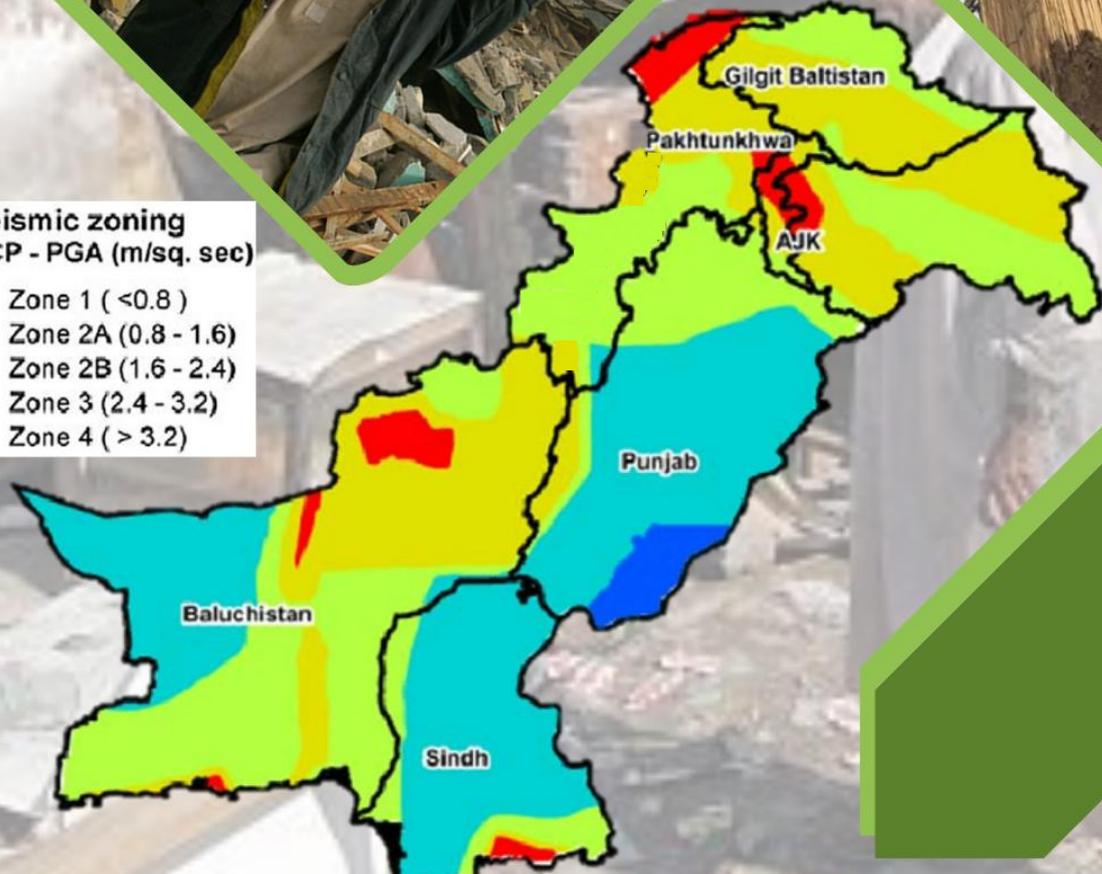




Seismic zoning
BCP - PGA (m/sq. sec)

- Zone 1 (<0.8)
- Zone 2A (0.8 - 1.6)
- Zone 2B (1.6 - 2.4)
- Zone 3 (2.4 - 3.2)
- Zone 4 (> 3.2)



Earthquake Guidelines 2025

Government of Pakistan
Prime Minister's Office
National Disaster Management Authority (HQ)

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1. **Earthquakes.** An earthquake is a sudden rapid shaking of the ground caused by the passage of seismic waves through Earth’s Crust. These seismic waves are produced when some form of energy stored in Earth’s Crust is suddenly released, usually due to masses of rock straining against one another and then suddenly fracturing and “slipping”. Earthquakes occur most often along geologic faults or fault lines, which are narrow zones where rock masses move in relation to one another. These fault lines are typically located at the fringes of the huge tectonic plates that make up Earth’s Crust. Severity of an earthquake is typically measured using the Richter Magnitude Scale (from 1 to 9). Earthquakes can cause a wide range of impacts, including ground shaking, ground failure (such as landslides), collapse of infrastructure (such as buildings, roads, bridges) and tsunamis in coastal areas.

2. **Pakistan’s Historical Earthquakes.** Situated in a region with high seismic activity Pakistan, has experienced several significant earthquakes throughout its history. Some of the most significant ones are:-

Year	Affected Area	Magnitude	Deaths
1935	Quetta, Balochistan	7.5	30,000+
2005	Balakot, KP and State of AJ&K	7.6	80,000+
2013	Awaran, Balochistan	7.7	800+
2015	Malakand, KP	7.5	300+



Quetta, Balochistan (1935)



Balakot, KP and State of AJ&K (2005)



Awaran, Balochistan (2013)



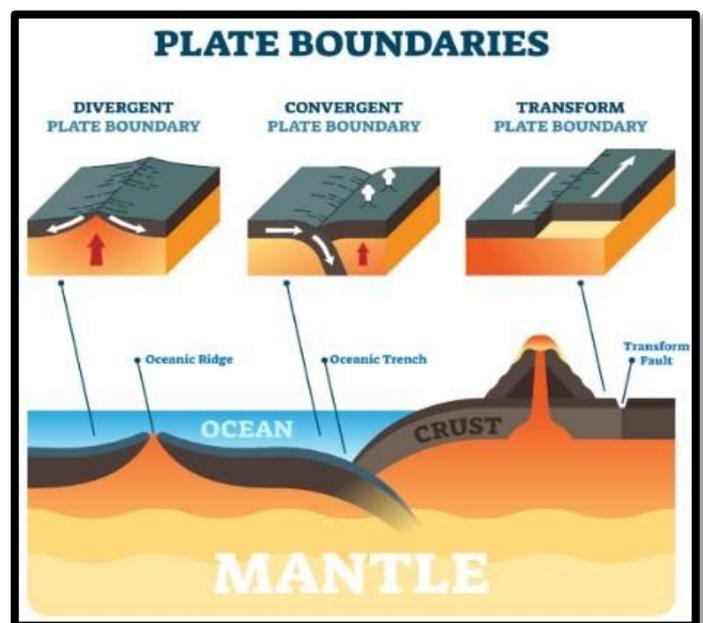
Malakand Division, KP (2015)

3. **Seismicity in Pakistan.** Seismicity refers to the frequency, type and size of earthquakes in a specific region. Pakistan is located in a highly seismically active area, making it prone to earthquakes.

a. **Earthquake Magnitude.** The value given by scientists and is related to things like the extent to which a fault was ruptured during the earthquake, how much energy was released by the earthquake, and how hard it was to break the fault. Earthquake magnitude is also related to how much shaking occurs and how widespread that shaking might be. There are many names for earthquake magnitude, such as local magnitude, Richter magnitude, and moment magnitude, but they all describe the size of the earthquake. Magnitudes of 0 to 3 are considered microearthquakes, magnitude 4 are small earthquakes, magnitude 5 and 6 are strong to major earthquakes that can do damage to communities, magnitude 7 are large earthquakes that can have extensive damage, and magnitude 8 and 9 are great earthquakes that will have widespread damage.

