abcd basic disaster awareness handbook

B.U. KANDILLI OBSERVATORY & EARTHQUAKE RESEARCH INSTITUTE
ISTANBUL COMMUNITY IMPACT PROJECT

ABCD Basic Disaster Awareness Handbook

prepared by: Marla Petal, MSW
Zeynep Turkmen

consultant: Prof. Dr. Ahmet Mete Işıkara

resources: City of Los Angeles, Fire Department
Southern California Earthquake Center
Boğaziçi University Kandilli Observatory & Earthquake Research Institute
American Red Cross
Turkish Red Crescent Society

graphic design: Burcu Kayalar Yörük

illustrations: Baran Baran
Ali Murat Erkorkmaz (Ahmet Mete Işıkara illustration)

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B.U. KANDILLI OBSERVATORY & EARTHQUAKE RESEARCH INSTITUTE
ISTANBUL COMMUNITY IMPACT PROJECT

Çengelköy 81220 İstanbul tel: 0216.308 05 11 / 345 fax: 0216.332 90 94 e-mail: iahep@boun.edu.tr www.iahep.org

FOREWORD

Earthquakes are natural phenomena that happen all over the world. 96 % of Turkey lies within an active seismic zone. Although, we have long-term predictions, no one can make short-term predictions yet about when an earthquake will strike.

At this point, the important thing that understand that we are exposed to the hazards of earthquake and must take action to reduce the risks of death and injury, and to reduce loss of property.

The Istanbul Community Impact Project is being implemended by Boshporus Universty, Kandilli Observatory and Earthquake Research Institution (B.U., K.O.E.R.I.) in order to create a disaster aware community, to protect ourselves against earthquakes and to reduce potential earthquake damages

I.C.I.P. is funded by the United States Agency for International Development, Office of Foreign Disaster Assistance and is administered by B.U., K.O.E.R.I.. As with all of our efforts, our goal is to increase disaster awareness, provide information to help identfy the many small steps that can be taken to reduce disaster risks and to assist everyone in be prepared to help ourselves and those around us following a disaster.

The Basic Disaster Awarness Handbook is consists of five sections; I. Disaster Awareness, II. Earthquake Hazards & Risks, III. Before an Earthquake, IV. During & After an Earthquake, V. Next Steps. In the Appendices section a series of Factsheets provide more detailed information related to the core content of the handbook.

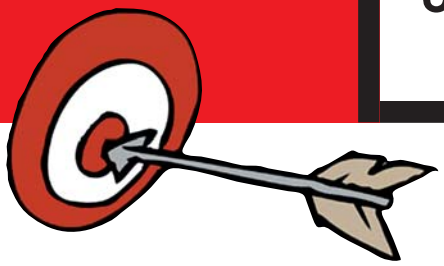
This Handbook was prepared by Marla Petal, Project Manager and Zeynep Turkmen, Program Coordinator under the auspices of the B.U. K.O.E.R.I/I.C.I.P.

I would like to express my gratitute to several of our B.U. K.O.E.R.I. faculty who provided scientific support in the preparation of this handbook: Prof. Dr. Mustafa Erdik, Head of the Earthquake Engineering Department, Professor Dr. Özal Yüzügüllü, Earthquake Engineering, Doç. Dr. Serif Barış, Geophysical Engineering Department, Dr. Doğan Kalafat, Head of Seismology Laboratory.

I would like to thank all who contributed to the creation of this handbook, which we hope you will find helpful in taking preparedness measures to reduce loss of life and property in probable earthquakes to come.

Prof. Dr. Ahmet Mete Işıkara
B.U. K.O.E.R.I. Director

GOALS



A strong or major earthquake can produce a disaster. A disaster, by definition, is a situation where people's needs far exceed the resources available to help them.

We have learned from disasters all over the world that in the first 72 hours after a disaster, most help comes from those immediately around us.

The goal of this handbook is to increase disaster awareness, provide information to help identify the many small steps that can be taken to reduce disaster risks, and to assist us to be prepared to help ourselves and those around us following a disaster.

Our mission is:

- To develop every individual's awareness of earthquake and other disaster risks.
- To educate every individual about what they can do to minimize their risks.
- To encourage everyone to recognize and take responsibility for taking the steps necessary for disaster preparedness
- To permit everyone to see themselves as part of the big picture.

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I DISASTER AWARENESS

I.1 DISASTER EXPERIENCES

What do you think of when you think about disasters?

There are many kinds of disasters. Many of the biggest disasters are natural disasters: floods, storms, hurricanes, volcanic eruptions, landslides, and earthquakes, Some are man-made: fires, transportation accidents, chemical spills, terrorist attacks.

What are some of the disasters that could happen that might affect YOUR region, your neighborhood, or your family? One of the worst kinds of natural disasters to affect our large population centers are earthquakes. By learning about earthquakes we learn how to protect ourselves from many kinds of disasters. What are earthquakes? What are our risks? What should we do before, during and after an earthquake to reduce the risks of death and injury, and to reduce loss of property, jobs and community.

- Did you experience the Kocaeli or Duzce, or any other earthquakes?
- Did you live in the disaster area?
- Did you lose family members or friends in the earthquake?
- Did you have family members or friends who were injured in the earthquake?
- Did you or any of your friends or family members lose their homes or their jobs?
- Did you see the disaster region with your own eyes?
- Did you learn aout the disaster region on t.v. or in the newspapers?

Anyone who has lived through a disaster like this will never forget it.

The Kocaeli and Duzce earthquakes of 1999 touched all of us. All over the world people learn the most about disaster prevention **after** a disaster.

I.2 EARTHQUAKES IN TURKEY

Turkey has had it's share of terrible earthquakes. The question for all of us is what we must learn from these tragedies.

Turkey is earthquake country. With the last eathquakes we have been reminded of this in the most painful ways. It is now up to us to remember, to protect ourselves, and to prepare. The earth has been shaped over millions of years, but the human settlements that civilizations have built can be destroyed in a minute. Just like other people around the world, we are exposed to the hazards of earthquakes (and other disasters) all over Turkey. And that puts us at risk.

The Marmara Region, which lies at the western end of the Northern Anatolian Fault system is ian area of high seismic hazard. Earthquakes in this region are evident throughout history.

Take a look at the fact sheets that show the history of earthquakes in Turkey, and in your region.

I.3 GEOLOGICAL TIME AND EARTHQUAKE SCIENCE

Human beings live a lifetime, so we think in terms of decades, generations, and maybe centuries. But earthquakes keep geological time, hundreds, thousands and millions of years.

Earthquake science has only been around for a small fraction of these millions of years and is very new. The big events we learn from happen infrequently. However, scientists have already begun to see some patterns. As a result, we know that we can anticpate a major earthquake in the Marmara Sea sometime within the next 30-50 years.

In geological time, this is a very short period!

Apparently when Japanese people hear that there is a 30% chance of rain, they take there umbrellas with them. We now know that there is a high probability of a major earthquake in the Marmara Region. Now is the time to take action.

I.4 EARTHQUAKES ARE NATURAL PHENOMENA THAT HAPPEN ALL OVER THE WORLD

There are about 3,500,000 earthquakes every year. Only about 1,000,000 of these are recorded. Only 34,000 earthquakes every year are strong enough to be felt.

There are about 800 moderate earthquakes (5.0-5.9) around the world that cause slight damage and about 120 strong earthquakes (6.0-6.9) each year that are damaging. In an average year there are about 18 major earthquakes (7.0-7.9) which are potentially destructive. (like the Kocaeli earthquake) Once every 10-20 years there is great earthquake (8.0-8.9) that can be devastating.

You may remember some of the earthquakes that happened after Kocaeli: Athens, Taiwan, India, Afyon, Seattle. How about the ones that happened before?

Your new awareness can help you protect yourself.

Earthquakes have been happening throughout history and all over the world. As human societies have created larger settlements the loss and damage from earthquakes has grown. However, we now know enough to protect ourselves from most of that damage so that an earthquake does not have to be a disaster.

I.5 EARTHQUAKE MYTHS

Every human civilization has lived with earthquakes, and many have experience their destruction. From ancient times legends were developed to explain what we didn't understand.

In Turkey, ancient people explained earthquakes by saying that the world was perched on the horns of a bull who tossed his head when angered.

Today we can explain much more. A scientific explanation called **Tectonic Plate Theory** gives us a much better understanding of earthquakes. And we know much more about how to protect ourselves.

But our society has modern myths about earthquakes. "Earthquakes always happen in the middle of the night". "All of a sudden there are so many earthquakes". "It's earthquake weather". These are all myths. The myth that many people would like to believe is that somebody knows when the next earthquake will be. Of course, if there are enough predictions one of them is bound to be right.

Although we have long-range predictions, no one can make short-term predictions yet about when an earthquake will strike. Modern myths cloud our vision of what we must do to protect ourselves. Let's reject these myths, It's time to look at reality.

I.6 TECTONIC PLATE THEORY

Tectonic Plate Theory provides us with a scientific explanation of earthquakes. The theory explains that the earth's crust is made up of tectonic plates that move very slowly and rub against each other, squeezing and stretching the rocks and causing an enormous buildup of pressure.

The tectonic plates that make up the surface of the earth are always moving, but just a little bit. The plates scrape and slip past each other in opposite directions. As the earth moves, friction prevents the movement, but eventually enough energy builds up that it overcomes the friction and is released along a faultline (very similar to if you snap your fingers – at first, the pushing doesn't result in movement, eventually the force overcomes the friction and "snap"). However, unlike your fingers the whole fault planes doesn't slip at once. Stresses in the earth's outer layer push the sides of the fault together. The friction across the surface holds the rocks together so they don't slip immediately when pushed sideways. Eventually enough stress builds up and the rocks slip suddenly, releasing energy in waves.

The earth's plates move at about the same rate that our fingernails grow - The fastest slipping faults move at a rate at a rate of between 2 mm and 8cm per year.

We know about some faults because they have left surface evidence or because an earthquake has broken the fault since we started instrumental measuring them (in 1932), or because our newer sesimographic network is recording earthquakes all the time. But there are other faults that are hidden, and new faults are created.

II EARTHQUAKE HAZARDS VS. RISKS

The Turkish Earthquake Regions map shows Turkey's exposure to seismic hazards. It divides the country into sections with higher and lower exposure to shaking. This map is interesting, but misleading, because it doesn't tell us about our risks. Our particular risk in a particular place is not simply a matter of which seismic region you live in.

Our risks depend on two factors:

a. The value that is exposed to the hazard

For example, an earthquake occuring in the middle of a desert or in the countryside where few people live will do much less damage than if the same size earthquake hits a large city. As our settlements grow, our risks increase.

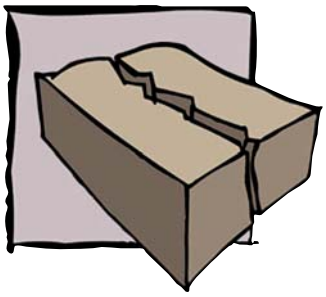
b. The measures we take to mitigate the risks or to reduce our vulnerabilities

Recent earthquakes in Turkey have killed and injured 10 times as many people as in Japan and 100 times as many as in California. This is because we have not yet taken some of the important steps to reduce our vulnerabilities.

Our risks are related to the density of population, the concentration of economic and natural resources, and our irreplaceable historic and cultural treasures.

We can learn the magnitude of an earthquake soon after it happens,but there are as many as 40 different factors that affect earthquake risk. Because of the difference between hazards and risks, magnitude is not the most helpful measure in understanding earthquake damage. Today, scientists in Europe and Turkey use the European Macroseismic Scale (ESOG), which is more helfpul in understanding the damage to human settlement .

Potential risks can now be estimated before hand, based on what we know about fault lines, long-term earthquake potential, soil conditions, construction quality, lifelines and mitigation efforts.



II.1 EARTHQUAKE HAZARDS

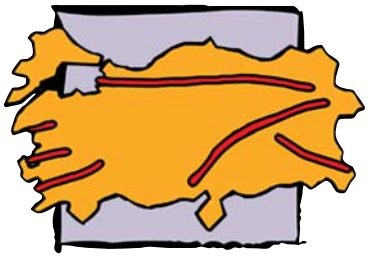
There are several important factors that determine earthquake hazards:

1. Strength of Shaking

Strength of shaking, or ground motion is related to the energy that an earthquake releases. The measure of earthquake magnitude is proportional to this energy. The larger the magnitude, the further the energy will travel and the larger the area that will be affected.

A seismographic network records the ground-shaking and then calculations can be made to pinpoint the starting place.

The rupture begins at a point called the hypocenter, usually kilometers below the earth's surface. Straight up above it is the epicenter.



2. Duration of Shaking

A larger fault will produce shaking for a longer duration. Depending on the magnitude of the earthquake, shaking may last from 10 seconds to 90 seconds. The longer buildings shake the greater the damage may be.

3. Distance from Epicenter

Since faults move either horizontally or vertically, shock waves transmitted can cause damage far from the epicenter. Strength decreases rapidly with distance from the earthquake. Since faults themselves move up from the hypocenter at various angles, damage may occur at various locations far from the epicenter.

4. Type of Soil

Shaking is increased in soft, thick, wet soils. In certain soils the ground surface may settle or slide. The soil conditions at your particular site are more important than the gross geology of your area. For this reason, earthquake damage can be estimated based partly on soil type.

5. Depth of Earthquake Origin

An earthquake's epicenter may be classified as deep, medium, or shallow. Following an earthquake the energy dissipatesas it travels, so a shallower earthquake will cause more damage on the surface.

II.2 EARTHQUAKE RISK FACTORS

Earthquake risks depend on the knowledge we use when we design and build human settlements. These include:

1. Building Design, Materials, Construction and Use

Certain types of buildings are not resistant enough to side-to-side shaking common in earthquakes. These structural hazards can be mitigated during design and construction and also afterwards with retrofitting.

2. Lifeline Vulnerability

The design and protection of roads and transportation systems, electric, water and gas lines affect our risk.

3. Non-Structural Hazard Mitigation

The measures which people take to secure the contents of buildings is extremely important both to the rates of injury and to economic losses.

4. Fire Prevention and Fire Fighting Capability

The development of fire prevention and fire response capability, including earthquake seismic shut-offs for natural gas and automatic generators, and personal and public fire-suppression capability are all important.

