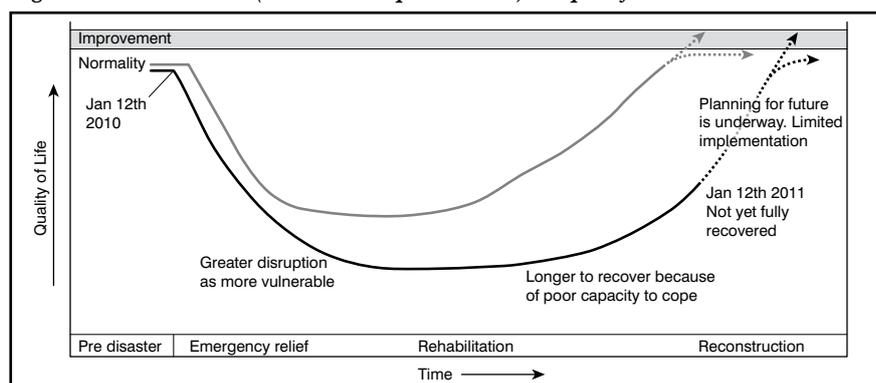


Figure 5: Haiti's Action Plan for National Recovery and Development

Area of Focus	What it involves
1. Territorial Rebuilding	Decentralisation of services away from Port-au-Prince. Land reform ensuring clear laws for land tenure.
2. Economic Rebuilding	Modernisation and further development of agricultural, manufacturing, construction and tourism sectors.
3. Social Rebuilding	Aim for universal primary education, an improved and expanded Higher Education sector and a healthcare system that operates nationwide and not just in urban areas.
4. Institutional Rebuilding	Modernise the legal framework of the country and get the core state functions up and running – eventually independently of aid. Have clear targets for transparency and accountability in government actions to reduce corruption levels.

### Conclusion

Haiti is a vulnerable country with a long history of unstable government and has had a number of severe disasters to contend with during the last 10 years. However, the aid to the country in response to the earthquake and the highlighting of its problems has led to some positive results. On 31 March 2010 the Haitian government presented to the UN its Plan of Action for Recovery and Development (Figure 5). There is a recognised need for the training of more health workers and offering jobs to keep them in the country. Teachers are to be trained in dealing with traumatised children and there is to be the development of manufacturing industries, with the help of the EU and the World Bank.

There are plans to decentralise so that resources are put into rural areas to act as a counterweight to the pull of Port-au-Prince. Micro-finance is being offered to enable small-scale entrepreneurs to begin businesses that will hopefully provide more jobs in the future.

Haiti is beginning to draw up a Disaster Plan which includes food

stockpiles and bottled water. There will be more co-ordination and working with the military in order to clear roads to access areas to receive aid. Foreign aid will be responsible to a Haitian co-ordinator who will direct what aid is sent where and who will have an overview. Camps need to be organised with security in mind to protect the vulnerable, especially women and girls.

In 2010 the international aid agencies tended to take over and they undermined Haiti's ability to respond. Although Haiti was not well prepared, its people know what they need after a disaster. It is to be hoped that with better co-ordination and different priorities Haiti will be better able to face any future natural disasters.

### Website resources

- [http://news.bbc.co.uk/1/hi/in\\_depth/americas/2010/haiti\\_earthquake/default.stm](http://news.bbc.co.uk/1/hi/in_depth/americas/2010/haiti_earthquake/default.stm) - BBC page dedicated to news and short videos of the earthquake and its aftermath.
- <http://www.merlin.org.uk/haiti?gclid=CNWP8dmw2rACFcQKfAod2Hg6zA> - Haiti pages of the site of the NGO Merlin

## FOCUS QUESTIONS

- Using Figures 1 and 2 explain why, when a natural disaster occurs in Haiti, it is so vulnerable to the impacts and has limited capacity to cope.
- 'The response to the Haitian earthquake could have been better managed.' Discuss.