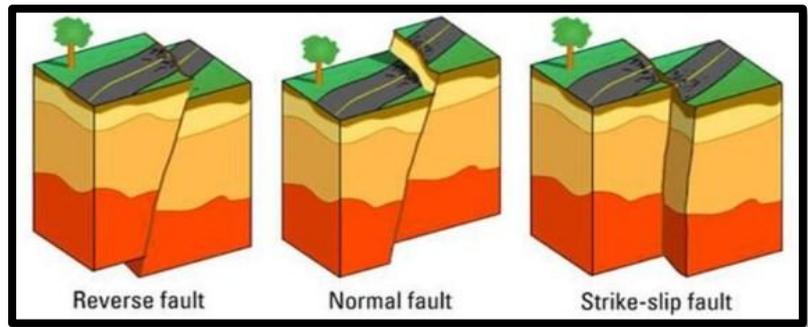
b. **Earthquake Intensity.** Describes how the earthquake affected people, buildings, and the ground surface. Earthquake intensity maps show the extent of the effects of an earthquake and can give a scope of a disaster and some intelligence for responding to an earthquake. The Modified Mercalli Scale ranges from I to X and is given in Roman numerals so it is not confused with earthquake magnitude (Details of Modified Mercalli Scale at **Annex-A**).

c. **Plates.** Pakistan is situated on the boundary between two significant tectonic plates, the Indian Subcontinent Plate and the Eurasian Plate. The collision between these two plates has resulted in the creation of the Hindukush-Karakorum-Himalayan Mountain Ranges and continues to cause seismic activity in the region. In addition to the Indian Subcontinent – Eurasian Plate Boundary, there are also several minor tectonic plates



present in the area, including the Arabian Plate, Tibetan Plate, and Iranian Plate, which all contribute to the tectonic and seismic activity in and surrounding Pakistan. Along the coastline of Pakistan runs the Makran Subduction Zone which is formed where the Arabian Plate slides beneath the Indian Subcontinent Plate and has the potential to generate very large earthquakes and trigger tsunami.

d. **Fault-lines.** Fault lines are fractures in the Earth's crust where significant displacement of rock layers has occurred due to extreme tectonic forces between plates. Movement



along these faults can result in earthquakes when stress builds up and is suddenly released. Fault-lines are categorised into three types; Reverse Fault, Normal Fault and Strike-slip Fault. Pakistan has a number of major fault lines running the breadth and width of the country (**Pakistan Fault-lines Map at Annex-B**). Fault lines can vary greatly in length, and they play a crucial role in shaping the Earth's landscape, including the formation of mountains and valleys. Some of the major fault-lines in Pakistan are: -

- (1) **Chaman Fault.** The Chaman Fault is a major strike-slip fault in southwestern Pakistan that affects several Districts in Balochistan, including Killa Abdullah, Pishin, Quetta, Mastung, Kalat, Ziarat, and Harnai.
- (2) **Chitral-Hunza Fault.** A North-south trending thrust fault in Northern Pakistan that affects several Districts in Khyber Pakhtunkhwa and Gilgit Baltistan including Chitral, Dir, Ghizer and Hunza.
- (3) **Dhurnal Fault.** The Dhurnal Fault is a geological fault in Pakistan that affects several Districts in Khyber Pakhtunkhwa, including Mansehra, Abbottabad, Haripur, and Battagram.
- (4) **Gabbar Fault.** The Gabbar Fault is a geological fault located in Northern Pakistan. It affects several Districts in both Khyber Pakhtunkhwa and Punjab, including Districts including Mansehra, Abbottabad, Haripur, Battagram, Rawalpindi, Attock, and Jhelum.
- (5) **Hindukush Fault.** The Hindukush Fault is a major tectonic fault in Afghanistan and Pakistan. It affects several Districts in Pakistan, including Districts Chitral, Dir, Swat, Kohistan, Shangla, Mansehra, and Battagram.
- (6) **Kohistan-Ladakh Fault.** The Kohistan-Ladakh fault affects several Districts in the Khyber Pakhtunkhwa and Gilgit Baltistan including Kohistan, Diamer, Ghizer, Gilgit and Skardu.
- (7) **Main Boundary Thrust (MBT).** A major geological boundary in Northern Pakistan and India. It affects several Districts in Khyber Pakhtunkhwa and Gilgit Baltistan, including Hazara, Kohistan, Chitral, Skardu, and Diamer.

- (8) **Main Himalayan Thrust (MHT)**. This thrust fault follows a NW-SE strike, reminiscent of an arc, and gently dips about 10 degrees towards the North, beneath the region. It is the largest active continental megathrust fault in the world.
- (9) **Main Mantle Thrust (MMT)**. A geological boundary in Northern Pakistan and India. It affects several districts in Northern Pakistan, including Hazara, Kohistan, Chitral, Gilgit-Baltistan, Skardu, and Diamer.
- (10) **Sulaiman Fold Belt**. The Sulaiman Fold Belt is a geological feature in Southwestern Pakistan. It affects several Districts in Balochistan, including Quetta, Ziarat, Pishin, Chaman, Loralai, Zhob, Sibi, and Kalat.
- (11) **Zaitun-Nal**. The Zaitun-Nal Fault is a geological feature in Southern Pakistan. It affects several Districts in Sindh, including Hyderabad, Mirpurkhas, Umerkot, Tharparkar, and Badin.

e. **Seismic Zonation**. Seismic zonation is the process of dividing an area into different zones based on the potential seismic hazard posed by earthquakes. Seismic hazard maps or seismic zonation maps are used to identify areas with different levels of seismic risk, which can then be used to inform land-use planning, building codes, and emergency response planning.

4. **Impact of Earthquakes**. Seismic activity has had a significant impact on the country and its people. Some of the key impacts include: -

- a. **Loss of Life**. Earthquakes have caused significant loss of life, particularly in areas with weak infrastructure. The 2005 Earthquake in Pakistan resulted the most casualties resulting in over 80,000 deaths.
- b. **Damage to Infrastructure**. Seismic activity has caused significant damage to buildings, bridges, roads and other critical infrastructure, resulting in costly repairs and disruption to daily life.
- c. **Economic Impact**. Earthquakes have had a negative impact on the economy of Pakistan in the past. According to UNDP, the earthquake in Kashmir caused an estimated \$5 billion in damage, with the cost of rebuilding and recovery estimated to be \$6 billion.
- d. **Displacement of Population**. In the 2005 Balakot / AJ&K Earthquake, over 3 million people were affected, with hundreds of thousands of people left homeless. During the 2013 Awaran Earthquake, thousands of people were displaced, and many homes and buildings were damaged. It is important to note that the displacement of people due to earthquakes can have a long-term impact on affected communities, including loss of homes, disruption of social and economic networks and increased vulnerability to other humanitarian challenges.