5. First Responder Capacity

The preparation that people have in search and rescue, first aid and fire fighting, and their organization and communication skills are all important.

The good news is that while we can do nothing about the hazards, there is a lot we can do about the risks. Earthquake risks can be mitigated by human action

II.3 EARLY WARNING AND RAPID RESPONSE SYSTEMS

Early Warning Systems depend on the different speeds of radio versus seismic waves. When we immediately measure ground motion and then calculate the source (by looking at the phase differences between waves) it's possible to send a radio message to a distant location that an earthquake will arrive in the next few seconds. In the Marmara region, because of the proximity of the fault, there might be just enough time to create systems that automatically shut off gas, nuclear power, electric trains, and overpass and bridge entrances. However, there are two large steps: getting the information, and then designing safe automated systems to respond. It's a big job, and a long term one. This kind of system is currently being implemented in Istanbul.

Rapid Response Systems also hold promise for getting help where it is needed quickly. With a large number of strong motion measurement instruments in place (eg. 120 around Istanbul), and using maps that take into account many different vulnerability parameters, it is possible to predict where the worst areas of damage will be for a scenario earthquake, or within a few minutes after an event. These can be used to organize fire-fighting, first aid, search and rescue and relief .

II.4 IT'S TOO LATE WHEN IT SHAKES

If we take no action at all, then the risks to Istanbul after the next major earthquake are estimated as follows:

Out of 700,000 reinforced concrete multistory buildings, 40,000 – 50,000 may be damaged beyond repair. 5,000 may be pancaked.

If we take no action at all, then the possible loss of life will be upwards of 40,000 - 50,000 people. Four times that number will have injuries that require hospitalization. And the dollar losses to property will be billions.

The most important challenge for us is to recognize our risk and to take measures to reduce the loss and damage that will take place.

If we take action, we can reduce these losses.

III BEFORE AN EARTHQUAKE

III.1 DISASTER PREPAREDNESS IS MADE UP OF SMALL STEPS

Disaster preparedness is nothing other than a series of small steps which everyone can and should participate in before a disaster. Preparedness is not accomplished overnight and it is never complete. But every small step taken is important.

Let us give you an example. Perhaps you have a family photo hanging on a nail in your hallway. After an earthquake you are thrilled to find that everyone is alive, unharmed, and your house is still standing. The only thing that happened may be that the family photo in the hallway fell on the ground and the glass broke. Not important. No big deal. But at that moment your child runs down the hallway towards you and cuts his feet. You pick him up and run outside in search of a doctor to take the glass out of his foot and stop the bleeding and stitch it up. Somewhere not far away there may be hundreds of people injured. The doctor you find is now busy with your child and now cannot go to help someone else, who may be dying.

How could this be prevented? A curved picture hook, instead of a nail. A small thing. But the small things ARE the big things. Every small step you take counts. A pair of small L-brackets can be a gift of life.

When it comes to earthquakes, we're all in this together. We're all on the same team!

III.2 STRUCTURAL HAZARDS AND RISK MITIGATION

Let's look at our worst fears. We have all seen terrible images of collapsed buildings from the Kocaeli and Duzce earthquakes. Most the the deaths happened in these buildings. But you may surprised at the real statistics.

For every building damaged beyond repair in Turkey there is an average of one death and four hospitalized injuries.

What percentage of buildings do you think were pancaked in the disaster area? 75%? 50%? 25%? 10%? 5%?

Would you be surprised to know that of ALL the damaged buildings approximately 5% were pancaked?

Of course, this is not random. The buildings that collapsed were those which were not build according to earthquake code.

In the entire disaster area, approximately 1% of the population lost their lives. This is a huge and unacceptable number. At this moment if you are in high seismic risk area, your probability of survival is 99%. But it is much higher if you live and work in a safe building and much lower if you live or work in a dangerous building.

BUILDING IT RIGHT

The easiest and most inexpensive way to achieve safety in buildings is to build them correctly to begin with. In large modern cities like Istanbul, almost all of the buildings are replaced every 40 years. So, if we started today, within 40 years most of our buildings would be safe.

No building can be fully earthquake proof. However, we do know how to build buildings that are "life safe" that will protect the lives of those inside them. Even here, the small things are the big things.

There are some simple dos and don'ts:

DO:

1. Have the building professionally designed by an architect and engineer, so that the building weight is distributed among the load-bearing elements. A building with a large open ground floor space without supporting columns to carry the weight on top or support the roof may not be safe.
2. Check that you building was built according to earthquake safety codes.
3. Know your soil type at the building site, because the building has to be designed in consideration of the soil conditions. What is important is the top 30m of soil.
4. Use the correct quantity and quality of construction material specified in the engineering design. Each building design specifies the correct quantitiy and quality of materials required.
5. Make sure that construction is carried out by trained and supervised workers.
6. Make sure that non-structural elements like pipes are flexible and can move with shaking, and that false ceilings, lighting, water heaters, heater ducts, air conditioners and signs are firmly fastened with earthquakes in mind.

DON'T:

1. Alter the building design by removing load-bearing elements. This may make the building unsafe.
2. Build floors illegally.
3. Substitute materials that were not specified in the design. Don't use too much or too little steel, or the wrong kind. Don't mix sand or dirt into concrete. The concrete will not be reliable.
4. Use the building for something very different than it was designed for. For example, buildings that will be used for storage, libraries, warehouses, heavy machinery, classrooms and gyms must all be designed to carry much more weight than a normal home or office.

INSPECTION AND RETROFITTING

If you want to be sure about the safety of your building, you must have it inspected by a qualified engineer. If your building was not built to code, then you should find out whether it can be retrofitted.

Some of the questions an engineer will ask are:

- Is there a strong and deep foundation?
- Are columns and beams designed to support the weight of the building?
- Is there an unsafe ground floor? For example; large spaces without proper support system (i.e. columns), large glass windows, high ceilings?
- Are all the columns where they should be? Have any columns been removed?
- Has adequate and quality building material been used?
- Have the steel frames, walls, floors and ceilings been joined to one another correctly?
- Are there deep cracks on walls in the building?
- How about the chimneys? Have they been reinforced and supported from below?

Minimum retrofit programs can save lives by adding columns and reinforcement to buildings that will greatly increase the ability of the buildings to protect the lives inside, even though it won't necessarily save the building. The reinforcement may not save your building, but it may save many lives.

Programs to increase the life-safety of buildings must start with schools, hospitals, and public safety buildings. Buildings built before 1976, or whose foundations were approved before 1976, and which are more than 5 stories high, are particularly vulnerable and should be inspected.

TEAR IT DOWN

If a building is not built according to code, and if it cannot be retrofitted to make it life-safe, then it must be taken down. Not only is it dangerous for the people who live or work in it, but it is also a danger to the people next to it, or who pass by it. This is not a private risk, but a risk imposed on other innocent people.

Although it is costly, many buildings will have to be torn down in order to prevent unnecessary deaths and injuries.

III.3 NON-STRUCTURAL HAZARDS AND RISK MITIGATION

Approximately half of the economic losses incurred in any earthquake are from non-structural causes. Non-structural damage can kill, injure, destroy historical and cultural treasures, and can cause huge economic losses.

Non-structural damage can put hospitals and fire stations out of action and thereby cause even more loss of life. It can close schools for months and thereby steal time from the lives of young people. It can destroy office equipment and machinery and cause loss of jobs and businesses. And it can wipe out inventories of food and supplies, raw materials and consumer products and thereby destroy businesses.

By taking some simple measures to secure the things that can slide or fall, by reaarranging a few things in your home and office, we can inexpensively protect our lives, our jobs, and everything we have worked hard to create.

What are "Non-Structural Hazards"? These are things that are not part of the supporting structure of the building. Not the columns, beams or walls, but everything else.

We need to think of ourselves, as though we were on a boat, that we know will rock. Anything that is not flexible, or anything that can slide, or fall, may be dangerous. This is especially important where we sleep, as well as where we work, study, live and play.

III.4 WE'RE GETTING READY! ARE YOU?

EARTHQUAKE HAZARD HUNT

A good place to start is with an **Earthquake Hazard Hunt**. Our objective is to think about and change the things that could slide or fall, and hurt us.

Let's think about it.

Picture your living room and look around carefully. Which objects (of all sizes, large and small) could slide and fall during a strong shake? What kind of damage can these do? Cabinets, clocks, chandelier...

Now your kitchen. Look around carefully. Here too there are many items that could slide or fall. Cabinet doors can be shaken open, cabinets can be shaken down, even heavy appliances can move across the floor.

Now think about the bathroom. Are there dangerous items that could slide or fall?

Imagine your bedroom. Is there a wardrobe?

Finally, make a quick check of your exit routes, in the corridors and behind the doors for things that could fall and block your exits.

What have you found during your short trip that can injure you and your family by sliding and falling?

Please complete your Earthquake Hazard Hunt worksheet at home. Walk around with your family and list all of the hazards. Discuss what you must do to mitigate each one. Decide what supplies you need and who will do what. Decide which items are the most important. Get started and record the date that you fixed each thing.

Sometimes you can mitigate a hazard, just by moving a piece of furniture. Move your bed away from the windows. Secure large objects that could fall on your bed or block your doorway.

As you tackle your Earthquake Hazard Hunt, prioritize the items as follows:

1. Secure life threatening items first (eg. wardrobe in bedroom, things blocking exit)
2. Secure those things that would entail significant economic loss (eg. computer, a/v equipment)
3. Secure those items that will let you live more comfortably (eg. family heirlooms, breakables)

Continue to use the Earthquake Hazard Hunt worksheet to check your progress in non-structural mitigation.

EARTHQUAKE HAZARD HUNT

The Earthquake Hazard Hunt should begin at home, with all family members participating. Imagination, and common sense are all that are needed as you go from room to room and think about what can happen when the earth and house start shaking. Check places where your family spends most of its time - where the family sleeps, eats, works and plays. Do some detective work! Make a list of what needs to be done and tackle it one by one until it's finished!

Prioritize the items as follows:

1. Secure life threatening items first (eg. wardrobe in bedroom, things blocking exit)
2. Secure those things that would entail significant economic loss (eg. computer, a/v equipment)
3. Secure those items that will let you live more comfortably (eg. family heirlooms, breakables)

- Check for things that can fall and for things that can slide.
- Anything heavy that's placed high up? Move it below the head level of the shortest family member.
- Bracket furniture to walls.
- Securely fasten pictures on closed hooks.
- Secure lighting fixtures to ceiling.
- Install kitchen cabinets latches that will hold shut during a quake.
- Remove glass bottles from anywhere near bathtubs (You may need to fill the tub after a quake for washing water).
- Check for any hazardous materials (poisons, flammable materials) to make sure they are secure.
- How about the hot water heater? (It may need plumbers tape to fasten it to the wall).

Hazards we found:	**Dates corrected:**

We're Getting Ready! Good luck! - Prof. Dr. Ahmet Mete Işıkara

THE FAMILY DISASTER PREPAREDNESS PLAN

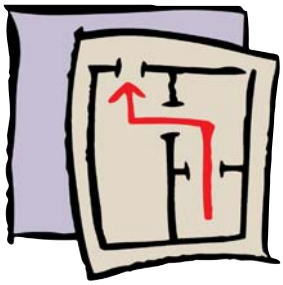
The second worksheet is the Family Disaster Preparedness Plan. It begins with a Family Meeting.

Family Meeting:

In preparation for a disaster, all the family members, including school age children should come together for a meeting . In this meeting, family members will discuss preparations prior to, during and after a disaster. This includes earthquakes, fire, flood, and other possible disasters.

Safe Locations:

Identify danger areas in your homewhere to stay away from: in front of windows, there are large and heavy hanging light fixtures, heavy and large objects that can slide and fall, sources of fire. Look for safer spaces where you can be protected: Under a sturdy table, next to a sturdy sofa or chair, next to your bed, in a corner, or by an inside wall. Look for the safest places to **Drop, Cover, and Hold.**



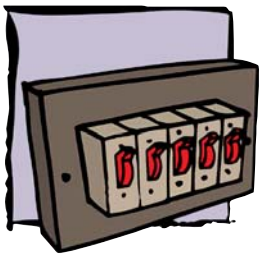
Exit Routes:

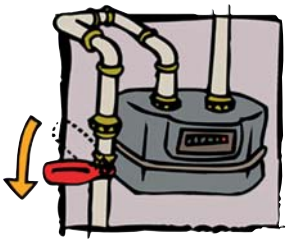
Identify the regular exit routes and also alternative exits that you may not have thought about, through windows and back doors. Learn all the exits from your building. If there are iron bars on an outside window or door, you should keep a heavy iron pry bar inside the building, in case you need to break these open. If there are any objects that can block the exit routes by sliding and falling, these should be removed. For example, objects which stand behind a door i.e. rolled up carpets or vacuum cleaners.

Food and Water:

Water is essential for survival. During an earthquake we can expect that many water pipes will be broken, both in the streets, and the pipes that bring water into your home. Water may be contaminated along the way by many sources. Immediately after an earthquake, if you home is safe, you can fill your bathtub and sinks with water immediately to give you an extra supply. It is almost certain that water supplies will be interrupted for some time.

Storing an alternative supply of water is essential. Store **four litres per person per day**. Three days is the absolute minimum for which you should be prepared. It would be better to store enough water for a week. This water will be required for drinking, preparing food, brushing teeth, other minimal hygiene needs and washing dishes. Store water in sturdy, opaque plastic jugs or bottles, but not on concrete.





Turning off Utilities:

Following an earthquake the biggest danger is from fire. If there is any danger of gas leakage, these valves should be turned off first. After all danger of gas fire is past, and if there are possible breaks in the electrical wires, then electricity should also be turned off. Appliances should be unplugged to prevent damage when the electricity returns. If there are damaged water pipes, the water too may need to be turned off. Everyone can learn to turn off these utilities.

Meeting Places:

Identify a meeting place inside your home, outside your home, and outside your neighborhood. Family members may not be together when an earthquake occurs. You will save yourself a lot of anxiety and worry, if you know where to find each other. It may take a long time to reach each other, and you must first help the people nearest to you. But this plan will save you from panicking about how to find each other.

