

Earthquakes and Landslides

Earthquakes and landslides are frightening and destructive natural disasters. An earthquake is the sudden, rapid shaking of the earth caused by the breaking and shifting of rock deep underground. If an earthquake occurs in a populated area, it has the potential to cause many deaths and injuries along with extensive property damage. Although earthquakes are sometimes believed to be a West Coast phenomenon, there are actually 45 states and territories throughout the United States (including Pennsylvania) that are at moderate to high risk.

Landslides and debris flows occur in all U.S. states. In a landslide, masses of rock, earth or debris move down a slope. They can be activated by storms, earthquakes, volcanic eruptions, fires and human modification of land. Landslides and debris flows can move rapidly, striking with little or no warning at avalanche speeds. They also can travel several miles from their source, growing in size as they pick up trees, boulders, cars, and other materials.

Because of the suddenness and unpredictability of earthquakes and landslides, it is important for you and your family to prepare ahead of time.

How to Prepare for Earthquakes

- Get an emergency supply kit that includes enough provisions for you and your family to live on for a minimum of three days. Be sure to include plastic sheeting, duct tape and scissors in your emergency kit.
- Make an emergency plan for you and your family.
- Know the important terms you may hear during an emergency (see below chart):

Earthquake	A sudden slipping or movement of a portion of the earth's crust, accompanied and followed by a series of vibrations.
Aftershock	An earthquake of similar or lesser intensity that follows the main earthquake.
Fault	The break in the earth's crust which moves during an earthquake. The movement may range from less than an inch to more than 10 yards in a severe earthquake.
Epicenter	The place on the earth's surface where the earthquake rupture began. Once fault slippage begins, it expands along the fault during the earthquake and can extend hundreds of miles.
Seismic Waves	Vibrations that travel outward from the earthquake fault at speeds of several miles per second. Although fault slippage by itself can cause considerable damage, the vibrations of seismic waves cause most of the destruction during earthquakes.
Magnitude	The amount of energy released during an earthquake, which is computed from the amplitude of the seismic waves. A magnitude of 7.0 on the Richter Scale indicates an extremely strong earthquake. Each whole number on the scale represents an increase of about 30 times more energy released than the previous whole number represents. Therefore, an earthquake measuring 6.0 is about 30 times more powerful than one measuring 5.0.

- Have a licensed professional repair defective electrical wiring, leaky gas lines, and inflexible utility connections (flexible fittings are more resistant to breakage).
- Store breakable items such as bottled foods, glass, and china in low, closed cabinets with latches.
Store weed killers, pesticides and flammable products securely in closed cabinets with latches and on bottom shelves.
- Fasten shelves securely to walls. Place large or heavy objects on lower shelves.
- Anchor overhead lighting fixtures and hang heavy items such as pictures and mirrors away from beds, couches, and anywhere people sit.
- Locate safe spots in each room under a sturdy table or against an inside wall. Hold earthquake drills with your family members so everyone knows what to do.
- Be prepared for aftershocks that may follow the earthquake. Aftershocks are usually not as powerful as the main earthquake, but may cause additional damage and weaken structures.

What To Do During An Earthquake (see below chart)

If You Are...	Then....
<p>Indoors</p>	<ul style="list-style-type: none"> • Take cover under a sturdy desk, table, or bench or against an inside wall, and hold on. If there isn't a table or desk near you, cover your face and head with your arms and crouch in an inside corner of the building. • Stay away from glass, windows, outside doors and walls and anything that could fall, such as lighting fixtures or furniture. • If you are in bed when the earthquake strikes, stay there (unless your bed is under a heavy light fixture that can fall, in which case you should move to the nearest safe place). Hold on and protect your head with a pillow. • Use a doorway for shelter only if it is in close proximity to you and if you know it is a strongly supported, load bearing doorway. • Stay inside until the shaking stops and it is safe to go outside. Most injuries during earthquakes occur when people are hit by falling objects when entering into or exiting from buildings. • Be aware that the electricity may go out or the sprinkler systems or fire alarms may turn on. DO NOT use the elevators.
<p>Outdoors</p>	<ul style="list-style-type: none"> • Stay there. Move away from buildings, streetlights and utility wires.
<p>In a moving vehicle</p>	<ul style="list-style-type: none"> • Stop as quickly as safety permits and stay in the vehicle. Avoid stopping near or under buildings, trees, overpasses and utility wires.
<p>Trapped under debris</p>	<ul style="list-style-type: none"> • Do not light a match. Do not move about or kick up dust. • If possible, cover your mouth with a handkerchief or clothing. • Tap on a pipe or wall so rescuers can locate you. Use a whistle if one is available. Shout only as a last resort, as shouting can cause you to inhale dangerous amounts of dust.

How to Prepare for and Help Prevent Landslides

- Be aware of changes in and around your home that could signal a landslide is likely to occur, such as changes in landscape and water drainage, or new cracks in foundations and sidewalks.
- Follow proper land-use procedures. Avoid building near steep slopes or along natural erosion valleys. Land-use zoning, professional inspections and proper design can minimize many landslide, mudflow and debris flow problems.
- Get a ground assessment of your property and, if necessary, consult a geotechnical expert for evaluating landslide hazards or designing corrective techniques to reduce landslide risk.
- Minimize home hazards by having flexible pipe fittings installed to avoid gas or water leaks, as flexible fittings are more resistant to breakage (only the gas company or professionals should install gas fittings).

Landslide Warning Signs

- Changes occur in your landscape such as patterns of storm-water drainage on slopes (especially the places where runoff water converges), land movement, small slides, flows or progressively leaning trees.
- Doors or windows stick or jam for the first time.
- New cracks appear in plaster, tile, brick or foundations.
- Outside walls, walks or stairs begin pulling away from the building.
- Slowly developing, widening cracks appear on the ground or on paved areas such as streets or driveways.
- Underground utility lines break.
- Bulging ground appears at the base of a slope.
- Water breaks through the ground surface in new locations.
- Fences, retaining walls, utility poles, or trees tilt or move.

What to do if there is a Landslide or Debris Flow

- Move away from the path of the landslide or debris flow as quickly as possible.
- If escape is not possible, curl into a tight ball and protect your head.
- When the landslide ends, stay away from the slide area. There may be danger of additional slides.
- Watch for associated dangers such as broken electrical, water, gas, and sewage lines and damaged roadways and railways.
- Replant damaged ground as soon as possible since erosion caused by loss of ground cover can lead to flash flooding and additional landslides in the near future.

For additional information, visit www.health.pa.gov, <https://www.ready.gov/earthquakes> and <https://www.ready.gov/landslides-debrisflow> or www.pema.pa.gov.