5. **Mitigation & Preparedness.** Preparedness and mitigation for earthquakes involves a combination of measures aimed at reducing the risk of damage and loss of life from earthquakes (**Earthquake Public Guidance** enclosed at **Annex-C**). Some of the key preparedness and mitigation measures include: -

a. **Mitigation**

- (1) **Developing Areas Safe from Earthquake.** Urban areas and rural areas must integrate disaster management functions and reduce vulnerability through land use planning and redevelopment. This includes earthquake-resistant structures, evacuation routes and preserved open spaces.
- (2) **Building Codes and Seismic Standards.** Developed building codes and standards incorporate seismic design principles to reduce the risk of damage from earthquakes. When constructing a new building, seismic provisions need to be catered for. From experience, the cost of construction of a seismically resilient building is only 5-8% more than that of a conventional building. The following are some of the structural elements that need to be incorporated to make buildings seismically resilient: -
 - (a) **Seismic Retrofitting.** The retrofitting of existing buildings and structures to make them more resistant to seismic effects is an important aspect of preparedness and mitigation. Existing buildings / structures should be strengthened with retrofitting.
 - (b) **Strengthening Lifeline Facilities.** The Ministries of Water, Power and Rural Development Corporations will work to promote the earthquake resistance of lifeline facilities, such as water and sewage systems, electricity, gas and phone networks and waste disposal and treatment sites.
 - (c) **Safety of Non-Structural Elements of Buildings.** Non-structural elements of buildings if not properly fixed and attached to structural elements, can cause death or injury during an earthquake.
 - (d) **Community Based Disaster Risk Management (BDRM) Programmes.** Community based disaster risk reduction aims to reduce the impact of earthquakes by raising public awareness and educating communities on Disaster Risk Reduction (DRR). These programmes help communities identify their needs, capacities and develop local risk reduction strategies. Key components of these programmes include education, training in emergency response, hazard and resource maps, emergency response plans and insurance. These measures increase preparedness and community resilience, helping to save lives, reduce injury and property damage and speed up recovery efforts.

(3) **General Preparedness**

- (a) **Warning and Evacuation / Drills for Aftershocks.** Natural alerts such as shaking, combined with the dissemination of warnings through various channels such as mosques, schools, or electronic media, provide adequate lead time for evacuation and improve the reaction time of the community during a real earthquake. Regular evacuation drills can also help identify safety issues and improve emergency response.
- (b) **Individual Preparedness.** Individual preparation includes understanding earthquake risks specific to one's location, making one's home or workplace safer and being equipped to respond to challenges posed by an earthquake. Measures can include: -
 - i. **Secure Your Home.** Anchor heavy furniture, secure cabinets and place large or heavy objects on lower shelves.
 - ii. **Emergency Supply Kit.** Includes water, non-perishable food, first aid supplies, flash lights, radio and batteries.
 - iii. **Plan an Evacuation Route.** Choose several evacuation routes from your home and workplace in case roads are blocked.
 - iv. **Gas Leaks.** Natural gas leaks are common after earthquakes, so be aware of the smell of gas and any hissing sounds.
 - v. **Practice Regularly.** Regularly practice your earthquake safety drills so you can react quickly in an emergency.

6. **Individual Preparedness**

a. **Schools**

(1) **Education and Training**

- (a) Educating students and staff about earthquake preparedness through drills and informational sessions, it is suggested that earthquake safety can be included in the school sciences curriculum.
- (b) Teach students the "Drop, Cover, and Hold On" technique ensuring you cover your head and neck, which involves dropping to the ground, taking cover under a sturdy desk or table, and holding on until the shaking stops.
- (c) Develop earthquake evacuation plans identifying safe routes and zones.
- (d) Prepare an appropriate amount of emergency supplies to cater for all students and faculty with special care to ensure fire extinguishers, first aid

kits, flashlights, non-perishable / long life foods, radios, batteries and potable water supplies.

- (e) Undertake regular earthquake safety and evacuation drills to teach children evacuation routes out of building and safety precautions while in buildings.
- (f) Conduct drill de-briefings with your faculty to address needs / gaps.
- (g) Schedule emergency drills for the entire school year.
- (h) Please refer to Pakistan School Safety Framework (PSSF) for further assistance in preparing school facilities, faculty, staff and student body for earthquakes (Framework available on NDMA Website).

(2) **Pairing Students**

- (a) Assign each student a buddy or small group of buddies.
- (b) Encourage students to choose buddies they are comfortable with and who they can rely on for support during emergencies.

(3) **Responsibilities.** Clearly define the responsibilities of buddies. For example, buddies should: -

- (a) Help each other stay calm.
- (b) Check on each other's safety and well-being.
- (c) Assist with the "drop, cover and hold on" procedure.
- (d) Evacuate together to the designated assembly point.
- (e) Account for each other during roll call or heads count.

(4) **Evacuation Planning**

- (a) Develop and practice evacuation plans that include designated assembly points and safe zones away from buildings.
- (b) Assign responsibilities to teachers and staff for guiding students to safety during an earthquake.
- (c) Ensure complete head count of students and faculty in assembly points and safe zones.

(5) **Secure Furniture and Objects**

- (a) Secure heavy furniture, bookshelves, and equipment to walls to prevent them from falling during an earthquake.
- (b) Keep breakable items and heavy objects on lower shelves to minimize hazards.

(6) **Emergency Supplies.** Maintain emergency supply kits in each classroom with essentials such as water, first aid supplies, flashlights, and batteries.

- (7) **Communication**
 - (a) Establish a communication plan to notify parents and guardians about the school's status following an earthquake.
 - (b) Ensure that emergency contact information for students and staff is up to date.
- b. **Offices**
 - (1) **Emergency Procedures**
 - (a) Implement an emergency response plan that includes procedures for earthquake.
 - (b) Designate evacuation routes and assembly points outside the building.
 - (2) **Secure Equipment**
 - (a) Anchor heavy office furniture, cabinets, and equipment to prevent them from toppling over during an earthquake.
 - (b) Store breakable items and heavy objects on lower shelves or in secure cabinets.
 - (3) **Training and Awareness**
 - (a) Conduct training sessions to educate employees about earthquake safety measures and evacuation procedures.
 - (b) Display visual aids and signage reminding employees of safety protocols.
 - (4) **Emergency Supplies**
 - (a) Maintain emergency kits with essentials such as water, non-perishable food, first aid supplies, flashlights, and batteries.
 - (b) Consider including items like dust masks and sturdy shoes for potential post-earthquake situations.
 - (5) **Communication**
 - (a) Establish a communication system to relay updates and instructions to employees during and after an earthquake.
 - (b) Ensure that contact information for employees and emergency services is readily available.
- c. **Homes**
 - (1) **Secure Heavy Items**
 - (a) Anchor heavy furniture, such as bookcases and water heaters, to wall studs to prevent them from tipping over.
 - (b) Avoid hanging heavy objects over beds or seating areas.