First decide on a place to meet inside your house. It should be a safe, central place or on the way to the exit. This is where you will meet after the shaking stops. Then decide on a safe place outside your building, away from overhead dangers where you can meet if your neighborhood is safe. This might be a park, or square. This is where you will meet if your building is not safe. Finally, decide on a place to meet outside your neighborhood, in case your neighborhood is unsafe, or it is impossible to get there. For many people this location will be their child's school, or a relative's home that everyone is familiar with.

We should plan for children to remain at school until their parents or another pre-approved relative or friend arrives to pick them up after an earthquake.

Identify a secure location outside your home where family members can leave messages for each other. This way if you're separated, and unable to remain in your home, your family will know where to go to find you. You don't want to publicize that you are not at home. That is why this location should be secure and discreet, i.e. under a paving stone, inside a tin can, in the back yard.

Out of Area Contacts:

It is very important after a disaster that all telephone lines be kept open to get help. The telephone lines will be disrupted by damage and by too many calls. The local lines and the lines to the capital city will be heavily overloaded. Therefore, choose a person who lives outside of your area and outside of the capital, and designate that person as your out-of-area contact. Give that person a list of all of your friends and relatives that will want to know about your safety. Give your friends your out-of-area-contact person's number. Then, you will only need to make one phone call to say that you are alright and your out-of-area contact will take care of all the rest. It will be easier to reach that person again later, to check on others who have called.

Family members should memorize this number and young children should always keep with them the information on out-of-area contact person and family meeting locations.

Do NOT use the telephone unless you have a physical emergency:

Do not use the phone after an earthquake unless there is a life threatening emergency. Otherwise phone lines will not be able to be used by those who are in need. What feels small to you may be large somewhere else.

During an earthquake telephone receivers can be shaken off the hook. Replacing the telephone receivers after an earthquake will help get telephone services back to normal more quickly.

Preparing copies of important documents:

Suppose that after a disaster you could not re-enter your home. Think about the documents you would need in order to continue your life: In order not to loose important documents for family members during an earthquake, you should have copies of these documents made. Send these to a relative outside of the area to keep for you or keep them in a water proof plastic bag. For example: bank books, IDs, bonds and title deeds, school records, passport

Keep a flashlight, shoes and work gloves next to your bed:

In case an earthquake happens at night while you are in bed you will need to protect your hands and feet and find your way in the dark. Keep a flashlight, shoes or hard-soled closed slippers by your bed. You can place these in a plastic bag right under your bed where you can grab them when you feel an earthquake. Practice reaching out these for these objects in a dark room.

Do NOT light any flame after an earthquake:

Unless we are hundred percent sure that there is no gas leak after an earthquake we should **never** use light a flame of any kind. Extinguish all fires around you.

First Aid kit:

Your first aid kit should contain those things necessary to meet the needs of your family. See the list in the factsheets. Plan to use these items for your everyday first aid needs, as well. As you replace items you use, you will be keeping them fresh

PREPARING EMERGENCY SUPPLIES:

Create a space where you will store your emergency supplies. If possible, keep these in a water proof and air tight box outside your house. If not, create a space in your home for these items. Rotate the items in normal use, so that you can keep them fresh. It is also important to prepare such an emergency supplies box in your neighbourhood.

Personal Earthquake Kit:

It is important to prepare survival supplies for your family. Although you may not need to evacuate, you may decide to stay outside your building until you are sure it is safe. So it will help to have these supplies with you – and to have another set in your car, and at the office, in case you are away from home.

Supplies to be put into this bag are;

- Water
- Energy Food
- Radio (with spare batteries)
- Flashlight (with spare batteries)
- First Aid kit
- A Change of Clothing
- Some Cash
- A pocket knife
- A Whistle
- Pen and paper
- A plastic bag including copies of important documents and out-of area contact information.
- Special supplies for babies and toddlers, old people and pets
- Individual prescription medication sufficient for 1 week (eg. for heart conditions, diabetes, blood pressure, hormone replacement)

You should prepare a school earthquake kit for school children containing the following:

- Information for contacting parents
- A family photo
- A small comfort toy
- Snacks
- One bottle of water

Schools themselves should have water, food, first aid and shelter supplies on hand. Every school should have a **Standard Emergency Management** or **Incident Command System Plan.**

Review your plan replace your food and water, medicine and batteries every 6 months. You could do this on the same weekend when the clocks are moved for daylight savings time!

_____FAMILY DISASTER PREPAREDNESS PLAN

Enter date of completion:

- [ ] We held a family meeting to discuss our Family Disaster Plan.
- [ ] We identified the safest places in the house, and in each room. (Away from windows, large and heavy objects that can fall, and objects like heaters that can cause fire.)
- [ ] We identified exits and alternative exits from our house and building.
- [ ] We considered the special provisions we need for pets, people who don't speak the language of the country, elderly, disabled, and small children.
- [ ] We have enough water to last us a week (4 liters per person per day), and food for 3 days.
- [ ] We know how to turn off our electricity, water and gas.
- [ ] We completed the hazard hunt and eliminated the hazards from our home.
- [ ] We know our out-of-area contact person(s) and phone number(s): It's: _____
- [ ] We know where we would reunite
  Inside the house: _____
  Outside the house: _____
  Outside the neighborhood: _____
- [ ] We know how to use a fire extinguishers.
- [ ] We keep shoes and flashlights by our beds.
- [ ] We have a good first aid kit.
- [ ] We collected our survival supplies, and made up our earthquake bags. (Flashlight, batteries, radio, first aid kit, change of clothes, cash, whistle, matches, 1 week prescription medication, paper and pencil, important phone numbers.)
- [ ] We made our copies of important documents, and key addresses and phone numbers, and keep them in our earthquake bag or with our out-of-area contact.
- [ ] We know never to light a match, lighter, or any other flame after an earthquake until we are sure there is no danger of escaping gas anywhere around.
- [ ] We're starting to spread the word to everyone we know.
- [ ] We know that we will only use the telephone in an emergency after an earthquake, so that the lines will be there for those who need them most.. We will get our information from TV and radio.
- [ ] We have completed our Earthquake Hazard Hunt. We have taken measures to protect ourselves.
- [ ] We plan to review our plan again every 6 months.

name _____

address _____

_____ e-mail _____

telephone _____ date _____

We're Getting Ready! Good luck! - Prof. Dr. Ahmet Mete Işıkara

III.5 EARTHQUAKE DRILL

The human brain responds to emergencies in one of three primitive ways: fight, flight, or freeze. All are forms of panic. They don't work well for us now that we live in buildings and cities. We need to plan and practice our responses so that we don't panic.

We need to have earthquake drills at home, at school, and at work.

When an earthquake happens, the solid earth will pitch and roll like a ship for a minute or two. The shaking may start out gentle and then you may feel a sharp jolt followed by swaying or rolling. If you are near the strongest ground shaking it will be impossible to move around much. Keep calm and ride it out. Your chances of getting through it safely are good if you act calmly and protect yourself from falling objects.

The rules are simple. Everyone should:

DROP, COVER AND HOLD.

- Find a safe place and **drop**.
- **Cover** your head and neck.
- **Hold** on to something secure.
- Stay where you are and do not move until the shaking stops.

Drop, means get down low. Cover means, cover your head and neck especially. Hold means hold on to something stable so that you do not go sliding.

Drop, cover and hold under a strong table, next to your bed, next to a sofa, by an inside corner or wall.

You will not have time to think about where you will be safe. You need to think about it ahead of time so that you can react appropriately and automatically, and immediately.

How? **Practice.** You should have formal earthquake drills at school or at work. You can also play this informal **Earthquake Drill Game** at home. Playing this game now may save yourself and your family from serious injury.

Rules:

1. Figure out the safest places in each room. Physically go to those spots and practice your positions.
2. In the days that follow this initial exercise hold surprise earthquake drills. Call out **"EARTHQUAKE!"** from the living room or kitchen. Each family member should respond by moving to the nearest safe place. Stay in place for one minute. Then move towards your meeting place in the house. A minute or two later, shout **"AFTERSHOCK!"** and do the same thing.

3. Once a month let a child call a surprise **"EARTHQUAKE!"** and follow through with what you've learned. Test each other. Was your choice the safest? Did the person in the kitchen turn off the stove? Did you meet afterwards where you said you would? Did you do the same things during the aftershock?
4. Now you know what to do! When the shaking is over, stay close. Share the clean-up chores. Talk about what happened and be sure to let all the children say what they felt, how afraid and how brave they were.

At school, children must practice being quiet and orderly and learn to follow their teachers instructions carefully.

III.6 FIRE PREVENTION AND FIRE SAFETY

After an earthquake, the biggest dangers are due to fire. In Kobe, for example, more people died from the fire after the earthquake, than from the earthquake itself. Most people are killed by smoke, rather than the fire itself. Fire safety is important at all times, not just after an earthquake.

After an earthquake fire risk is higher because of the dangers of broken natural gas lines, damaged LPG tubes, upset heaters and electrical appliances. Cigarettes, matches, candles all add to the danger.

The main reason for having flashlight and batteries on hand after an earthquake is so that you will **not** light a match or candle until you are sure that all danger of fire is past.

EARTHQUAKE FIRE RISKS

These are some additional hazards to be aware of:

Electricity:

Live electrical wires may be exposed outside in the street, or inside your building. Electrical sparks or matches, lighters, or cigarette flames can ignite gas fires. **If there's any danger of gas leaking, do not touch anything electrical.**

Natural gas and liquid propane gas leaks:

Gas lines may rupture at street, building, and apartment level, leaking dangerous gas. LPG gas tanks may explode or be damaged, may be leaking and in danger of exploding. You may not always be able to smell natural gas leaks. Natural gas rises, and may be escaping into the air where it can be diluted. LPG gas is heavier than air and sinks, therefore, even if the leaks begin on upper floors, it may be especially dangerous on lower floors and basements where the gas accumulates.

Flammable or combustible liquids:

When working with flammable or combustible ilquids, be sure that the area where you are working is well-ventilated. If the air is kept moving through the area, vapor levels are reduced and are less likely to reach dangerous concentrations. Make sure there are no ignition sources such as electric motors or pilot lights.

FIRE PREVENTION MEASURES

How can you prevent fires?

- Teach children not to play with fire.
- Don't leave flammable things close to a heat source.
- Don't lie down while smoking a cigarette (cigarettes are the most common cause of fire).
- Replace faulty wiring.
- Don't plug too many things into one electrical outlet.
- Keep at least one, and preferably two fire extinguishers in your home.
- Check that fire escape doors are always open.
- Install smoke detectors in your home, office or school to alert you to smoke.
- If you don't have fire escape stairs, then keep a portable ladder rolled up by a second floor window.

IF YOU SEE A FIRE

If you see a fire there are some basic rules!

- If the fire is small you should put it out immediately.
- Sound an alarm or shout to warn people and get help. Call 110 if you can.
- Close the door to the room with the fire behind you, and the doors between you and the fire to limit the spread of the fire.
- Make sure there is no one left in the building. Get out!
- Call the Fire Department: 110 (say where the fire is, what kind of fire, who and what is involved. Stay on the telephone until the operator tells you to hang up.)

Under the following circumstances never try to extinguish a fire, leave fire area immediately and call the fire department:

- if fire is expanding rapidly,
- it tends to block your exit route,
- if you are not sure about how to use the fire extinguisher
- if the fire extinguisher is too big for you.

PUTTING OUT A SMALL FIRE

Three things are necessary for are fire to burn:

a. fuel

b. air

c. heat

Take one of these away and there will be no fire. A fire will be extinguished if there is no air, if the fuel is used up, if the heat is reduced, or if the flames are inhibited.

Most big fires start small. Everyone can learn how to extinguish a small fire. A small fire can be suppressed by

- covering it with a towel or blanket
- pouring sand or dirt on to it
- using a fire extinguisher
- using a fire hose

IF YOU ARE CAUGHT IN A FIRE

Smoke kills more people than fire

- Crouch down low
- Cover your face with a wet cloth
- Crawl to a safe exit.
- Don't open a door that is hot
- If trapped, close the door and place wet towels at the bottom of the door.

If there is a small fire between you and the only exit, then you should run quickly through to the exit.

If you find that your clothing is on fire,

STOP, DROP AND ROLL!

- Shout for help.
- **Stop.** Don't run. If you run the oxygen will feed the fire. If you stand the flames will rapidly rise to your vital organis and hands.
- **Drop.** Lie down on the ground. Cover your face with your hands.
- **Roll** to extinguish the fire.
- If someone else is on fire, make them **stop, drop** and **roll.**

Never put ice on a burn. Don't put anything else on a burn. Run water over the burn for 10-15 minutes. Cover with sterile bandage only.

USING A FIRE EXTINGUISHER

A portable fire extinguisher is extremely important for extinguishing fire. A fire extinguisher can save lives and property. By intervening early a small fire can be extinguished and a large fire averted. Everyone should learn how a small fire can be extinguished.

In every house and office there should be at least one multi-purpose (ABC Type) fire extinguisher (approximately 6 kg or more, smaller ones) which can be lifted up by everybody. Every member of the family must learn how to use a fire extinguisher.

PARTS OF A FIRE EXTINGUISHER

1. Gauge:
The scale shows if the extinguisher is full or needs to be refilled.

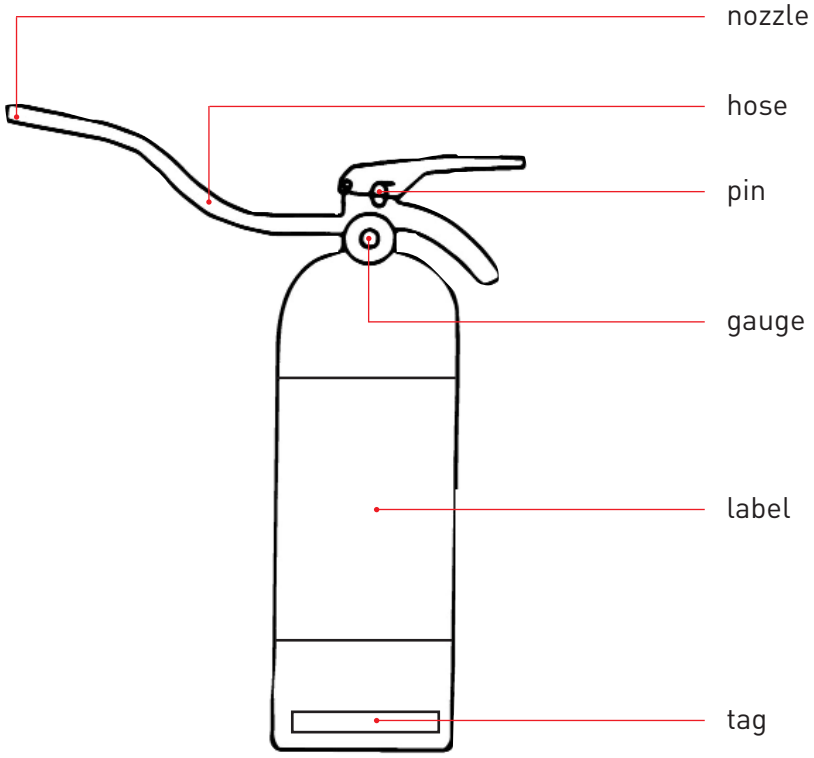
2. Pin:
You have to pull the pin in order to use the extinguisher.

