



## EARTHQUAKES

Please note that the foundation messages are included in the previous section: *Key messages for all-hazards household and family disaster planning*. Separate messages are also available for other specific hazards.

An earthquake is a sudden, rapid shaking of the ground caused by the shifting of rocks beneath the earth's surface or by volcanic or magmatic activity in the earth. Earthquakes strike suddenly, without warning, and can occur at any time of the year – day or night. Earthquakes can lead to death, injuries and property damage, loss of shelter and livelihood, disruption of critical or lifeline infrastructure, and destroy communities.

Earthquakes are among the deadliest of natural hazards. Most deaths are due to building collapse or to secondary hazards, such as fires, tsunamis, flooding, landslide and release of chemicals or toxic materials. Injuries tend to be due to less-severe building damage, parts of buildings or their contents falling or breaking, and failure to take precautions during aftershocks.

Each year there are about 15 major earthquakes, 135 strong earthquakes and more than 1,000 moderate

earthquakes. However only 70–75 of these are reported to cause damage. Their impacts differ widely and depend on resilience and preparedness. Vulnerability factors include:

- non-compliance or non-conformity to building codes established for expected intensity of shaking
- poor land-use planning
- building in unsafe locations
- unprotected critical infrastructure
- inadequate non-structural measures to secure building contents and equipment
- disorganized or unpractised response.

Tsunamis are usually associated with earthquakes, but volcanic eruptions or underwater landslides can also generate them. The precautions highlighted here apply regardless of the cause..



## Assess and plan

Key messages	Context-specific details
Identify safest places	<ul style="list-style-type: none"> <li>Identify the safest places in the building, and in each room. These places must be located away from exterior walls, unsecured partition walls, windows, glass and large or heavy objects that can fall, slide or collide, or objects such as heaters and open fireplaces that can cause fire.</li> <li>Outside your building, the safest places are away from overhead and underground hazards.</li> </ul>
Identify items that may cause death or injury and work out how to secure these	<ul style="list-style-type: none"> <li>Identify items within the building and around the perimeter that could fall, slide or collide during an earthquake. Move or find the best ways to secure these.</li> <li>Move or secure objects that may fall and block exits.</li> </ul>
Do not be misled by misinformation, myths or rumours	<ul style="list-style-type: none"> <li>Base safety information on the available scientific evidence. Do not spread rumours or unfounded myths about causes or effects of hazards. Many popular anecdotes are not supported by scientific data.</li> </ul>



## Mitigate risks: physical or environmental

Key messages	Context-specific details
Select a safe site for your building	<ul style="list-style-type: none"> <li>Find out from local authorities where earthquake risks are highest in your area.</li> <li>Locate buildings on stable, solid, dry ground (in other words, on deep and unbroken rock known as bedrock). Avoid adjacent hazards by leaving sufficient space between buildings so that they cannot pound against each other during an earthquake.</li> <li>Avoid building on unstable slopes or sites subject to liquefaction, avalanches or inundation from tsunami, flooding or dam failure.</li> <li>Avoid building directly on top of, or within 15 meters (50 feet) of known earthquake faults.</li> </ul>
Build and maintain your building with earthquakes in mind	<ul style="list-style-type: none"> <li>Whether a building can withstand earthquakes depends on the ground it sits on, its shape, and the design of the structure, the materials it is built with, and construction detailing. Ideally, it should be strong but flexible, so that it does not fail when shaken.</li> <li>Follow these principles for seismic-resistant construction:             <ul style="list-style-type: none"> <li>Rigorously follow anti-seismic building codes.</li> <li>Select an appropriate foundation system for the topography, soil conditions and construction type.</li> <li>Select a simply symmetrical shape for the building (usually a simple rectangle).</li> <li>Ensure that the parts of the structural system (such as the columns, beams and walls) are continuous, evenly distributed and well connected.</li> <li>Use the appropriate quality and quantity of materials.</li> <li>Protect your building from water and moisture damage.</li> <li>Review the overall safety of the building periodically.</li> </ul> </li> </ul>