- (2) **Safe Zones**
 - (a) Identify safe spots in each room, such as under sturdy tables or desks, where family members can take cover during an earthquake.
 - (b) Avoid placing beds near windows or heavy objects that could fall.
- (3) **Emergency Supplies**
 - (a) Keep emergency supply kits in easily accessible locations with water, non-perishable food, first aid supplies, flashlights, batteries, and a battery-powered or hand-crank radio.
 - (b) Include items like sturdy shoes, gloves, and blankets in your kit.
- (4) **Family Emergency Plan**
 - (a) Develop and practice a family emergency plan that includes communication strategies and designated meeting places.
 - (b) Ensure that all family members know how to respond during an earthquake.
- (5) **Structural Safety**
 - (a) Regularly inspect your home for structural weaknesses and address any issues promptly.
 - (b) Consider retrofitting older homes to enhance their earthquake resistance.
- d. **High-Rise Buildings**
 - (6) **Seismic Retrofitting**
 - (a) Ensure that the building has undergone proper seismic retrofitting to strengthen its structure against earthquakes.
 - (b) Retrofitting measures may include adding shear walls, braces, or base isolators to improve the building's ability to withstand seismic forces.
 - (7) **Emergency Response Plan**
 - (a) Develop and implement an emergency response plan specifically tailored to high-rise buildings.
 - (b) Clearly outline evacuation procedures, designated evacuation routes, and assembly points both within and outside the building.
 - (8) **Evacuation Strategies**
 - (a) Establish phased evacuation procedures to prevent congestion in stairwells and ensure a systematic evacuation process.
 - (b) Assign floor wardens or emergency response teams to facilitate evacuations and provide guidance to occupants.

- (9) **Safe Zones**
 - (a) Identify safe zones within the building where occupants can take cover during an earthquake.
 - (b) Safe zones may include reinforced areas near interior walls or columns, away from windows and heavy objects.
- (10) **Communication Systems**
 - (a) Install and maintain reliable communication systems, such as intercoms, emergency notification systems, and public address systems, to disseminate instructions and updates to occupants.
 - (b) Provide instructions for using communication devices such as two-way radios or mobile phones in case of network disruptions.
- (11) **Emergency Supplies**
 - (a) Stock emergency supply kits on each floor with essentials such as water, non-perishable food, first aid supplies, flashlights, batteries, and dust masks.
 - (b) Consider the needs of occupants with disabilities or medical conditions when planning emergency supplies.
- (12) **Training and Drills**
 - (a) Conduct regular earthquake drills and training sessions for building occupants, including tenants, employees, and visitors.
 - (b) Practice evacuation procedures, stairwell navigation, and the "Drop, Cover, and Hold On" technique.
- (13) **Structural Integrity Checks**
 - (a) Regularly inspect the building's structural integrity and address any maintenance issues or vulnerabilities promptly.
 - (b) Monitor and maintain building systems such as elevators, fire suppression systems, and emergency lighting to ensure functionality during emergencies.
- (14) **Post-Earthquake Procedures**
 - (a) Develop protocols for post-earthquake assessments of the building's structural stability and safety.
 - (b) Establish procedures for re-entry and occupancy clearance following seismic events, considering potential hazards such as gas leaks or electrical failures.

7. **Earthquake Myths.** It is always important to rely on scientific information, not heed myths. Some common myths about earthquakes that you should avoid include: -
- a. There's a belief that dogs and other animals can "sense" when an earthquake is going to strike. However, there's no scientific evidence to support this claim.
 - b. Some people believe that earthquakes occur during specific weather conditions, often referred to as "earthquake weather". This is usually described as hot and dry or hot and humid weather. However, earthquakes begin miles below ground level, where the weather above plays no part in their occurrence.
 - c. Another widespread belief is that earthquakes are far more likely to occur during the early morning, specifically within an hour of dawn. However, whatever is happening on the surface of the Earth is too far away from where quakes take place to have any effect on when or if temblors occur.
 - d. Small earthquakes prevent big ones, this is also a myth. Small earthquakes can release some of the stress on a fault line, but they do not prevent big ones from happening.
 - e. The safest place to be in an earthquake is under a doorway. This is outdated advice. In the past, in older buildings not designed to withstand earthquakes, the door frame may have been the only thing left standing in the aftermath of an earthquake. Today, doorways are no stronger than any other parts of a house and do not provide protection from falling or flying objects. You are safer practicing the "Drop, Cover, and Hold On" technique under a piece of furniture.
8. **Response & Recovery.** It is important to have plans in place for both responding to and recovering from earthquakes. In response, the safety of people is prioritized and involves actions such as: -
- a. Evacuating buildings and seeking shelter (If it is safe to do so, evacuate the building immediately. Avoid elevators and use emergency stairs instead. If there is debris blocking the exit, find another way out or take shelter in a secure location until the shaking stops).
 - b. Provision of first aid and medical assistance: -
 - (1) **Assess the Situation.** Check yourself and others for injuries and assess the overall situation before providing aid. If you or others are in immediate danger, evacuate the area before providing first aid.
 - (2) **Administer Basic First Aid.** If someone is injured, provide basic first aid, such as controlling bleeding, treating shock, and stabilizing broken bones or sprains. If you are not trained in first aid, call for professional medical assistance as soon as possible.

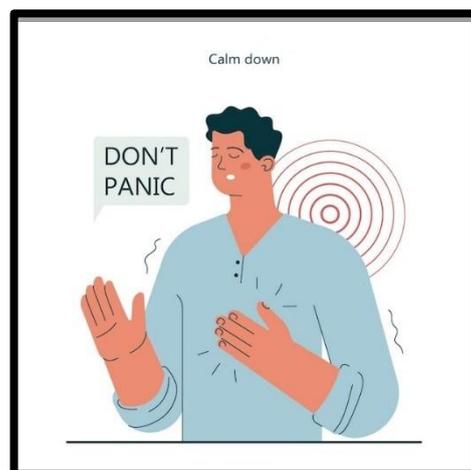
- (3) **Prioritize Treatment.** Prioritize treatment based on the severity of the injury. Injuries that are life-threatening, such as severe bleeding or difficulty breathing, should be treated first.
 - (4) **Maintain Sanitation.** Maintain sanitation when providing first aid to prevent the spread of infection. Use clean dressings and equipment and wash your hands frequently.
 - (5) **Coordinate with Emergency Services.** Coordinate with local emergency services, such as the fire department, ambulance service, and police, to provide medical assistance to those in need. If necessary, direct those in need of medical assistance to the nearest hospital or medical center.
- c. **Searching for and rescuing people trapped in rubble:** -
- (1) **Wait for Help.** If you are not trained in search and rescue, wait for professional rescue teams. These teams are equipped with specialized tools and training for faster and safer rescue process.
 - (2) **Safety First.** If you are trained in search and rescue and must help in the rescue effort, make sure the rubble is stable before entering. Be aware of the risk of aftershocks and take necessary precautions to protect yourself from further injury or collapse.
 - (3) **Call Out.** If you hear someone trapped in the rubble, call out to them, but do not shout. Let them know you are there and reassure them that help is on the way.
 - (4) **Dig Carefully.** If you are trained in search and rescue, dig carefully around the rubble to avoid causing further collapse or injury. Use caution when removing debris and never lift heavy objects on your own.
 - (5) **Coordinate with Emergency Services.** Coordinate with local emergency services, such as the fire department, ambulance service, and police, to provide effective search and rescue assistance.
- d. Recovery efforts after an earthquake should focus on rebuilding infrastructure, restoring basic services and helping affected communities return to a sense of normalcy. This can include: -
- (1) Clearing debris Repairing or rebuilding damaged buildings.
 - (2) Providing temporary housing for displaced individuals.
 - (3) Providing aid for physical and psychological recovery.
 - (4) Having effective response and recovery plans in place can great reduce the impact of earthquakes on communities and ensure a swift and organized response.