3. Nozzle:
The nozzle must be aimed at the source of the fire.

4. Hose:
The hose must be flexible, good quality and easy to use.

5. Label:
The label shows the type of the extinguisher and how to use it.

6. Tag:
The tag shows the use before date.



TO USE THE FIRE EXTINGUISHER

P.A.S.S. (Pull, Aim, Squeeze, Sweep)

1. Pull.

2. Aim towards the fuel. Hold the extinguisher low and perpendicular to the fire; avoid inhaling the escaping fumes and spray.

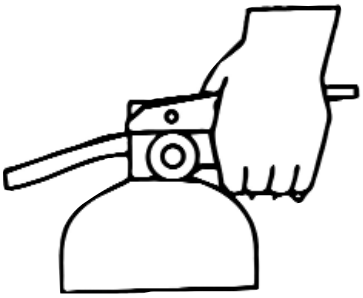
3. Squeeze the nozzle to spray the base of the fire. Start from a distance and approach as fire gets smaller.

4. Sweep from one end to the other until the fire is suppressed. If the fire does not get smaller after the first response continue sweeping.

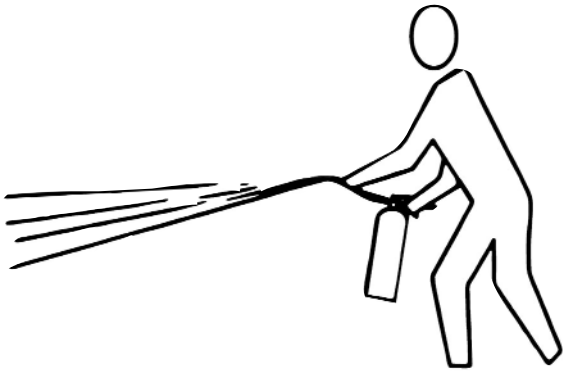
Once the fire extinguisher has been used, even if it's not empty, it must be refilled.

1. pull the pin

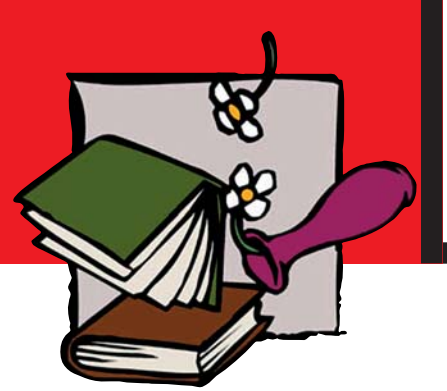
2. aim at the source



3. squeeze



4. sweep



IV DURING AND AFTER AN EARTHQUAKE

IV.1 DURING AN EARTHQUAKE

WHAT YOU SHOULD DO DURING AN EARTHQUAKE

As things develop quickly during an earthquake, you will have little time to think. First you hear a noise, then shaking starts.

If there are others around, shout "EARTHQUAKE" just as you did in your drill, to warn them to take cover. If it was just a small earthquake or a passing truck, don't be embarrassed – you just had another good earthquake drill. This practice is important.

DROP, COVER AND HOLD.

- Find a safe place and **drop** (move away from windows and glass and away from large heavy objects).
- **Cover** your head and neck.
- **Hold** on to something secure.
- Stay where you are and do not move until the shaking stops.

If you are inside;

Drop under a solid table or a similar object, keep away from windows and take cover beside the inner walls, corners or doors.

If you are outside;

Try to go to an open area while keeping away from falling debris, electric wires and trees.

If you are in a car;

Drive your car to an open area and stay in it. Keep away from bridges, underpasses or electric poles.

In narrow city streets;

There are very few places outside that are safe. In fact, running out of the building may be the most dangerous thing to do.

WHAT YOU SHOULD NOT DO DURING AN EARTHQUAKE

- Do not run to the stairs or exit doors
- Do not go out to the balcony
- Do not jump from balconies or windows
- Do not use the elevator.

IV.2 AFTER AN EARTHQUAKE

WHAT YOU SHOULD DO AFTER AN EARTHQUAKE

- **Stay calm. Do not panic.** If you don't feel calm pretend to be calm. That will help others around you.
- **Avoid broken glass.**
- **Check around you and help anyone who is injured.** Do not move someone unless they are in immediate danger. Give first aid as necessary. Bring help to them.

INSIDE

- **Check for fire.** Take appropriate actions and precautions.
- **Check gas, water and electric lines.** If gas is leaking, don't use matches, flashlights, appliances or electric switches. Open windows, leave building, and report damage.
- Look around you and **observe any structural damage or fire hazards** as you exit, so that you can report it.
- If you do not see any structural damage, smell any gas or see any fire then you are not in any immediate danger.
- If your building is damaged you should not panic. You should calmly and carefully exit your building. On your way out pick up your evacuation bag and water and go to a safe place.
- There are many outside areas that will be more dangerous than inside areas. If your building is not damaged, check that your telephone receivers are hung up in their cradles (closed). Clean up any hazardous spills. Gather your emergency supplies.
- Listen to emergency broadcast station on radio or television.
- **Stay out of damaged buildings.**

OUTSIDE

If you have been trained as a **Community Emergency Response Volunteer** or have skills in first aid, search and rescue, or fire suppression, first check that those around you are safe. Then take your supplies bag and make your way to your community meeting point, observing and noting damage on your way.

If you have not been trained as a volunteer, but you want to help, first help those around you. Go to your neigbborhood assembly place and volunteer to help. We'll give you an idea of how you can do this.

AFTERSHOCKS

Earthquakes come in clusters. Several aftershocks usually occur within the first hour after the main shock.

Aftershocks generally continue during the following two weeks, geting smaller and less frequent. Aftershocks are natural.

During an aftershock you should behave exactly as you did during the main earthquake.

WHAT YOU SHOULD NOT DO AFTER

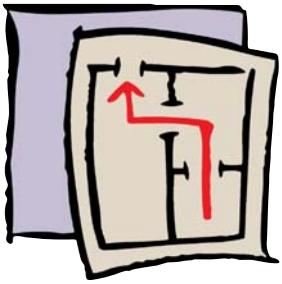
Do not panic, scream, or run.

Remember, **do not use telephones except to report physical emergencies and fire.** You may have shaken and be fine - but somewhere else someone needs help and your phone call will prevent theirs from getting through. Leave the telephones free so that neighborhoods with real emergencies will be able to reach the help they need and so that authorities and media can get information through to speed help. Stay off the telephones. Make only one call to your out-of-area contact.

Do not light any match, lighter, candle, or fire until you are sure that all danger of escaping gas and other flammables is gone. If you smell gas, turn it off where possible, open the windows and doors and exit immediately. If it is dark, turn on your flashlight.

IV.3 EVACUATION

BUILDING EVACUATION



Building evacuation is done is order to make sure that everyone is safe and accounted for, and to assess damage before reoccupying the building. Building evacuation should be done calmly and carefully.

There may be more danger outside your building than inside.

There may be no safe assembly area outside.

There may be no clear routes to get outsides.

Alternative routes may need to be cleared.

AREA EVACUATION

Evacuation should **never** be automatic. It must be planned and checked before it can be implemented.

There are two main reasons why some areas should be evacuated:

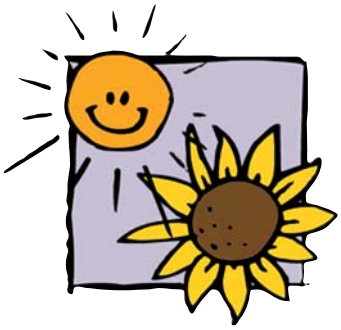
- low lying areas immediately by the coast should be evacuated because the ground may be particularly unstable. Everyone should move carefully to higher stable ground away from the shore.
- fire or chemical hazard dangers may require people to move quickly out of the way of danger.

However, in general, an earthquake itself is NOT a reason for evacuation.

Before begining an evacuation, it must determined that there is a safe place to go and a safe way to get there.

After a severe earthquake, children in the affected area **should not be sent anywhere** on service buses, until it has been determined that the route and the destination are both safe. Instead, everyone should be prepared for children to stay at school unil their safety can be assured, and until they can be released to parents or predesignated relatives or friends.

IV.4 PSYCHOLOGICAL SUPPORT



Disasters affect people in many ways. There is a range of behavior that is normal under these abnormal circumstances.

People experience many different losses in a disaster. There is a natural grieving process following any loss and a disaster causes much distress.

Some normal initial responses to disaster inlcude:

- fear
- disbelief
- disorientation and numbing
- reluctance to abandon property
- need for information
- seeking help
- offering help

Soon after there may be other responses:

- change in appetite
- anxiety
- anger and suspicion
- apathy and depression
- crying
- frustration and feelings of powerlessness
- moodiness and irritability
- increased illnesses
- difficulty sleeping
- headaches
- disappointment with and rejection of outside help
- isolating oneself from family and friends
- guilt
- domestic violence
- inability to enjoy normal activities.

Young children may also experience:

- return to earlier behaviors
- clinging to parents
- reluctance to go to bed
- nightmares
- inability to concentrate
- refusal to attend school

To help the best things you can do are:

- recognize your own feelings
- talk to others about your feelings
- accept help from others in the spirit in which it is given
- get enough rest
- get physical activity
- give someone a hug, physical touching helps
- learn to really listen and show that you are listening
- accept the feelings of others without trying to change them
- spend extra time with your child
- be tolerant of others

GRIEF

After a disaster the large scale of the loss overwhelms our normal grief processes and rituals to cope with the death of a loved one. Every culture has many steps to help us share grief eg. notifying relatives and friends, funeral, visits to family home, bringing food, keeping company, praying together, an intense week of mourning, 30 or 40 days of semi-mourning, anniversaries. These normal rituals are disrupted after disaster and people must create new ways to acknowledge their losses and share their grief.

V NEXT STEPS

V.1 THE FIRST 72 HOURS

During the first 72 hours after a disaster, most help comes from those immediately around us. There is no government anywhere in the world that has the resources to meet all the needs in a disaster. In order to be ready there are many skills we can learn:

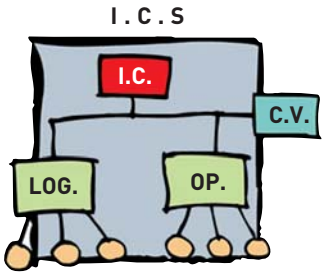
- First Aid
- Light Search and Rescue
- Fire Suppression
- Response Organization

You can take a course for Community Emergency Volunteers and learn skills in first aid, search and rescue, and fire fighting. You can learn how to operate a wireless radio. You can volunteer on your local Disaster Preparedness Committee where you live or where you work in order to help prepare your community and reduce your risk

There are many ways we can help, even without extra skills: find supplies and transportation, collect and prepare food and water, set up shelters and temporary toilets, supervise elderly and children, secure the perimeter of unsafe areas, offer psychological support to those in need.

V.2 INCIDENT COMMAND SYSTEMS (STANDARD EMERGENCY MANAGEMENT SYSTEMS)

There is an international system for organizing emergency response. It is called **Incident Command Systems** or sometimes, **Standard Emergency Management Systems**. It involves one person (in an area) becoming a **Commander** (even temporarily) with help from a **Communications Volunteer** and creating two branches, as necessary: an **Operations** branch to handle damage assessment, search and rescue, fire and hazard suppression, and first aid, and a **Logistics** branch to handle supplies, volunteers, transportation, food and water, shelter and sanitation, and psychological support and supervision.



Community Emergency Response Volunteers and others trained in Incident Command Systems may be working in your area. See if you can get training and offer your help.

The earth is normally stable and supports us. When the earth shakes unexpectedly, we are shaken deep inside.

As we take steps to make ourselves safer, we replace fear with knowledge and helplessnesss with preparedness.

We're Getting Ready!

