

## Chapter 2

# EARTHQUAKES



Ahmedabad 26<sup>th</sup> January 2001  
Improperly built high-rise buildings crumbled and cracked

### WHEN THE EARTH SHOOK:

More than 13,000 people were killed, at least 15 lakh injured, 3.4 lakh buildings damaged, and about 7.8 lakh houses destroyed in the Gujarat earthquake of 26<sup>th</sup> January 2001. Many bridges and roads were damaged. This earthquake, with its epicentre at Bhuj occurred along a fault in the east-west direction. The stress that caused this earthquake was due to the Indian plate pushing northward into the Eurasian plate.

An earthquake in simple terms is a sudden trembling or shaking movement of the earth's surface, called the **crust**. Most earthquakes are minor **tremors**. Larger earthquakes usually begin with slight tremors but rapidly take the form of one or more violent shocks, and end in vibrations of gradually diminishing force called aftershocks. The subterranean point of origin of an earthquake is called its focus; the point on the surface directly above the focus is the **epicenter**. The magnitude and intensity of an earthquake is determined by the use of scales, such as the **Richter scale** and the **Modified Mercalli scale**.

#### Important Terms:

1. **Crust:** the solid surface of the earth
2. **Tremor:** shaking of the ground
3. **Epicentre:** the place on the surface of the earth directly above the hypocentre
4. **Richter scale:** a scale which classifies the magnitude (force) of an earthquake
5. **Modified Mercalli scale:** a scale which classifies the intensity (effects) of an earthquake
6. **Hypocentre:** the place deep in the earth's crust where an earthquake starts

## Why do earthquakes happen?

The earth's crust is made of massive interlocking blocks of rock called tectonic plates, which resemble a jigsaw puzzle. These blocks float on a layer of semi-liquid rock called the **mantle**. This flowing semi-liquid rock causes the blocks in the crust to move against or relative to each other. As tectonic plates collide or move, pressure is built up.

This pressure is released when these plates slip or slide relative to each other, resulting in a **fault**. These movements cause vibrations to pass through and around the earth in waveform, just as ripples are generated when a pebble is dropped into water.

Earthquakes are natural phenomena. They cause the most sudden of all disasters, without any warning time. Floods and cyclones, the hazards that cause the other major sudden disasters have a warning period, and hence can be anticipated to some extent, allowing for evacuation and protection. Earthquakes happen without notice, and are not predictable or preventable. We can however reduce the damage that they can cause. Most of the damage is caused not by the earthquake itself, but by the buildings that we live in, especially in urban or semi urban areas with concrete structures. The picture shows a high-rise building succumbing to the Gujarat earthquake in 2001 because the required structural engineering norms were not adhered to during construction and design of this building.

## How are people affected by earthquakes?

The effects of earthquakes are diverse. People are more likely to die or be injured where large numbers of people live close together, and where local buildings are not designed to resist earthquakes. *About 95 per cent of people killed in an earthquake are killed by falling buildings.* Earthquakes are most dangerous when they happen at night. This is because people may sleep through the first tremors (foreshocks), and so have less time to prepare. Also, lying flat in bed means that you are more likely to be hit by falling objects than if you are standing up. The effects of an earthquake are strongest in a broad zone surrounding the epicentre.

### Important Terms:

1. **Mantle:** the semi-liquid layer of rock below the earth's crust
2. **Fault :** a place where two or more blocks of the earth's crust join

Earthquakes are destructive. But sometimes, they do afford an opportunity for communities to start afresh and improve on their pre-disaster conditions, as witnessed in Gujarat and Latur after the major earthquakes that devastated them.

## ACTIVITIES

### Organise your School First Aid Kit:

Find out from your teacher or nearest doctor/VHW what you can add to this list

1. Sterile gauze Pads
2. Adhesive Tape
3. Bandage to create slings for fractures
4. Fever reducing and anti-inflammatory tablets
5. Anti-diarrhoea tablets
6. Antiseptic liquid and ointment
7. Hydrogen Peroxide skin disinfectant
8. Cotton wool
9. Oral Rehydration Salts
10. \_\_\_\_\_
11. \_\_\_\_\_

1. What is a seismograph? Where is it usually kept in your city? If you live in a village, can you find out where the nearest seismograph is kept?
2. What would you do if you find that some one is trapped inside a building under the rubble and you can hear the person, though you can't see him or her? Can you find out if your village or Gram Panchayat or Block/Taluka has specialised search and rescue teams for disasters, if you live in a rural area? If you live in a city, do you know if such teams exist?
3. How would you deal with a person who has lost everything in an earthquake and is shocked? Find out more about trauma counselling. Who can be a good counsellor?
4. How would you prevent bleeding from a wound on the arm?

5. Make posters to tell people what to do when there are tremors. Display them in prominent places in your village or area, if in zones 3-5.
6. Make an illustrated comic type information sheet on the DROP, COVER & HOLD routine for people or children who cannot read and explain it to them.
7. What precautions should one take when one enters a building that has cracked or collapsed because of an earthquake?
8. Are there Ham Radio Operators in your village or area? Find out more about Ham Radio.
9. Draw a map of your village or area, locating your school, houses, ponds, tanks, etc., as well as open spaces and high-rise buildings. Mark an emergency evacuation route plan, for use in case of an earthquake. Take your plan to your local DMT. Do they have a community contingency plan for your village or area? Take their help to locate possible relief centres and cattle protection areas (if in a village). If your village or area does not have a DMT yet, your teachers could help you with this exercise.



## EXERCISES

1. Which earthquake vulnerability zones do you live in? (Use the map)
2. What would you do if you were going home from school and there was an earthquake?
3. Where would you go if you were in the games field and there was an earthquake?
4. What activities would you do with children who have witnessed and experienced an earthquake when they come to a relief camp or shelter?
5. List simple do's and don'ts in the event of tremors or an earthquake.
6. How does preparedness help you and your community when an earthquake occurs.