e. **Individual Guidelines for Response**

(1) **Indoors**

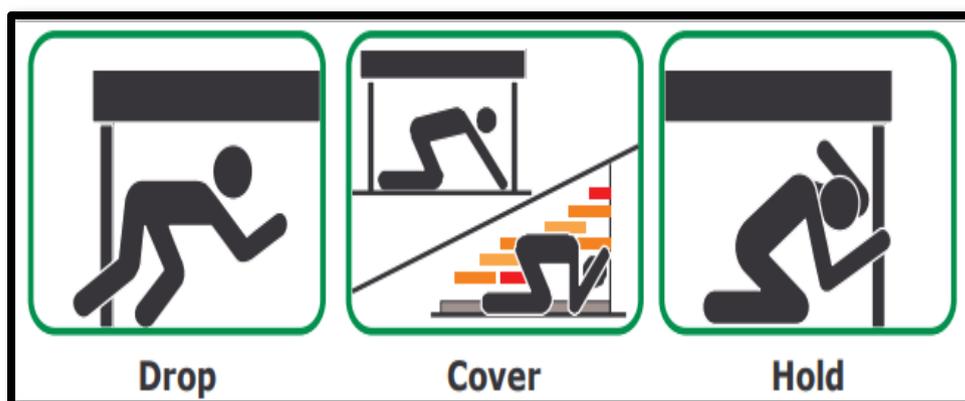
(a) **Schools**

i. **Stay Calm.** It's natural to feel scared during an earthquake, but staying calm can help you make rational decisions and stay safe.

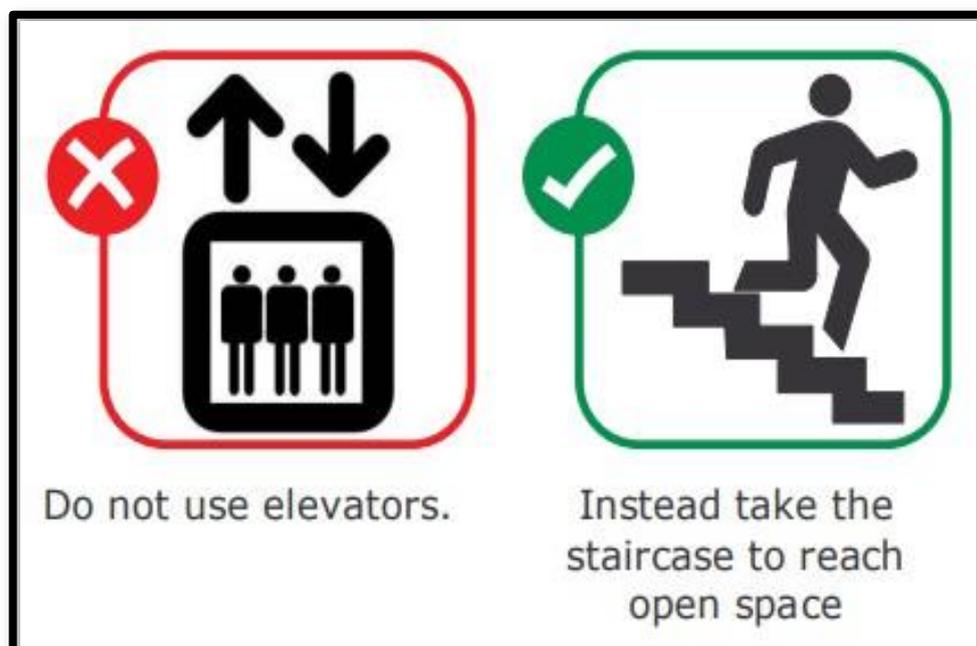


ii. **Drop, Cover, and Hold On** — Take cover under a sturdy desk, table, or bench, or against an inside wall, and hold on. If there is no desk or table near you, cover your face and head with your arms and crouch in an inside corner of the building. It is safer to **Drop, Cover,**

and Hold until the shaking is over.



iii. Do not use elevators, use the stairs.



- iv. Stay away from glass, windows, outside doors and walls, and anything that could fall, such as lighting fixtures and furniture.



- v. 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.



Do not panic; stay calm and take necessary action.

Do not rush to the exit point. Get out calmly in an orderly manner.

(b) Offices

- i. **Stay Calm.** It's natural to feel scared during an earthquake, but staying calm can help you make rational decisions and stay safe.



- ii. **Drop, Cover, and Hold On** - Take cover under a sturdy desk, table, or bench, or against an inside wall, and hold on. If there is no desk or table near you, cover your face and head with your arms and crouch in an inside corner of the building. It is safer to **Drop, Cover, and Hold** until the shaking is over.



- iii. Do not use elevators, use the stairs.



- iv. Stay away from glass, windows, outside doors and walls, and anything that could fall, such as lighting fixtures and furniture.

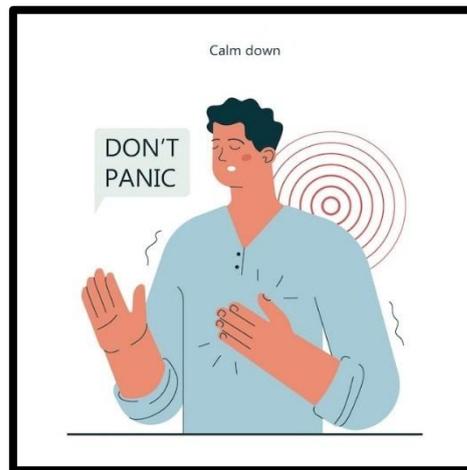


- v. Stay inside until the shaking stops and it is safe to go outside. Most injuries during earthquakes occur when people are hit by falling objects while entering or leaving buildings.

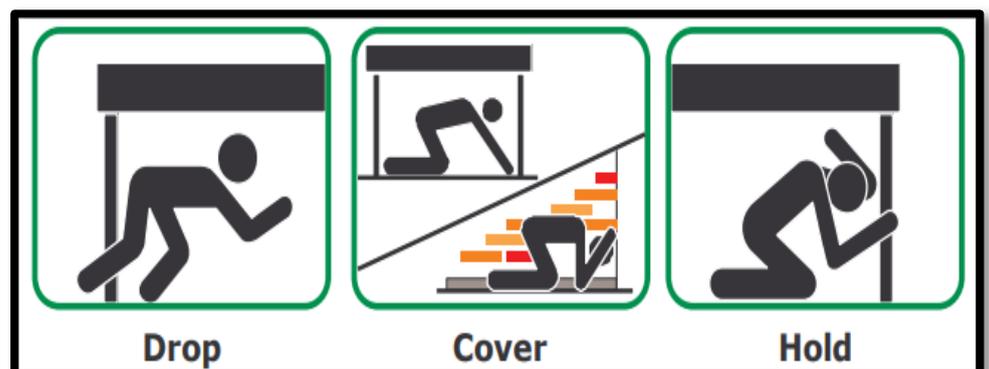


(c) **Home**

- i. **Stay Calm.** It's natural to feel scared during an earthquake, but staying calm can help you make rational decisions and stay safe.



- ii. **Drop, Cover, and Hold On** - Take cover under a sturdy desk, table, or bench, or against an inside wall, and hold on. If there is no desk or table near you, cover your face and head with your arms and crouch in an inside corner of the building. It is safer to **Drop, Cover, and Hold** until the shaking is over.