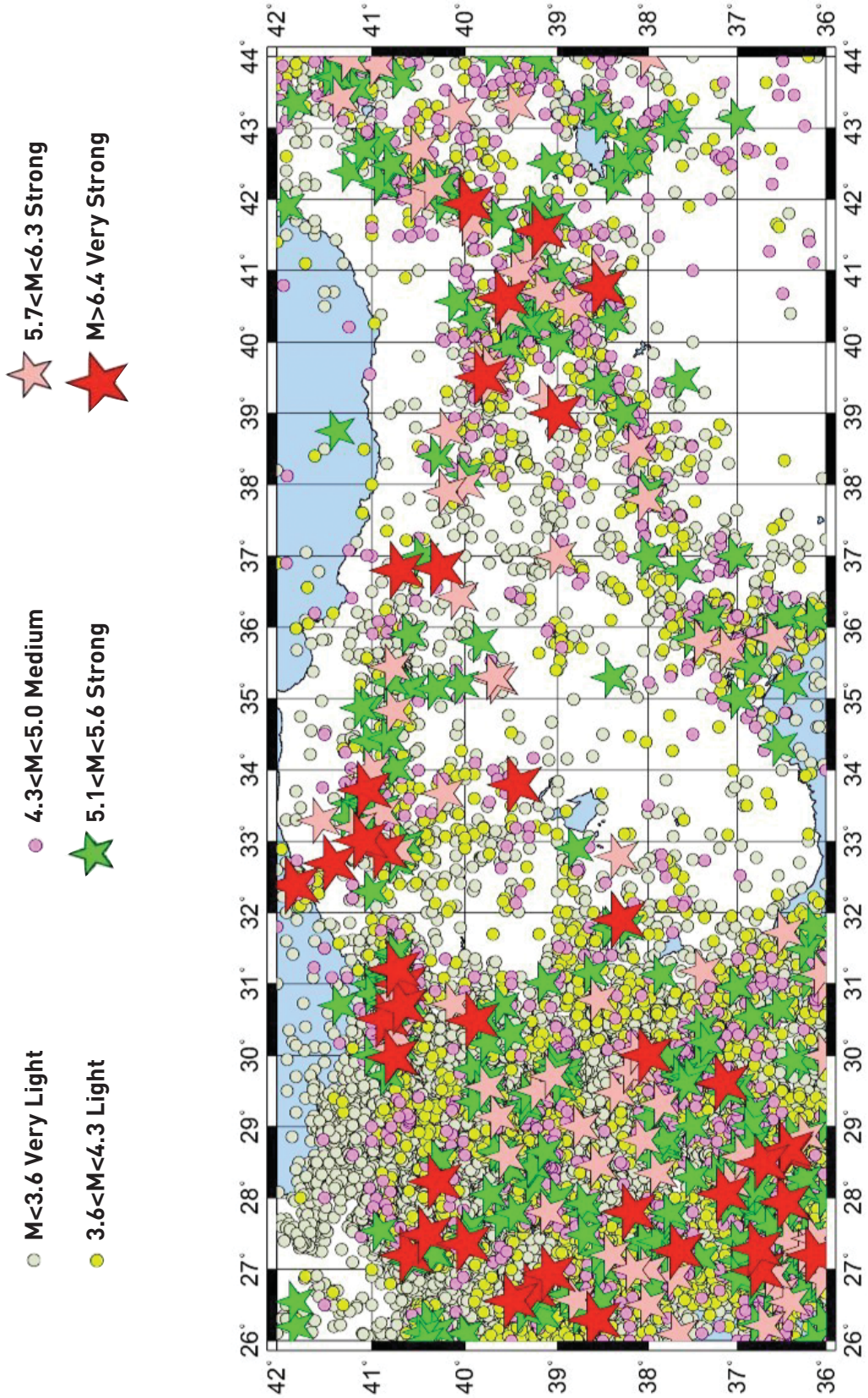
Are You?

NOTES

abcd
basic disaster awareness
factsheets

B.U. KANDILLI OBSERVATORY & EARTHQUAKE RESEARCH INSTITUTE
ISTANBUL COMMUNITY IMPACT PROJECT

EARTHQUAKES IN TURKEY BETWEEN 1900-2000



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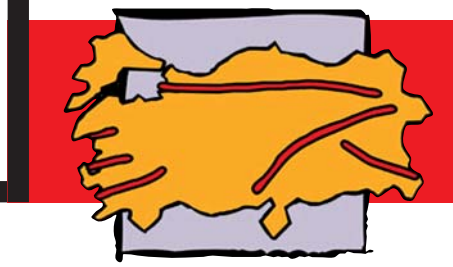
NOTABLE EARTHQUAKES IN TURKEY, 20TH CENTURY



Bold indicates more than 1,000 deaths.

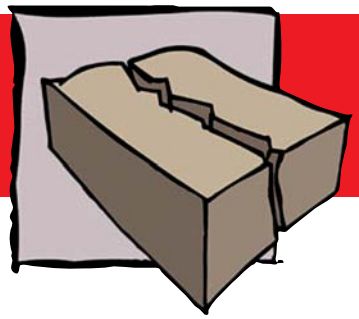
DATE	AREA	LIVES LOST	STRENGTH	MAG (MS)	HEAVILY DAMAGED BLDGS
28.04.1903	Malazgirt (Muş)	600	IX	6.7	4,500
09.08.1912	Mürefte (Tekirdağ)	216	X	7.3	5,540
04.10.1914	Burdur	300	IX	6.9	6,000
22.10.1926	Kars	355	VIII	5.7	–
07.05.1930	Hakkari	2,514	X	7.2	--
19.04.1938	Kırşehir	149	IX	6.6	3,860
26.12.1939	**Erzincan**	**32,962**	**X-XI**	**7.9**	**116,720**
10.09.1941	Erciş (Van)	194	VIII	5.9	600
20.12.1942	**Erbaa-Niksar (Tokat)**	**3,000**	**IX**	**7.0**	**32,000**
27.11.1943	Hendek (Adapazarı)	336	X	6.6	2,240
26.06.1943	**Ladik (Samsun)**	**2,824**	**IX-X**	**7.2**	**25,000**
01.02.1944	**Gerede (Bolu)**	**3,959**	**X-IX**	**7.2**	**20,865**
31.05.1946	Varto (Muş) – Hınıs	839	VIII	7.0	1,986
17.08.1949	Karlıova (Bingöl)	450	IX	7.0	3,000
03.01.1952	Hasankale (Erzurum)	133	VIII	5.8	701
18.03.1953	Yenice (Gönen)	265	IX	7.4	9,670
19.08.1966	**Varto (Muş)**	**2,394**	**IX**	**6.9**	**20,0007**
22.07.1967	Adapazarı	89	IX	7.2	7,116
28.03.1970	**Gediz (Kütahya)**	**1,086**	**IX**	**7.2**	**9,452**
22.05.1971	Bingöl	878	VIII	6.7	5,617
06.09.1975	**Lice (Diyarbakır)**	**2,385**	**VIII**	**6.9**	**8,149**
24.11.1976	**Muradiye-Çaldıran (Van)**	**3,840**	**IX**	**7.2**	**9,552**
30.10.1983	**Erzurum (Kars)**	**1,155**	**VIII**	**6.9**	**3,241**
13.03.1992	Erzincan	653	VIII	6.8	6,702
14.08.1996	Mezitözü (Çorum)	1	VI	5.6	707
27.06.1998	Ceyhan (Adana)	146	VIII	6.2	1,338
17.08.1999	**İzmit-Marmara**	**17,127+**	**X**	**7.8 (Ms)**	**50,000**
12.11.1999	Bolu-Düzce	798	X	7.5 (Ms)	20,503

NOTABLE MARMARA REGION EARTHQUAKES

According to historical records gleaned from books, paintings, financial records and other documents there have been devastating earthquakes in Istanbul throughout history. These are recorded as early as the year 325. Significant Marmara area earthquakes from the 20th Century are also listed below.

DATE	AREA	LIVES LOST	STRENGTH	MAG (MS)	HEAVILY DAMAGED BLDGS
325			IX		
427			IX		
553			IX		
865			IX		
986			IX		
1344			IX		
1462			IX		
1509			IX	7.2	
1556				7.2	
1659			IX		
1719				7.4	
1766			IX	7.4	
1841				6.1	
1894			X	7.3	
1912	Saros-Marmara	216	X	7.4	5,540
1935	Marmara			6.4	
1953	Yenice / Gönen	265	IX	7.2	9,670
1953	Edirne			5.2	
1963	Çınarcık / Yalova	1	VII	6.4	230
1964	Manyas	23	IX	6.9	5,398
1965	Saros			5.9	
1967	Mudurnu / Adapazarı	89	IX	7.1	7,116
1975	Saros			6.6	
1999	Kocaeli Izmit / Marmara	17,000+	X	7.8	50,000

1999 EARTHQUAKES IN TURKEY: GENERAL INFORMATION



17 August 1999 Izmit (Gölcük-East Marmara) Earthquake

Date: 17/08/1999
Origin Time: 00:01 :39.1 (GMT); 03:01 (L.T)
Coordinates: 40.750 N-29.860E
Location: Golcuk/ Izmit-East Marmara
Intensity (MSK): X
Magnitude: Ms (Surface Wave Magnitude) = 7.8 (USGS-USA)
Mb (Body Wave Magnitude) = 6.3 (USGS-USA)
Mw (Moment Magnitude) = 7.4 (ISK-Kandilli; USGS-USA)
 # Dead: 17.480
 # Injured: 43.953
 # Houses/Buildings Destroyed: 73.342
 # Damaged buildings: 244.383
 # People affected: 16 Million
 # Cities affected: 10

17 August Izmit Earthquake occured at the north of the branch of the Northern Anatolian Fault Zone that divides into two in the west. For the first time in our country first time about seven cities and many other locations were directly affected by this earthquake. After the earthquake the upper branch of the Northern Anatolian Fault Zone divided into three parts between Lake Sabanca, Lake Sabanca-Akyazi, and Akyazi-Golyaka. The length of the surface rupture that is clear in the field observatories is about 110km. The length of the west branch of the rupture is about 72km at the boundaries of Yalova-Cinarcik.

12 November 1999 Duzce Earthquake

Date: 12/11/1999
Origin Time: 16:57:19.5(GMT), 18:57 (L.T.)
Coordinates: 40.76 N- 31.16E
Location: Duzce-Kaynasli
Intensity (MSK): IX
Magnitude: Ms (Surface Wave Magnitude) = 7.5 (USGS-USA)
Mb (Body Wave Magnitude) = 6.3 (USGS-USA)
Md (Duration Magnitude) = 6.5 (ISK-Kandilli)
Mw (Moment Magnitude) = 7.2 (ISK-Kandilli, HRW-USA)

 # Dead: 763
 # Injured: 4.948
 # Houses/Buildings Destroyed: 35.519
 # Damaged buildings: 133.496
 # People affected: 16 Million
 # Cities affected: 9

12 November 1999 Duzce Earthquake occured on the Akyazi-Golkaya segment that ruptured in the Marmara Earthquake, triggering the Duzce fault. After the Duzce earthquake a new rupture of about 40 km length occured. This rupture is along both parallel and jumping segments that occured as a result of the oblique fault's vertical and right lateral movement.

The 12 November Duzce Earthquake reveals about 40km new rupture.

We have studied the earthquake damage along the Northern Anatolian Fault Zone up until now, and the seismic pattern of is Main Shock+ Aftershock. This special pattern fits the Northen Anatolian Fault system.

HOW MANY EARTHQUAKES ARE THERE EACH YEAR?

There are an estimated 3,500,000 earthquakes every year. Most aren't even recorded. About 30,000 of them are felt somewhere in the world.

MAGNITUDE	DESCRIPTION	AVERAGE PER YEAR	INTENSITY NEAR EPICENTER
0 – 2.9	-	3,165,000	Recorded, not felt
3.0 – 3.9	MINOR	49,000	Felt by some
4.0 – 4.9	LIGHT	6,200	Felt by many
5.0 – 5.9	MODERATE	800	Slight damage
6.0 – 6.9	STRONG	120	Damaging
7.0 – 7.9	MAJOR	18	Destructive
8.0 – 8.9	GREAT	1 in 10-20 years	Devastating

Source: USGS

EARTHQUAKES AROUND THE WORLD

Around the world more than 1.5 million people have died in earthquakes in this century. The worst are shown in bold.

YEAR	REGIONS	DEATHS	MAGNITUDE	NOTES
856	**Corinth Greece**	**45,000**		
1290	**Chihli, China**	**100,000**	**6.7**	
1556	**Shensi, China**	**830,000**		**lots of damage**
1737	**Calcutta, India**	**300,000**		**moderate damage**
1755	**Lisbon, Portugal**	**70,000**		**buildings collapsed, tsunamis, fires left tens of thousands dead, priceless artwork lost**
1828	**Echigo, Japan**	**30,000**		
1906	San Francisco, California, USA	3,000	8.2 – 8.3	San Francisco fire
1906	Santiago, Chile	20,000	8.6	
1908	**Messina, Italy**	**70,000+**	**7.5**	**lots of damage**
1920	**Gansu, China**	**200,000**	**8.5**	**lots of damage**
1923	**Kanto (Tokyo-Yokohama) Japan**	**143,000**	**8.3**	**great Tokyo fire**
1935	**Quetta, India**	**30,000+**	**7.5**	
1939	**Chillan, Chile**	**28,000**	**8.3**	
1939	**Erzincan, Turkey**	**33,000**	**7.9**	**lots of damage**
1960	Agadir, Morocco	14,000	7.3	
1962	Northwestern Iran	12,230	7.3	
1964	Alaska, USA	131	8.3	
1968	Iran	12,000+	7.4	
1970	**Northern Peru**	**66,000**	**6.5 – 7.7**	**$530 million damage, rock slide**
1971	San Fernando, CA	65	6.5	$550 million damage

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YEAR	REGIONS	DEATHS	MAGNITUDE	NOTES
1972	Managua, Nicaragua	5,000	6.2	
1975	Liaoning, Haicheng, China	1,380	7.5	predicted when underground water levels and animals living underground were observed; 1,000,000 people evacuated
1976	**Guatemala**	**22,778**	**7.5**	
1976	**Tangshan, China**	**255,000**	**7.8**	**lots of damage**
1978	**Northest Iran**	**25,000+**	**7.7**	
1983	Erzurum, Turkey	1,342	6.9	
1985	Michoacan, Mexico	9,500	8.1	30,000 injured, $3 billion damage
1988	**Northest Armenia**	**25,000**	**6.8**	**19,000 injured, $16.2 million damage**
1989	Loma Prieta, CA	54	7.1	3.757 injured, $5.6 million damage
1990	**Northwest Iran**	**40,000 - 50,000**	**7.7**	
1992	Erzincan	498	6.8	$.5 million damage
1994	Northridge, CA	57	6.7	$30 million damage
1995	Kobe, Japan	6,000	6.9	
1999	**Kocaeli, Turkey**	**17,480+**	**7.8**	**43,953 injured, lots of damage**
1999	Bolu - Duzce, Turkey	763	7.2	lots of damage
1999	Athens, Greece	143	5.8	slight damage
1999	Oaxaca, Mexico	31	7.5	
2000	Taiwan	2,400	7.7	
2000	Solawesi, Indonesia	46	7.5	
2001	El Salvador	844	7.8	
2001	El Salvador	314	6.5	
2001	**Gujarat, India**	**20,000+**	**8.0**	
2001	Seattle, WA	1	6.4	

MODERN MYTHS

Myth #1: Big earthquakes always happen early in the morning. They always happen when it's hot and quiet.

If the two most recent earthquakes happened at the same time of the day, or in the same season, people tend to think that that is when most earthquakes happen. In fact earthquakes, happen at all times of the day and night, and in all seasons. So we need to be protected in the places we live, work, study, and spend our time, and at all times of the year.

Myth #2: Everyone who appears on TV is an expert in the subject he is talking about.