### Repair and retrofit for life safety

- Whether you are a homeowner or a tenant, there are things that you can do to improve the structural integrity of your home. Anything you do to strengthen your home can reduce the risk of death and injury.
- Where possible, consult a qualified engineer or skilled professional to help identify your building's weaknesses and fix these. Check that the person you hire is fully qualified in anti-seismic building techniques, has full knowledge of local regulations, and follows them rigorously.
- Check for:
  - inadequate foundations
  - unbraced walls
  - discontinuous columns or beams
  - damage to concrete
  - unreinforced masonry
  - rotting wood
  - vulnerable pipes
  - in frame buildings that supporting columns and beams are evenly spaced, continuous, and well connected.
- Check for any building adaptations or alterations that might have adversely affected the safety of the structure.
- Implement retrofit. Even minimum retrofit is effective in preventing total collapse of structures that consequently saves lives.

### When making improvements, maintain the structural integrity of your building

- Make improvements that follow local building codes, in consultation with a qualified engineer.
- If you make structural changes, take care not to remove or damage any part of the load-bearing elements of the building (the columns, beams or walls). This can weaken the structure and impact everyone in the building.

### Secure your belongings

- Secure large objects and furniture that could fall, break, slide or collide during an earthquake and cause crushing or piercing injuries.
- Your choices are to relocate, remove or refit, or to anchor, fasten, or secure. For example:
  - Fasten bookcases, display cabinets and other tall and heavy furniture to the wall. Position them away from anywhere where they can block exit pathways. Secure anything that can fall on people while they are sleeping.
  - Secure water heaters, gas cylinders, outside fuel tanks and other gas and electrical appliances.
  - Install latches on cabinets and drawers.
  - Hang heavy items, such as pictures and mirrors, away from exit doors, beds, couches or anywhere that people sleep or sit.
  - Anchor computers and televisions.
  - Secure fire extinguishers.
  - Move beds away from windows.

The screenshot shows the Nepal Red Cross Society's Facebook profile. The cover photo features the NRCS logo. The timeline post displays a detailed infographic titled "NEPAL EARTH QUAKE 2015" with the following key figures:

- Major Earthquake Highlights:**
  - Magnitude: 7.8
  - Depth: 15 km
  - Time: 11:58 AM, 25 April 2015
  - Location: Kathmandu, Nepal
  - Affected Population: 1.1 M
  - Houses Damaged: 0.6 M
  - Houses Destroyed: 0.28 M
- Shelter, Settlements and Non Food Items:**
  - Shelters constructed: 22
  - Shelters repaired: 0.89K
  - Shelters reached with non-food items: 16,629
  - Shelters reached with emergency message: 4,061
  - Shelters reached with cash or kind: 49,996
- Livelihoods:**
  - Households for seeds and tools: 5,881
  - Households trained on skill development: 161
  - Households provided with cash or kind: 100
  - Households provided with cash or kind: 1,062
- Health:**
  - Health posts constructed: 4
  - Health posts construction ongoing: 1
  - Health posts reached with cash or kind: 3,160
  - Health posts reached with cash or kind: 2,969
  - Health posts reached with cash or kind: 70
  - Health posts reached with cash or kind: 450
  - People benefited with medical treatment: 130
  - Volunteers trained: 173
  - Training centers: 6

## Prepare to respond: develop skills and store provisions

Key messages	Context-specific details
Practise earthquake drills in different locations	<ul style="list-style-type: none"> <li>Practise earthquake drills, both physically and as thought exercises, in different locations. Consider the impact of strong shaking, identify the safest actions in each place (at home, work and school).</li> </ul>
Take immediate action	<ul style="list-style-type: none"> <li>Trust your senses. Assume that the first shaking you feel is an earthquake.</li> <li>Move away from windows, glass and exterior walls and unstable and heavy objects.</li> <li>Extinguish all flames.</li> <li>If you are near an exit door, open it a little so that in the event of a mishap, the door does not get stuck.</li> </ul>