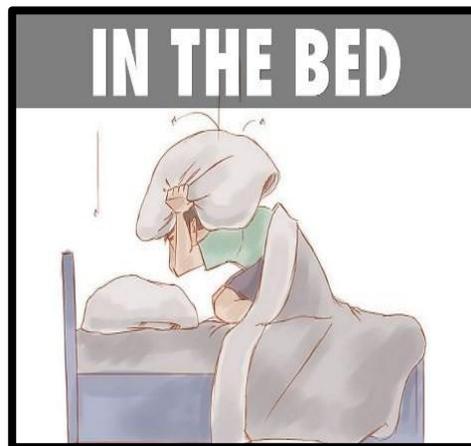
- iii. Do not use elevators, use the stairs.



- iv. Stay away from glass, windows, outside doors and walls, and anything that could fall, such as lighting fixtures and furniture.



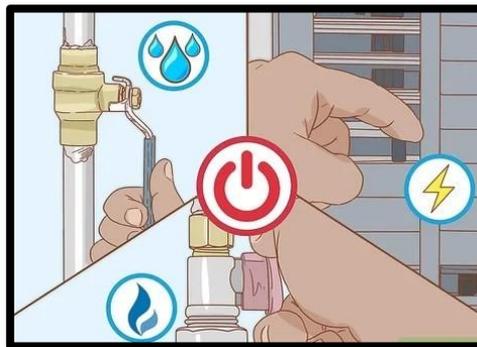
- v. If you are in bed when the earthquake strikes, stay there. Hold on and protect your head with a pillow, unless you are under a heavy light fixture that could fall. In that case, move to the nearest safe place.



- vi. 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 while entering or leaving buildings.

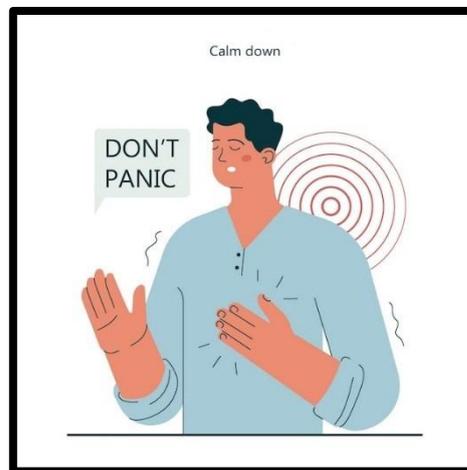


- vii. Turn Off Appliances if it's safe to do so, turn off gas, water, and electrical appliances to prevent fires, flooding, or gas leaks.



(d) **High-Rise Buildings**

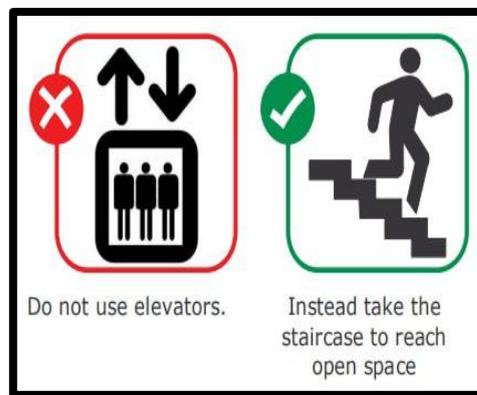
- i. **Stay Calm.** It's natural to feel scared during an earthquake, but staying calm can help you make rational decisions and stay safe.



- ii. **Drop, Cover, and Hold On** - Take cover under a sturdy desk, table, or bench, or against an inside wall, and hold on. If there is no desk or table near you, cover your face and head with your arms and crouch in an inside corner of the building. It is safer to **Drop, Cover, and Hold** until the shaking is over.



- iii. Do not use elevators, use the stairs.



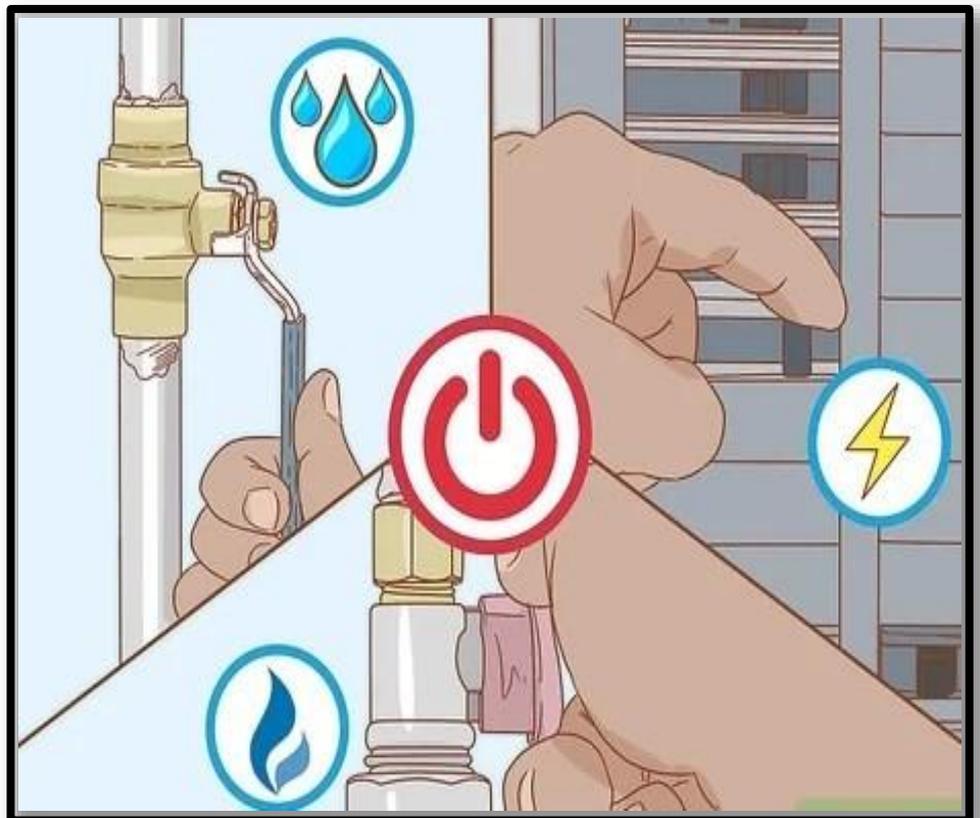
- iv. Stay away from glass, windows, outside doors and walls, and anything that could fall, such as lighting fixtures and furniture.



- v. If you are in bed when the earthquake strikes, stay there. Hold on and protect your head with a pillow, unless you are under a heavy light fixture that could fall. In that case, move to the nearest safe place.

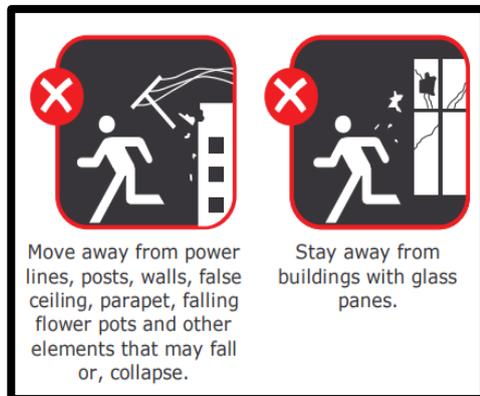


- vi. Stay inside until the shaking stops and it is safe to go outside. Most injuries during earthquakes occur when people are hit by falling objects while entering or leaving buildings.
- vii. Turn Off Appliances if it's safe to do so, turn off gas, water, and electrical appliances to prevent fires, flooding, or gas leaks.