Unfortunately it's hard to know exactly who to listen to on any particular subject. In general we'd like to hear from scientists who are experts in their field. But sometimes the media asks people to comment on things outside their area of expertise. When it comes to scientists there are many different specialty areas of study. If you want to know about someone's expertise you might ask: Where did they study? What advanced degrees do they have? Have they done any research on this topic? What countries have they studied in. What languages do they read? Have they written articles published in peer-reviewed journals?

Myth #3: All of a sudden there are so many earthquakes.

You can probably remember the large eathquakes that have happened since the Kocaeli earthquake in 1999. (Duzce, Athens, Taiwan, Gujarat). Try to remember the large earthquakes that happened before the Kocaeli earthquake. Not so easy. This is because, we are now aware of earthquakes. When we didn't realize it could happen to us, we didn't pay as much attention to what was going on either in Turkey or in other places in the world (1992, Erzincan, 1995 Dinar and 1998 Ceyhan).

Myth #4: The earth will open and swallow us up.

No. This happens mostly in story books. There are faults everywhere. It's not possible to know which ones will become active and where new ones will appear. But you won't fall into a big black hole.

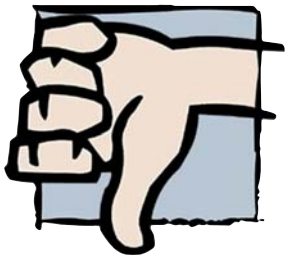
Myth #5: Make a 1m x 1m box of books, to survive a building collapse.

This is expensive and unnecessary. Before your building collapses you can be injured by the moving container. No one can tell you how to survive in a collapsed building.

Myth #6: Head for a doorway.

No. Old news. This came from one picture of a California adobe house where the only thing left was the doorways. Doorways with strong wooden or steel beams that are part of load bearing walls may be safe. Doorways in cosmetic walls and unreinforced concrete buildings may not be safe.

Myth #7: Lie down by a refrigerator.



No. This came from examples of buildings being pulled down or and the strong white appliances had small empty spaces by them (called "triangles of life") where people might have survived. Unfortunately, we cannot predict where we will find these life triangles. With strong shaking the refrigerator itself might fall over and kill you. A gas pipe may be broken. **If** you attach your low appliances to the wall (washing machine, dishwasher) these may hold up large falling objects. If not, these objects themselves can slide, fall, and hurt you. At the same time, you also need to be safe from cabinets and their contents and flying objects from across the room. Search and Rescue professionals and engineers are trying to learn more about the safest places in buildings. However, if you are close to strong shaking, you may not be able to move at all. Once again, there is nothing that anyone can tell you that will save your life if your building pancakes.

Myth #8 They know when the earthquake is - they just aren't telling.

No. "They" really don't know. Earthquake science is new. The best "predictions" we have are that there is a 70% likelihood of a major earthquake along the Northern Anatolian Fault system, in the Marmara Sea, within the next 30 years. Today. Tomorrow. Next year. In 35 years, 7 months and 3 days...? No one knows. Scientists are contantly looking for new methods that will help them to forecast when and where major earthquakes will occur.

Myth #9 My brother's friend's barber knows the mayor and...

Rumor. Rumor. Rumor. How many false prophets have there been, predicting earthquakes on this date or that date, at this time or that time. These legends are built upon our fears. They aren't much different than the stories that ancient people told their children. Use your common sense. Complain if you see these things taking up time and space in the mass media. Let's be serious.

Myth #10 It's up to God.

When and where the earth shakes is something over which we have no control. But God gave us all brains. It up to us to use our brains. We need to use what we know to protect ourselves and our loved ones, and to learn more.

EUROPEAN MACROSEISMIC SCALE

The European Macroseismic Scale provides a useful measure of the relative damage caused by a particular earthquake.

I NOT FELT

Not felt, even under the most favourable circumstances.

II SCARCELY FELT

Vibration is felt only by individual people at rest in houses, especially on upper floors of buildings.

III WEAK

The vibration is weak and is felt indoors by a few people. People at rest feel a swaying or light trembling.

IV LARGELY OBSERVED

The earthquake is felt indoors by many people, outdoors by very few. A few people are awakened. The level of vibration is not frightening. Windows, doors and dishes rattle. Hanging objects swing.

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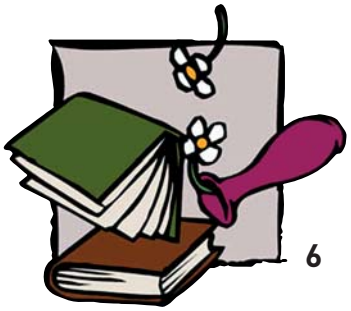
V STRONG

The earthquake is felt indoors by most, outdoors by few. Many sleeping people awake. A few run outdoors. Buildings tremble throughout. Hanging objects swing considerably. China and glasses clatter together. The vibration is strong. Top heavy objects topple over. Doors and windows swing open or shut.



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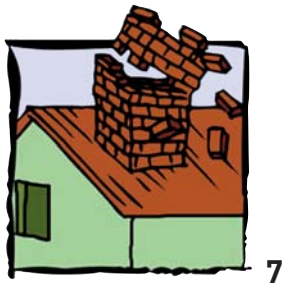
VI SLIGHTLY DAMAGING

Felt by most indoors and by many outdoors. Many people in buildings are frightened and run outdoors. Small objects fall. Slight damage to many ordinary buildings e.g.; fine cracks in plaster and small pieces of plaster fall.

VII DAMAGING

Most people are frightened and run outdoors. Furniture is shifted and objects fall from shelves in large numbers. Many ordinary buildings suffer moderate damage: small cracks in walls; partial collapse of chimneys.



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VIII HEAVILY DAMAGING

Furniture may be overturned. Many ordinary buildings suffer damage: chimneys fall; large cracks appear in walls and a few buildings may partially collapse.

IX DESTRUCTIVE

Monuments and columns fall or are twisted. Many ordinary buildings partially collapse and a few collapse completely.

X VERY DESTRUCTIVE

Many ordinary buildings collapse.

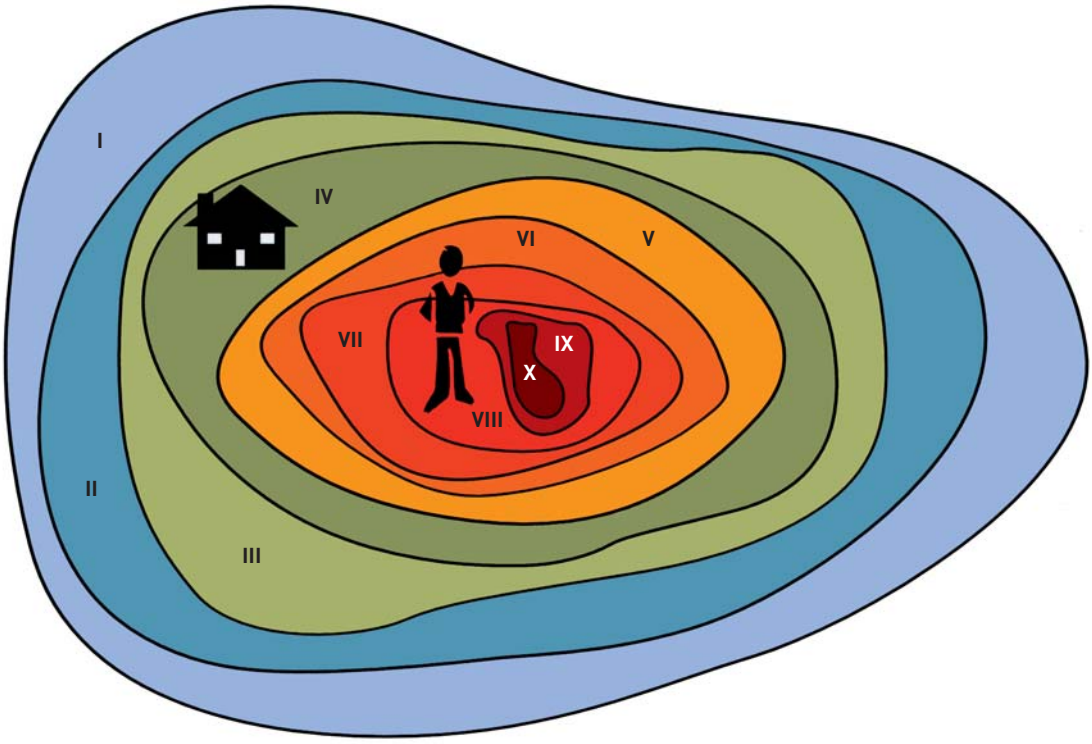
XI DEVASTATING

Most ordinary buildings collapse.

XII COMPLETELY DEVASTATING

Practically all structures above and below ground are heavily destroyed.

Every earthquake has is measured with one magnitude, and may have many different intensities. In the example below, a magnitude 7 earthquake is experienced as a 4 where the home is located and an 8 where the person is standing.

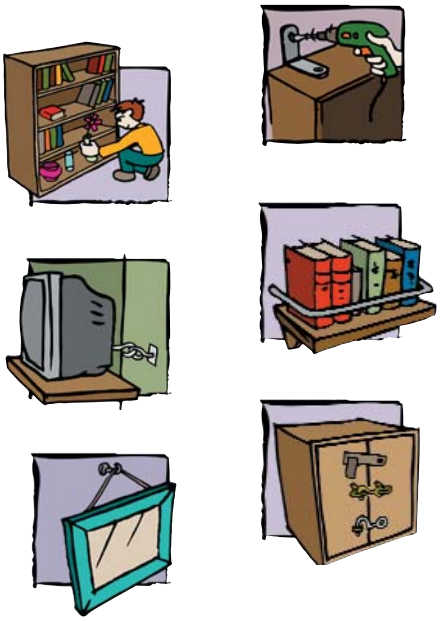


EARTHQUAKE HAZARD HUNT

The Earthquake Hazard Hut should begin at home, with all family members participating. Imagination, and common sense are all that are needed as you go from room to room and think about what would happen when the earth and house start shaking. Check places where your family spends most of its time - where the family sleeps, eats, works and plays. Do some detective work! Make a list of what needs to be done and tackle it one by one until it's finished!

As you tackle what needs to be done, prioritize the items as follows:

1. Secure life threatening items first (eg. wardrobe in bedroom or thing blocking exit)
2. Secure those things that would entail significant economic loss (eg. computer, a/v equipment)
3. Secure those items that will let you live more comfortably (eg. family heirlooms, breakables)



- Check for things that can fall and for things that can slide.
- Anything heavy that's placed high up? Move it below the head level of the shortest family member.
- Bracket furniture to walls.
- Securely fasten pictures on closed hooks,
- Secre lighting fixtures to ceiling.
- Consider replacing kitchen cabinets latches with ones that will hold shut during a quake.
- Remove glass bottles from anywhere near bathtubs (You may need to fill the tub after a quake for washing water).
- Check for any hazardous materials (poisons, flammable materials) to make sure they are secure.
- How about the hot water heater? (It may need plumbers tape to fasten it to the wall).

Hazards we found:	**Dates corrected:**

We're Getting Ready! Good luck! - Prof. Dr. Ahmet Mete Işıkara

FAMILY DISASTER PREPAREDNESS PLAN

Enter date of completion:

- [ ] We held a family meeting to discuss our Family Disaster Plan.
- [ ] We identified the safest places in the house, and in each room. (Away from windows, large and heavy objects that can fall, and objects like heaters that can cause fire.)
- [ ] We identified exits and alternative exits from our house and building.
- [ ] We considered the special provisions we need for pets, people who don't speak the language of the country, elderly, disabled, and small children.
- [ ] We have enough water to last us a week (4 liters per person per day), and food for 3 days.
- [ ] We know how to turn off our electricity, water and gas.
- [ ] We completed the hazard hunt and eliminated the hazards from our home.
- [ ] We know our out-of-area contact person(s) and phone number(s): It's: _____
- [ ] We know where we would reunite
  Inside the house: _____
  Outside the house: _____
  Outside the neighborhood: _____
- [ ] We know how to use a fire extinguishers.
- [ ] We keep shoes and flashlights by our beds.
- [ ] We have a good first aid kit.
- [ ] We collected our survival supplies, and made up our earthquake bags. (Flashlight, batteries, radio, first aid kit, change of clothes, cash, whistle, matches, 1 week prescription medication, paper and pencil, important phone numbers.)
- [ ] We made our copies of important documents, and key addresses and phone numbers, and keep them in our earthquake bag or with our out-of-area contact.
- [ ] We know never to light a match, lighter, or any other flame after an earthquake until we are sure there is no danger of escaping gas anywhere around.
- [ ] We're starting to spread the word to everyone we know.
- [ ] We know that we will only use the telephone in an emergency after an earthquake, so that the lines will be there for those who need them most.. We will get our information from TV and radio.
- [ ] We have completed our Earthquake Hazard Hunt. We have taken measures to protect ourselves.
- [ ] We plan to review our plan again every 6 months.

name _____

address _____

_____ e-mail _____

telephone _____ date _____

We're Getting Ready! Good luck! - Prof. Dr. Ahmet Mete Işıkara

COALINGA SCHOOLS REPORT

At 4:42 p.m. on Monday, May 2, 1983, an earthquake registering 6.5 on the Richter scale struck the Coalinga area. Seconds later there was an aftershock of 5.0 Richter magnitude.

Coalinga has three elementary schools, one junior high, and one high school, serving approximately 1,900 students. The school buildings were constructed between 1939 and 1955. They contain 75 classrooms, plus gymnasiums, auditoriums, libraries, and multipurpose rooms. Superintendent Terrell believes that death and serious injury would have occurred if school had been in session. The following is an account of the nonstructural damage to these schools:

Windows
Large windows received and caused the most damage. The 31-year-old junior high library had glass windows approximately 8ft x 10 ft on the north and south walls. The glass was not tempered. All the windows imploded and littered the room with dagger-shaped pieces of glass. Floor tiles and wooden furniture were gouged by flying splinters.

Lighting Fixtures
Approximately 1,000 florescent bulbs fell from their fixtures and broke. All of the fixtures in the elementary schools came down, and many in other buildings. None of the hanging fixtures had safety chains. Glass in the older recessed fixtures was shaken out and broken.

Ceilings
Improperly installed T-bar ceilings came down. Glued ceiling tiles also fell, especially around vent ducting and cutouts for light fixtures.