If you are indoors, drop to your knees, cover your head and neck, and hold on to your cover	<ul style="list-style-type: none"> <li>Drop down on your knees. Cover your head and neck, and protect your face. Hold on to or move in this position, until the shaking stops. Do not attempt to run.</li> <li><i>Drop, cover and hold on.</i> This is shorthand for several positions to take during an earthquake. These positions protect you from the worst and most-common injuries, by protecting your head, neck and throat. Pulling in your hands, arms, feet and legs places you in position, ready to crawl to a safer location.           <ul style="list-style-type: none"> <li>If you are near a sturdy table, get under it. Hold on to the table leg with one hand and protect your eyes with the other hand.</li> <li>If you are in bed, stay there and protect your head with a pillow.</li> <li>If you are near a sofa, get down next to it and use a cushion to protect your head and neck.</li> <li>If you are sitting in a theatre or stadium seat, brace yourself while protecting your head and neck.</li> <li>If you are in a wheelchair, lock it. If you cannot get down low, brace yourself and protect your head with your arms.</li> <li>If you cannot drop to the floor, stay where you are, bracing yourself in place.</li> <li>Stay indoors until the shaking stops and you are sure it is safe to exit.</li> </ul> </li> </ul>
Remain calm	<ul style="list-style-type: none"> <li>Stay calm by counting or taking slow, deep breaths. Look around to assess the situation before moving.</li> </ul>
If you are on the ground floor of an adobe house with a heavy roof, exit quickly	<ul style="list-style-type: none"> <li>If you are indoors, on the ground floor of a house with a heavy roof, and if you can get outside to a clear space, then exit quickly and carefully as soon as you feel the shaking. <i>Drop, cover and hold on</i>, away from the building and any overhead hazards.</li> <li><b>Note:</b> This is the only exception to the rule to stay indoors until the shaking has stopped, as lightweight roofs pose little danger.</li> </ul>
If you are outdoors, find a clear spot and drop to your knees to prevent falling	<ul style="list-style-type: none"> <li>If you are outside, find a clear spot away from overhead hazards such as buildings, trees, streetlights, power lines, overpasses, underpasses or above ground gas lines. Drop to the ground and stay there until the shaking stops. Stay outside and remain in open areas away from hazards.</li> </ul>
If you are in a multi-storey building, be careful both during and after the shaking	<ul style="list-style-type: none"> <li>After the shaking stops, check for the safety of stairs or exterior fire escapes, before using them.</li> <li>Do not use elevators under any circumstances.</li> </ul>
If you are in a vehicle, go to a clear location and pull over	<ul style="list-style-type: none"> <li>Stop the vehicle in a safe place. Stay in the vehicle until the shaking stops. Avoid bridges, trees, power lines, poles, street signs, overpasses, underpasses, tunnels and other overhead or ground-level hazards.</li> <li>Once the shaking has stopped, proceed with caution. Avoid bridges, elevated roadways, ramps and tunnels that might have been damaged by the earthquake.</li> </ul>
After the initial shaking stops, expect aftershocks	<ul style="list-style-type: none"> <li>Aftershocks will be frequent during the first hours and days after an earthquake, and will gradually diminish in frequency and intensity. However, unusually large aftershocks may occur days or even weeks after the main earthquake. Aftershocks can trigger additional building damage or collapse.</li> <li>Follow the same guidance for an aftershock as you would for any earthquake.</li> </ul>

**After the main shaking stops, if you are indoors, move cautiously and evacuate the building**

- Put on sturdy shoes before you move around. If it is dark, use a torch or flashlight. Move to your pre-determined meeting place either inside the building or outside, away from buildings. Notice any damage as you exit.
- If you feel strong shaking, exit the building following the standard building evacuation rules: *Do not run. Do not talk. Do not push. Assist others to evacuate the building.*
- Take your evacuation go-bag with you when you evacuate.
- Make sure school buildings are evacuated and have been visually inspected before people are allowed to go back inside.
- Other public or private buildings should have their own emergency plans and the management should inform all occupants whether to evacuate or not. If visual inspection shows signs of moderate or heavy damage, the building should be evacuated and should not be re-occupied until qualified engineers have inspected it.