(2) **Outdoors**

- (a) Stay outdoors in clear open spaces.
- (b) Move away from buildings, trees, streetlights, and utility wires.
- (c) Stay calm and keep alert for any falling debris or other hazards.



- (d) Stay in a safe location and remain there until the shaking stops.

(3) **Vehicle**

- (a) Stop as quickly as safety permits, pull to the side of the road, and stay in the car.



- (b) Avoid stopping near or under buildings, trees, overpasses, and utility wires.
- (c) Do not attempt to drive across bridges or overpasses that have been damaged.
- (d) Proceed cautiously after the earthquake has stopped, watching for road and bridge damage.

(4) **If Trapped Under Debris**

- (a) Do not light a match.
- (b) Cover your mouth with a handkerchief or clothing. Do not move about or kick up dust.
- (c) Tap on a pipe or wall so that rescuers can find you. Use a whistle if one is available.
- (d) Shout only as a last resort, shouting can cause you to inhale dangerous amounts of dust.

9. **Best Practices – Do’s and Don’ts After the Earthquake**

a. **Do’s**

- (1) Check yourself for injury, paying extra attention to areas where you may have reduced sensations.
- (2) Be prepared for aftershocks.
- (3) Check for fire, and if any, control it using a fire extinguisher or other means.
- (4) Look around for other hazards such as broken glass and objects in your immediate area.
- (5) Stay close to and aware of the safe spaces in your environment.
- (6) Evacuate only if necessary, otherwise stay where you are.
- (7) Obey public safety guidance and precautions.
- (8) If the authorities advise an evacuation for your area, follow their directions immediately.
- (9) Pack only essential belongings and valuables to take with you during the evacuation.
- (10) Leave a message stating where you are going if you must evacuate your residence.

b. **Don’ts**

- (1) Don’t enter partially damaged buildings. Aftershocks can cause further damage to the building and weakened structures may collapse!
- (2) Don’t use your unnecessarily busy telephone / mobile phone networks immediately after an earthquake. Undue stress on the network may hinder the ability for others to contact emergency services.
- (3) Don’t drive around your vehicle in earthquake affected areas, extra traffic may hinder access for emergency services in the affected areas.
- (4) Don’t use elevators in buildings until they have been checked and certified safe for use.
- (5) Don’t attempt to cross any bridges or flyovers which may have been damaged.

10. **Conclusion.** Despite these measures, the risk of damage and loss of life from earthquakes remains high in Pakistan due to the country's location in a highly seismic zone and the widespread non-compliance with building codes and standards. As such, it is important to prioritize investment in preparedness and mitigation measures to reduce the risk of damage from earthquakes. Overall, earthquakes are a natural hazard that can cause significant harm to people, buildings and infrastructure. Understanding their causes, impacts and ways to reduce their risk is an important aspect of disaster risk management and reducing the vulnerability of communities to natural hazards.

1. **Earthquake and Tsunami Risk.** Pakistan is vulnerable to both **Earthquake** and **Tsunami**, particularly due to its geographic location along the **Makran Subduction Zone (MSZ)** in the Arabian Sea. The MSZ is an active tectonic boundary where the **Arabian Plate** is subducting beneath the **Eurasian Plate**, making it a potential source of earthquake-triggered tsunamis.

a. **How Earthquakes Cause Tsunamis**

- (1) **Subduction Zone Earthquakes:** Tsunamis are primarily caused by underwater earthquakes that occur at subduction zones, where one tectonic plate slides beneath another.
- (2) **Seafloor Displacement:** A strong earthquake displaces a massive volume of water, creating powerful waves that travel across the ocean at high speeds.
- (3) **Wave Amplification:** As these waves approach shallow waters near coastal areas, they increase in height and cause widespread flooding and destruction.

b. **Makran Subduction Zone (MSZ) – Pakistan’s Tsunami Threat**

- (1) The Makran Subduction Zone (MSZ) off the coast of Balochistan is one of the few regions in the world where earthquakes can generate tsunamis.
- (2) Historical records show that large earthquakes in the MSZ have triggered deadly tsunamis in the past.

c. **Major Earthquake-Tsunami Events in Pakistan’s History**

Year	Location	Magnitude	Tsunami Impact
1945	Makran, Balochistan	8.1	Tsunami killed over 4,000 people along the Makran coast and parts of India and Iran.
2013	Awaran, Balochistan	7.7	No tsunami, but underwater seismic activity raised concerns.

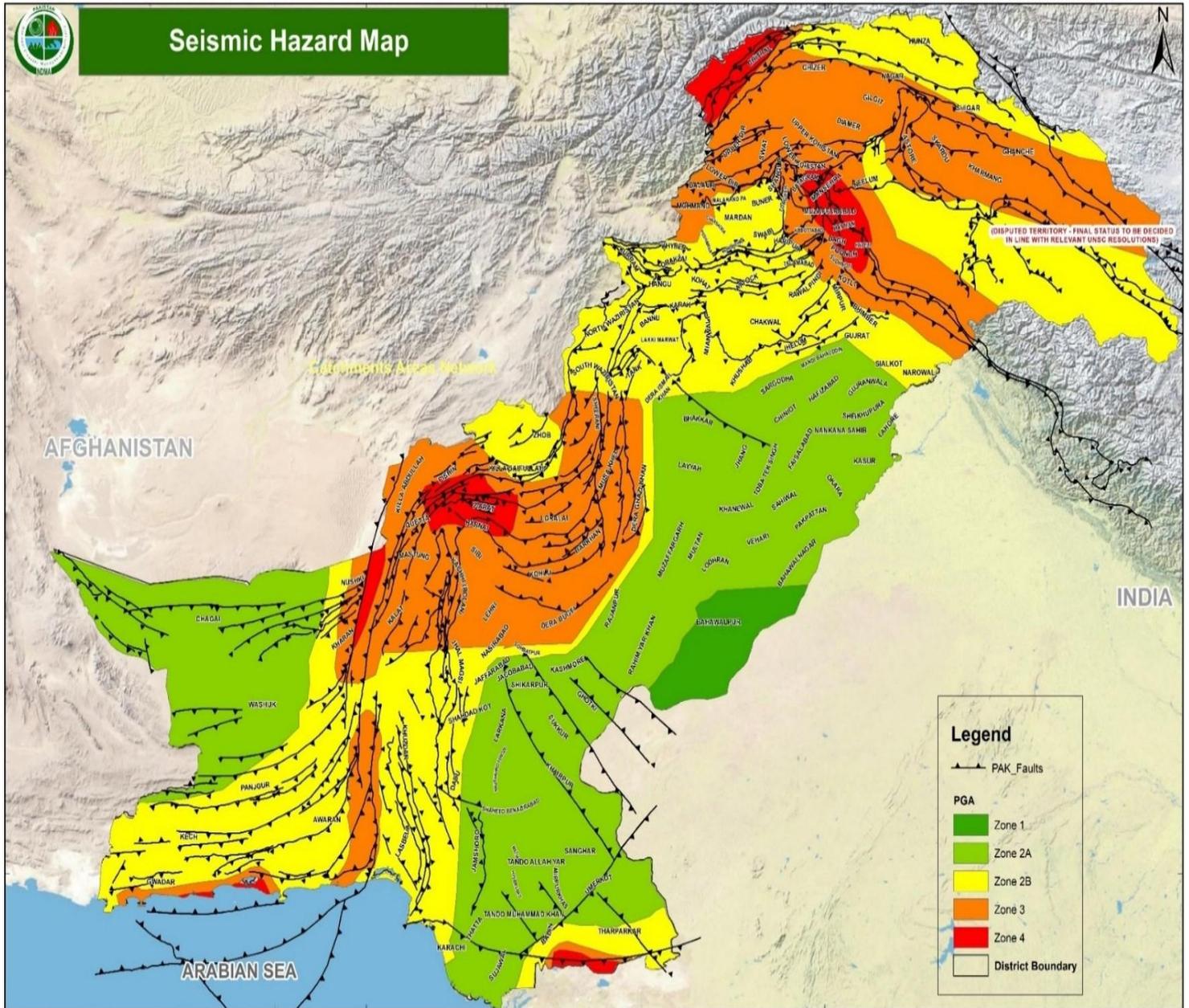
2. **NDMA Mobile App.** National Disaster Management Authority (NDMA) mobile application, designed to provide essential early warnings and advisories directly to users' devices. Developed by NDMA, this app aims to empower individuals and communities with vital information of earth quacks to effectively prepare for and respond to potential disasters. Stay informed, stay safe, with the NDMA mobile app at your fingertips.