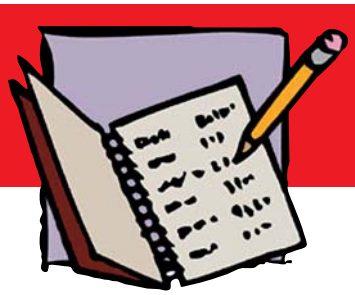
Basements and Electrical Supply
Water pipes which came into the buildings through concrete walls were severed by the movement of the walls. Basements were flooded to five feet. Since all the electrical supply and switching mechanisms for these buildings were in the basements, all of them were destroyed by water.

Chemical Spills
In the second-floor high school chemistry lab, bottles of sulfuric acid and other chemicals stored in open cabinets overturned and broke. Acid burned through to the first floor. Cupboard doors sprang open and glass cabinet doors broke, allowing chemicals to spill. Because there was no electric ventilation, toxic fumes permeated the building.

Furnishings and Miscellaneous Items
File cabinets flew across rooms; free-standing bookcases, cupboards, cabinets, and shelves fell over. Machine shop lathes and presses fell over. Typewriters flew through the air. Metal animal cages and supplies stored on top of seven-foot cabinets crashed to the floor. Movie screens and maps became projectiles. Storage cabinets in the high school had been fastened to the wall with molly bolts, but they were not attached to studs. They pulled out of the wall and fell to the floor with their contents.

(Based on a report prepared by E. Robert Bulman for Charles S. Terrell, Jr., Superintendent of Schools for San Bernardino County, California.)

NON-STRUCTURAL HAZARD MITIGATION AT HOME



Non-structural mitigation is one of the least expensive ways to decrease the incidence of injury. Here are a few of the identified hazards and some suggested solutions:

WINDOW AND MIRROR GLASS

Sharp shards may fall or be thrown across a room. Consider safety glass, wire glass or solar/safety film. The solar/safety film has the advantage of improving the insulatig factor of the window. The energy saving may pay for the cost of the film. There are cost-free protective meaures that you can use if the glass where you are is not safety type. You can pull down and close shutters or draw drapes. Even blinds that are pulled down, but not closed, offer some additional protection from flying glass.

HEAVY FURNITURE

Furniture will move and fall duing many types of disasters,especially tall, top-heavy items. Secure the furniture to the wall. Use braided metal cable, chain, or angle brackets and appropriate bolts for your wall type.

Secure it if it's taller than it is wide!

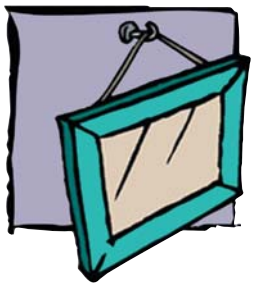
GAS APPLIANCES

Your stove, water heater, furnace, clothes dryer, etc. may run on natural gas or propane. Unsecured gas appliances may crush someone or rupture their gas feed line during a quake. If these objects move or topple the resulting gas leak may destroy your home – a home which would otherwise have survived with only minor damage. Secure all gas appliances to a wall and use flexible gas lines. The flexible gas line should be longer than necessary to allow for some movement. The appliance should be secured top and bottom to prevent tipping, rolling and sliding.

REFRIGERATORS

Refrigerators are extremely heavy and most of them are on wheels. Beause of their weight they may crush someone if they move and tip. Secure refrigerators to the wall to insure they remain in place and upright during any earth movement.

HANGING PICTURES, MIRRORS, CLOCKS ETC.



Anything simply hanging on a wall will come flying off in a large shake. Use an appropriately sized eyebolt for lighter items. Larger item will require an anchor or bolt.

DECORATIVE ITEMS AND BRIC-A-BRAC ON SHELVES, BOOKCASES ETC.

Unsecured objects will fall during a shock. Run a wire, monofilament fishing line, guardrail, chain or elastic strap across the shelf front. (1/3 the height of the shelf from the bottom). Objects can be secured in place with hook-and-loop tape, 2-sided tape, or quake wax. Place large or heavy objects on the bottom shelf. Heavy items can be secured with industrial strength -hook-and-loop tape.

CROCKERY CUPBOARD ITEMS

Cupboards will open and spill their contents during a quake. Put heavy items on bottom shelves and use safety latches inside to prevent doors from opening.

FLAMMABLE LIQUIDS

Spilled flammable liquids may cause fire and destroy a home that would have survived undamaged. Store all flammable liquids outside, in their original/proper containers, away from structures and vehicles. If you must store flammable liquids in your home store them in the garage, keep them in a cabinet with locking doors, and always store them on the lowest shelf.

BED LOCATION

Plate glass may break during a disaster. Relocate beds away from windows and tall heavy futniture. Apply safety film to windows where possible. Close windows and blinds at night.

NON-STRUCTURAL HAZARD MITIGATION AT WORK

Good employees are your most valuable asset. Protect them with a safe working environment.

EQUIPMENT AND FURNISHINGS

- Strap rows of multple file cabinets, mainframe computers, book cases, etc. together. High racks should be secured together on top and to the floor on the bottom.
- Secure desktop computers, typewriters and other equipment.
- Keep computer CPUs on the floor next to their work stations.
- Secure cabinet doors with positive latches.
- Store hazardous materials correctly and educate all your employees about them.
- Secure freestanding, moveable partitions

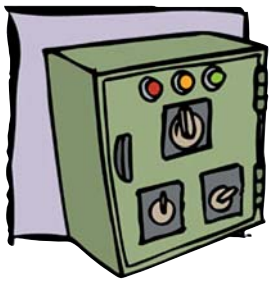
Secure anything heavy that is at or above desktop level!

OVERHEAD OBJECTS

Seen and unseen objects overhead and above suspended ceilings may pose hazards to workers below. Secure all objects that are above desktop level.

- Check for diagonal bracing wires in suspended ceilings.
- Ensure proper restraint of "stem" light fixtures and flourescent light panels.
- Securely attach decorative ceiling panels, spotlight, speakers, air conditioning units, etc.
- Check above suspended ceilings for poorly attched ducts, cables, etc.

ELECTRICAL EQUIPMENT



Shock hazards exist if unsecured electrical equipment breaks its connections or exposes energized lines. Unsecured equipment may short out the power in your office or building.

- Secure any electrically powered equipment
- Have backup power generator for emergency lighting and to protect computers against data loss. Ensure that generators, their fuel tanks, battery packs, and fuel lines are properly secured.
- Secure emergency lighting.
- Secure telecommunication equipment, switches, and control boxes.
- If you use an automatic generator to work during power outage, be sure that it is fitted with a seismic safety shut-off valve to avoid fire hazard. The generator should be turned on only when there's no danger from flammable gases or liquids.

PLANT EQUIPMENT

Loss of plant equipment may prevent you from continuing your business after a quake. Secure water heaters, furnaces, boilers, fans, pumps, heating, ventilating, airconditioning equipment, and the ducting or pipes that go with them.

HAZARDOUS MATERIALS

Unsecured or improperly stored hazardous chemicals may force your business out of an otherwise undamaged building.

- Secure large containers of production chemicals or cleaning supplies.
- Ensure that all toxic items are in the correct containers and properly labelled.
- Ensure that all employees know what to do in case of a spill.

FLAMMABLE LIQUIDS

Gasoline, thinner, paints and some cleaning materials are highly flammable.

- Keep all large containers or vats of toxic, hot, or hazarouds items covered to prevent spills in an earthquake.
- Store flammable and hazardous materials properly. Remember the acronym **L.I.E.S.** – **Limit, isolate, eliminate, separate.**
    - **Limit** the amount of hazardous materials stored.
    - **Isolate** products in approved containers, and store them inside closed cabinets.
    - **Eliminate** products that are no longer necessary by disposing of them properly
    - **Separate** incompatible materials (e.g. chlorine products and ammonia).

EMPLOYEES

- Establish an education and awareness program for work and home. Encourage family involvement.
- Encourage employees to be prepared at home and work.
- Give each employee specific instructions as to areas of responsibility before, during and after a disaster.
- Establish a good safety program. Keep the employees continuously informed regarding hazards, safety warnings, emergency plans, and supplies.

NEIGHBORS

Find out what your business neighbors do. Their enterprise may put your business in greater jeopardy and you may need to plan for problems related to their potential problems.

SAFE DRINKING WATER

WATER IS THE MOST IMPORTANT ITEM TO STORE

Loss of safe drinking water can be deadly. Most people, with few exceptions, will be feeling the effects if they do without water for more than 36 hours. Dehydration occurs much more quickly than starvation. Our bodies can tolerate loss of food much better. With an ample water supply, starvation is delayed many days, even weeks. The city water supply is vulnerable to the effects of a large earthquake. Contaminants can get into the drinking water supply through ruptures in the pipes, through the mixing up of sediments, through the adulteration of filtering systems, etc. Now we take our water for granted. That will be dangerous after a big quake.

How Much Should I Store?

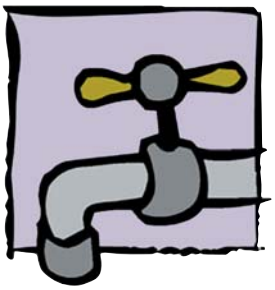
A good rule of thumb is 20 litres per person minimum. Four litres of wter per person per day for 1 week (2 litters for drinking and 2 for washing and sanitation) is a good idea.

WATER SOURCES

- Bottled drinking water in sealed containers
- 5 , 10, 20 litre sealable water containers. Be sure to sanitize the container and treat the water that you are storing.

Do not store any plastic water container directly on concrete. The concrete will leech chemicals, contaminating it and degrading the plastic, causing failure.

Purifying Your Tap Water



Store all plastic water containers on a wooden pallet or shelf. Keep water containers in a location where container failure will not destroy your other supplies. Keep all water and supplies in a cool dark place.

Any water that you make up yourself needs to be treated. If left untreated over time, it becomes contaminated with bacteria and algae

- Use 2 drops of pure unscented liquid bleach per litre of water to reduce contaminants.
- Add the bleach when you first store the water away.

Note: Rotate your water every six months (including the store-bought bottles and the supply made up from tap water).

If the purity of your water source is questionable, use the following methods to make the water safe to drink:

- **BEST!** Add liquid chlorine bleach to the water 2 drops per liter of water. (Double this dose if the water is cloudy.
- **GOOD!** Add 2% tincture of iodine to the water - 3 drops per liter. (Double this dose if the water is cloudy.
- **ACCEPTABLE!** Boil the water vigorously for 10 minutes.

Don't forget to clean and sanitize your food and water containers before using them. Wash with soap and water then fill with a 10% bleach solution. After 5 minutes, empty the bleach solution and let air dry.

Water that is dirty should first be strained through a coffee filter, cheesecloth or paper towel to remove suspended matter.

Getting The Water Out Of Your Water Heater

- Use extreme caution. Let the water cool
- Turn off the cold water supply to the tank
- Turn off the gas or electric heater for the tank.
- Open the drain valve at the bottom of the tank.

Remember: Some sediment at the bottom of the tank may at first make water flowing out look murky. Continue to drain water until it becomes clear.

OTHER SOURCES OF WATER IN YOUR HOME

- Toilet Water Storage Tank. Note: use the water from the tank, **not the toilet bowl.** (Don't drink the water if you use coloring or chemicals in it).
- **Melted ice cubes**
- **Water-packed canned goods**
- **Water trapped in home piping.** Water can be removed by locating nd shutting off the main water valve. Then open the valve at the highest point of your home (eg. upstairs, shower). Then, when you open the valve at the lowest point gravity will force the water from the pipes.

Do not drink swimming pool or spa water. This contains many toxic chemicals and can give you darrhea, causing dehydration.

EMERGENCY FOOD SUPPLY

Food is important for post-earthquake survival. Psychologists tell us that people who have experienced a severe emotional trauma may give up on life and can even die from the depression which follows.

Psychologically, a normal and healthy diet can lessen the emotional trauma of a disaster. Therefore we recommend that people store supplies for a disaster that are as close as possible to their normal fare. The food must be of a type that stores well. The minimum time that food should be able to last without refrigeration is 6 months.

The information here is to give the person who wants to store emergency food supplies some ideas. **It is not intended as a shopping list.** In each of the categories there is more food listed than should be needed. Think about the tastes and needs of your family.

ROTATING PERISHABLE SUPPLIES

Rotating supplies every 6 MONTHS is the key. Not because everything will go bad in six months, but because you need to make rotating supplies part of your normal habits. The easiest way to remember to rotate is to change your supplies every time you change your clocks for "daylight savings time". Remember, when you **rotate your clocks**, you **rotate your supplies.**

The easier it is for you to think about doing it, the more apt you are to do it continuously. When you rotate your supplies, don't throw them out, put them in the pantry and use them. Nothing has to go to waste.

Remember: Your supplies rotation should include (but is not limited to) batteries, food, water, medications. Don't forget to check and shake that fire extinguisher while you're at it.

SAMPLE FOOD ITEMS

It is prudent to keep at least **7 days worth of supplies per person plus pets.** These supplies should be nonperishables with long shelf lives. They should be stored in a cool, dry and dark place. Heat and moisture speed the spoilage of food.

The following is a list of a few sample items. You should keep items that you and your family will eat. Try and select items that you use daily in your home. Try to plan as if you're going on a camping vacation for 7 days, because this is essentially what you will be doing.

Remember to consume what you have in your refrigerator first, then your freezer, then your stored goods.

SAMPLE FOOD STORAGE ITEMS

Beverages:

- Milk – dehydrated or evaporated
- Soda
- Coffee, tea, instant cocoa (Remember; drinks containing caffeine will move water through your body faster, so you might consider storing 50% again more water).
- Powdered beverages
- Fruit / tomato / vegetable juices
- Sports drinks
- Canned soup

Grain products:

- Bread (store in freezer)
- Pasta
- Flour
- Soda crackers
- Rice

Protein sources:

- Canned meat
- Canned poultry: chicken, turkey
- Canned fish: tuna, salmon, sardines
- Cheeses

Fruits and vegetables:

- Canned fruit
- Canned vegetables
- Dried peas
- Dried beans
- Instant mashed potatoes

Staples:

- Salt
- Sugar
- Cooking oil
- Honey

Seasonings and spices:

Include seasonings appropriate for the meals you choose to store. Spice foods increase the consumption of fluids.