**Check for damage and stay out of damaged buildings**

- Use extreme caution. Move cautiously and check for any unstable objects and other hazards around you. Open cabinets and closet doors with care.
- Stay out of damaged buildings and away from damaged areas. Arrange for temporary shelter rather than staying in damaged buildings. If your building is damaged, it may need to be surveyed by an expert to determine whether you can go back inside.
- Watch out for and avoid fallen power lines or broken gas lines.

**Extinguish flames and put out small fires**

- Fire is a common hazard following earthquakes. In areas with wooden construction, fires following an earthquake can cause more damage than the earthquake itself. Check for small fires and extinguish any that you find.

**If you are in a coastal area or near a tributary, move away from water to higher ground**

- If you are in a coastal area and there is an earthquake, *drop, cover and hold on*. When the shaking stops, move quickly away from the coast or tributaries, to higher ground, avoiding buildings, bridges and downed power lines. Take your animals with you, if you can. If you cannot get inland, go up to higher floors of the strongest buildings available. Do not return to the shore, as waves may continue to arrive for hours.
- The earthquake can cause a tsunami soon afterwards or some hours later. If there is a tsunami watch, stay informed by radio. If a tsunami warning is issued, be ready to evacuate.
- If you are near the coast and feel a strong earthquake that lasts 20 seconds or longer, or if you see receding waters at the shoreline, you may only have minutes until a tsunami arrives. Do not wait for an official tsunami warning. Most tsunamis have two or three large waves, and may be tens of minutes apart.
- If you are on a boat or ship at sea, do not return to port. If you are in shallow water, move to deep water if you have time. If you are in deep water stay there. Contact the harbour authorities to report any large waves near to the shore, before you return to harbour.

**If you are in a mountainous area, stay alert**

- If you are in a mountainous area or near unstable slopes or cliffs, be alert for:
  - falling rocks and other debris
  - unusual sounds, such as cracking trees
  - sudden increase or decrease of water in streams
  - local dams, dykes, or levees that may be prone to damage or destruction.
- Tune into your early warning system.
- Be alert for earthquake-induced landslides and avalanches, which can dam streams or rivers or cause outbursts from glacial lakes. Even weeks after an earthquake, breakage of dams can put downstream areas in danger of flooding.

**If you are near unstable slopes or cliffs, or have a landslide or flood warning, leave if it is safe to do so**

- Listen for landslide or flood warnings.
- Consider leaving the area if it is safe to do so.
- If a warning includes evacuation, evacuate immediately.
- If there is a landslide warning and there is a sudden burst of rain, evacuate immediately to your *safe haven*.
- Watch for flooding and be alert when driving near embankments or along swollen waterways.

**Look for and prevent fire hazards**

- Extinguish all flames immediately.
- Do not light any match, candle, lighter, flame or cigarette until you are sure there is no danger of a gas leak.
- Check for gas leaks and turn off any gas connections. If there is any doubt, shut off main connections.
- Do not use any electrical switch, appliance or phone if there is danger of a gas leak. Evacuate immediately if you hear or smell gas and cannot immediately locate the source and shut it off.
- Remember that natural gas rises and can escape through windows and doors, but that liquefied propane, kerosene and carbon monoxide gases sink, and can be trapped on lower floors.
- Stay away from downed power lines. Do not touch wires that are lying on the ground or hanging, or any objects touching them.
- Shut off power at the main electrical switch if you suspect any damage to household electrical wiring.
- Do not refuel or operate generators indoors. Take care when handling flammable fuel.