MODIFIED MERCALLI SCALE FOR EARTHQUAKE INTENSITY

CIIM Intensity	People's Reaction	Furnishings	Built Environment	Natural Environment
I	Not felt			Changes in level and clarity of well water are occasionally associated with great earthquakes at distances beyond which the earthquakes felt by people.
II	Felt by a few.	Delicately suspended objects may swing.		
III	Felt by several; vibration like passing of truck.	Hanging objects may swing appreciably.		
IV	Felt by many; sensation like heavy body striking building.	Dishes rattle.	Walls creak; window rattle.	
V	Felt by nearly all; frightens a few.	Pictures swing out of place; small objects move; a few objects fall from shelves within the community.	A few instances of cracked plaster and cracked windows within the community.	Trees and bushes shaken noticeably.
VI	Frightens many; people move unsteadily.	Many objects fall from shelves.	A few instances of fallen plaster, broken windows, and damaged chimneys within the community.	Some fall of tree limbs and tops, isolated rockfalls and landslides, and isolated liquefaction.
VII	Frightens most; some lose balance.	Heavy furniture overturned.	Damage negligible in buildings of good design and construction, but considerable in some poorly built or badly designed structures; weak chimneys broken at roof line, fall of unbraced parapets.	Tree damage, rockfalls, landslides, and liquefaction are more severe and widespread with increasing intensity.
VIII	Many find it difficult to stand.	Very heavy furniture moves conspicuously.	Damage slight in buildings designed to be earthquake resistant, but severe in some poorly built structures. Widespread fall of chimneys and monuments.	
IX	Some forcibly thrown to the ground.		Damage slight in buildings designed to be earthquake resistant, but severe in some poorly built structures. Widespread fall of chimneys	
X			Most ordinary masonry structure collapse: damage moderate to severe in many buildings designed to be earthquake resistant.	

PAKISTAN EARTHQUAKE ZONATION & FAULTLINE MAP



PUBLIC EARTHQUAKE GUIDANCE



Earthquake Be Prepared



Earthquakes are the **sudden, rapid shaking of the earth**, caused by the **breaking and shifting of underground rock**.

Earthquake Facts



Gives **no warning**



Causes **fires** and **damage roads**

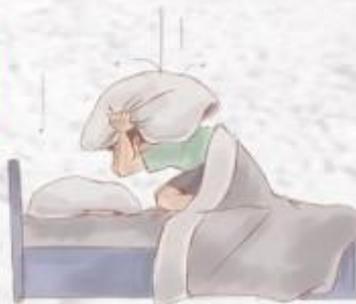


Causes **tsunamis, landslides,** and **avalanches**

If an Earthquake Happens



If in a vehicle, **pull over** and **stop**.



If in **bed**, **stay there**.



If outdoors, **stay outdoors**.



Do not **get in a doorway**.



Find an **open spot**.



Do not **run outside**.



Earthquake Be Prepared



Prepare Now

Secure items such as **televisions** and objects that **hang on walls**.



Create a **family emergency communication plan**.



Make a **supply kit** that includes **enough food** and **water** for at least three days, a **flashlight**, a **fire extinguisher**, and a **whistle**.



Consider a **retrofit** of your house if it has **structural issues**.



Survive During

Drop, Cover and Hold



Cover your head and neck.



Avoid using elevators if in a building.



If near **slopes, cliffs, or mountains**, be alert for **falling rocks** and **landslides**.



Safe After

Expect aftershock



If in a **damaged building**, go **outside** and do not enter any **damaged building**.



If you are **trapped**, send a **text** or **bang** on a **pipe** or **wall**.



If you are in an area that may experience **tsunamis**, go **inland** or to **higher ground** immediately after the **shaking stops**.





Earthquake Mitigation & Prevention



BEFORE



Risk Assessment and Preparedness Planning



Building Codes and Infrastructure Standards



Infrastructure Inspection and Maintenance



Public Awareness and Education

AFTER



Timely Mobilization of Search & Rescue Teams



Timely Mobilization of Heavy Machinery



Psychological Support



Shelter and Temporary Housing



Centralized Coordination and Communication



Damage Assessment & Reporting



Community Outreach and Recovery Support



Deployment of personnel to maintain order



Timely Mobilization of Medical Teams & Medical Camps



Earthquake

School Safety Essential Guidelines



Earthquake Drill



ASSUME "CRASH" POSITION on **knees**, **head down**, **hands clasped** on back of neck or head covered with book or jacket



Take **cover** under **desk** or **table**



FACE AWAY from **windows**



COUNT ALOUD to **60** - Earthquakes rarely last longer



Use the **BUDDY SYSTEM**. Classes should **exit in pairs** with **one teacher** in **front** and **one** in the **back**.



Have **teachers, students** and **staff** familiarize themselves **evacuation procedures**



Use **4** Evacuation Rules – **Don't Talk!** **Don't Push!** **Don't Run!** **Don't turn back!**



If an aftershock occurs while exiting, **crouch** rather than **dropping to knees** to avoid injury from **debris**.



Emergency Supply Kit Earthquake



Non-Perishable Food



Gallon of Potable
Water per Person



Hygiene Items



First Aid Kit



Prescription Medicine



Swiss Army Knife



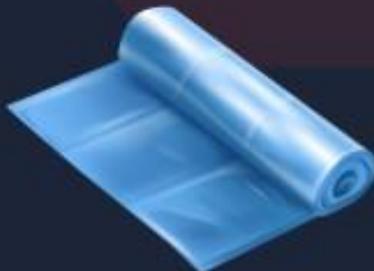
Whistle



Matches or Lighter



Flashlight



Garbage Bags



Dust Mask



Battery-powered or
Hand-crank Radio



Solar Charger /
Powerbank