Snacks and other foods:

- Nuts
- Peanut butter
- Hard candy
- Dried fruit
- Dry soup mix

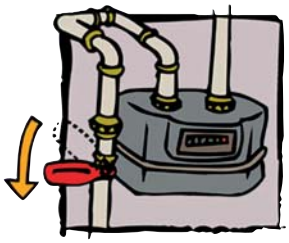
HOW TO SHUT OFF UTILITIES

There is no cost involved in teaching everyone in your home about how and when to turn off the gas, electricity and water after an earthquake. This can be as simple as clearly marking where the shut-off valves are, and posting instructions close by.

Remember, consider shutting off all utilities if you can smell gas, smell or see fire, or see damage to, from, or near the utility lines. It is wise to shut off utilities if you are going to leave the home for extended periods of time. This is because of the probability of aftershock.

GAS SHUT OFF

Locate main gas shut-off (usually outside your building at the gas meter). Turn the valve crosswise to the pipe to turn off the gas. All the pilot lights in and around your home will go out when you turn the valve off. Turn your gas off outside your apartment in your kitchen and any other locations in your home.



After an earthquake, turn off your gas at the shut off valve if:

- you smell, hear or even suspect gas is escaping in your damaged or undamaged building(s).
- your gas water heater or any other gas appliance has been knocked over and/or pulled free from its wall connection.
- your building has suffered extensive damage, such as large cracks in the walls or in the concrete slab floors, etc. AND you suspect the gas lines my have been damaged.
- you smell smoke and/or see or suspect fire.

Note: If you have none of the above you are probably OK leaving your utilities on.

WARNING: If you smell gas don't turn on or off any switches. Don't use any open flame to check for leaks. Don't turn on any battery opeated flashlights, unless it is a safety/waterproof light. Chemical light sticks are a safe source of light in the event of gas leak.

WARNING: It is very dangerous and therefore not recommended that you go searching for gas leaks inside any damaged building.

BE AWARE: After an earthquake, aftershocks will continue to occur, possibly causing additional damage (or even first damage) to your building(s).

REMEMBER: Do not turn the gas valve back on after an earthquake, unless a qualified person has checked extensively for gas leaks.

AUTOMATIC GAS SHUT-OFF VALVES

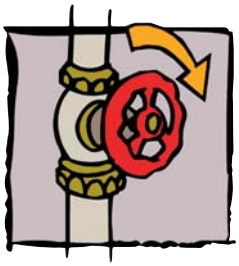
Automatic gas shut-off valves are an excellent way to ensure that your gas is shut off in the case of a major earthquake. With an automatic valve your gas will be off even if you aren't home at the time. Contact your local gas company for more information and installation.

ELECTRICAL SHUT OFF

First locate all of your home's electrical panels. Note: There may be more than one. Your house may be equipped with fuses or circuit breakers. If your house has fuses, you will find a knife switch handle or pullout fuse that should be marked "MAIN". If your house has circuit breakers, you may need to open the metal door of the breaker box to reveal the circuit breakers (never remove the metal cover). The main circuit breaker should be clearly marked showing on and off positions.

Remove all the small fuses or turn off all the small breakers **first**, then shut off the "MAIN". If you have any sub-panels adjacent to the main fuse or breaker panel or in other parts of the house, in an emergency, be safe and shut them off too. Shorts can sometimes develop that cause a circuit to bypass the breaker or fuse. Turn off and unplug your major appliances, television, stereo and computer equipment. If you leave these plugged in then when the electricity returns, the power surges can damage these items.

WATER SHUT OFF



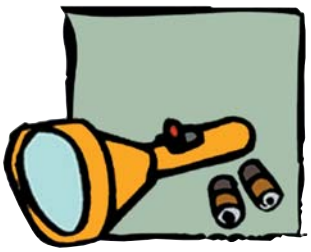
Locate the main water service pipe into your house (probably in the front at the basement level). You will see a gate valve on the pipe. If you know you have leaks after an earthquake, you can shut off all water in your house with this valve. You may wish to paint the valve so it is easy to find in an emergency. You can shut off all water to your property by finding the water meter box. Open the cover. Be sure to identify this box and the water valve inside before the need to use them arises. Turn the valve clockwise to turn it off.

EMERGENCY LIGHTING

Don't use matches, candles, or oil lamps, especially right after the earthquake. Aftershocks are coming and they could cause candles or oil lamps to fall, causing fires. Immediately after an earthquake there is the danger of natural gas or propane leaks and any source of flame could cause an explosion.

Emergency lighting choices include:

- Flashlight or battery-operated lantern for the home (plus **extra** batteries and **change** them).
- Flashlights/penlight for personal use.
- Power failure lights (the type left plugged into wall, or rechargeable)
- Chemical light sticks (very safe light source)
- Gas/propane lanterns (plus mantles, matches, fuel). Protect these lamps from falling or being knocked over during aftershocks.
- Portable electric generator (plus fuel). Remember, light requires little energey from a generator. A 200-watt light bulb will light a camp well enough to read by. Creating heat or cold requires large amounts of electricity. Purchase your generator with sufficient power for your needs.



FIRST AID KIT

Prepare a first aid kit for both your house and your car. The kit should contain the following items:

- Bandaids of different sizes
- 5x5 cm sterile gauze bandage (4 - 6 pieces)
- 10x10 cm sterile gauze bandage (4 - 6 pieces)
- Antiallergic bandage adhesive (1 roll)
- Triangular bandage (3 pieces)
- 5 cm wide bandage roll (3 pieces)
- 10 cm wide bandage roll (3 pieces)
- Scissors
- Tweezers
- Latex gloves
- Safety pin
- Pen
- Note pad
- Flashlight
- Whistle
- Oil pencil

EMERGENCY COMMUNICATIONS

TELEPHONE COMMUNICATION

After a major disaster most of our normal methods of communication will be interrupted. Telephones will be out, the mail won't be delivered (you may not have a home to deliver to) or you may be isolated at work and unable to travel to your family. Immediately afer an earthquake, your phones will probably not work. This could be because of damage to switching centers, local phone lines, and trunk lines. It could be that power to operate the phone systems itself is unavailable.

The number one cause of phone failures is too many phones off the hook at one time. Many will be off the hook because they were knocked over in the shock, but a larger number will be because everyone is trying to call friends and family. This overload can damage the phone companies' switching systems. To prevent his damage, whole sections will shut down automatically when a certain percentage of phones are off the hook.

It's normal to want to check on your family, or let family know you're OK. But, we need to limit our calls if we want the system to work at all. The solution to this problem is to have **one** out-of-area contact for all you family members. This way all your relatives and friends will not be tying up the phone lines trying to get you and you them. Long distance lines do not go down from too many calls or phones falling off the hook. Another advantage is that if an earthquake shuts down the long distance lines, these lines will be one of the first lines returned to service. You will be able to reach someone out of the area before you could reach someone next door.

When you reach your out-of-area contact **keep it short and quick.** The phone system may go out again any time. Give your condition and the condition of the family members you know about. Get information on members who are not with you. Tell them you'll call them in a few days. Then say good-bye and hang up.

Use the sample "Out-of-area contact cards". Fill these out and give them to all your family and friends. Copy extras if needed. This system has proven that it works!

CELL PHONES

Cellular telephones are really radios on a network. They can't talk to each other, but must use a cell site to connect calls. It is recommended that if you plan to use cell phones to communicate after a disaster that they be on the same network or service provider system as the people you want to talk to.

HAM RADIO COMMUNICATION

Ham radio is a mainstay of disaster communications. A ham radio association can help you learn these skills.

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EMERGENCY CONTACT CARDS

1. Call a friend or relative who lives outside the area and ask them to be your family's "**out-of-area contact**".
2. Explain to them that after a disaster they will be your surest means of communicating with other family members, both in and out of the area. Make sure that they understand that it will be their responsibility to be available to take calls immediately following a disaster in your own area. Give that person a list of phone numbers for your family and friends that should be notified after you call.
3. Agree to do the same for your contact in case disaster should strike their area.
4. Notify all you friends and family members that this one person will be the person to contact if they need to get a message to you. Tell them not to try to call you directly.
5. Completely fill in the contact card. It should be typed or printed in ink and then "plasticized" to protect it from water.
6. Have each member of your family carry this card at all times. Copy this page so that you can have some spare cards in cars, taped to the bottom of your phone at work, etc.
7. Have family members in other areas agree on the same out-of-area contact for any family emergency. Plan for an alternate contact in case your main emergency contact person is out of town or otherwise unavailable.

EMERGENCY OUT-OF-AREA CONTACT FOR .....FAMILY		**EMERGENCY OUT-OF-AREA CONTACT FOR .....FAMILY**	
name:	name:	name:	name:
phone numbers:	phone numbers:	phone numbers:	phone numbers:
address:	address:	address:	address:
EMERGENCY OUT-OF-AREA CONTACT FOR .....FAMILY		**EMERGENCY OUT-OF-AREA CONTACT FOR .....FAMILY**	
name:	name:	name:	name:
phone numbers:	phone numbers:	phone numbers:	phone numbers:
address:	address:	address:	address:

TIPS FOR DURING AN EARTHQUAKE

DURING AN EARTHQUAKE

When you first notice an earthquake, if there are others around, shout **"EARTHQUAKE!"** to warn them. Then everyone should **drop, cover and hold.**

- Find a safe place and **drop.**
- **Cover** your head and neck.
- **Hold** on to something secure.
- Stay where you are and do not move until the shaking stops.

Duck under a sturdy table or desk, or next to a solid low piece of furniture or a low appliance. Stay away from windows, bookcases, file cabinets, heavy mirrors, and other heavy objects that could fall. Watch out for falling plaster and ceiling tiles. Stay under cover until the shaking stops. Hold onto your cover. If it moves, move with it.

Here are some additional tips for specific locations:

- If you are in a **high rise building**, and you are not near a desk or table, move against an interior wall, and protect your head with your arms. Don't be surprised if the alarm or sprinkler systems come on. Stay indoors. Glass windows can dislodge during the quake and sail for hundreds of feet.
- If you are **outdoors**, move to a clear area away from trees, signs, buildings, or electrical wires and poles.
- If you're on a **sidewalk near buildings**, duck inside the doorway to protect yourself from falling bricks, glass, plaster and other debris.
- If you're **driving**, pull over to the side of the road and stop. Avoid overpasses, powerlines, and buildings. Do not get down near your vehicle because other moving cars may hit you, and your car will be a moving, jumping object. Stay inside the vehicle until the shaking is over.
- If you are in a **crowded store** or **other public place**, do **not** rush for the exit. Move away from display shelves containing objects that could fall.
- If you're in a **wheelchair**, stay in it. Move to cover, if possible. Lock your wheels and protect your head with your arms.
- If you're in the **kitchen**, move away from the refrigerator, stove, and overhead cupboards. (take time **now** to anchor appliances and install latches on cupboard doors to reduce hazards).
- If you're in a **stadium or theatre**, stay in your seat and protect your head with your arms. Do not try to leave until the shaking is over. Then leave in a calm, orderly manner. Avoid rushing toward exits.

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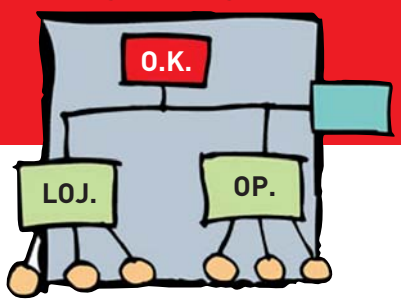
INCIDENT COMMAND SYSTEMS ACTIVITY



There is an international system for the organization of emergency response. This is known as an "Incident Command System" or a "Standard Emergency Management System. In this system in any given area one person functions as a Leader or Incident Commander with assistance from a Communications Operator, and then establishes two branches, Operations and Logistics, as needed. The Operations arm (the doers) has responsibility for: damage assessment, search and rescue, fire and hazardous materials control, and first aid. The Logistics arm (the getters) are responsible for obtaining supplies, volunteers, transportation, food and water, shelter and sanitation, and psychological support and supervision.

You can use the lists below to organize work after a disaster. You can use it to mobilize volunteers for planning and drills.

I. INCIDENT COMMANDER

1. Establish the command post in a safe and secure place.
2. Identify a wireless radio operator to be your shadow.
3. Establish response teams
4. Establish priorities from incoming damage assessment reports
5. Keep track of all incidences on the Incident Status Record Form
6. Maintain Order

II. COMMUNICATIONS

You are the Incident Commander's shadow. Stay with that person and provide communications between them and the Emerency Operations Center.

1. Contact the Emergency Operations Center through: Follow their directions and be brief.
2. Monitor Emergency Radio.
3. Identify yourself and your neighborhood and your district.
4. Work with Logistics Commander to identify additional communication channels.

Reminders:

- Maintain contact between COMMAND POST and the Emergency Operations Center.
- Never leave radio unattended.

III. OPERATIONS

1. Supervise **Search & Rescue, Fire Suppression/Hazard Control, First Aid** teams.
2. Centralize damage, injury and death reports.
3. Maintain contact with **Command Post**.

III.1. Light Search & Rescue

1. Assign someone to compile initial damage assessment reports.
2. Simultaneously A. Form at least one team to do a complete home-to-home check.
   B. Form teams to systematically assess all homes in this order:
      a. Heavy damage (needs professional SAR team)
      b. Moderate damage (needs light SAR team)
      c. Light and no damage

3. As problems at each residence are identified and resolved make the universal SAR markings in an obvious place that can be seen from the front of the house.
4. Each team must document activities using the Damage Assessment Form.
5. Maintain contact with the Command Post.

Reminders:

- All teams must have at least two people.
- Damage assessment must be redone after every aftershock.

III.2. Fire Suppression:

Form teams to safely

1. • fight small fires
   • isolate potential hazardous materials situations
   • evaluate utilities
2. Let the damage assessment reports determine which teams should be formed and in which order.

III.3. First Aid

1. Establish treatment area and begin triage.
2. Establish a morgue if necessary in a separate area.
3. Care for injuries.
4. Utilize psychosocial support and supervision team in a separate location.
5. Work with Communications to identify nearest hospitals and clinics.
6. Work with Logistics to identify alternative methods of transportation.
7. Document activites on Medical Team Form.
8. Maintain contact with Psychological Support/Supervision team.
9. Maintain contact with Command Post.
10. Report number of injuries requiring medical attention.

IV. LOGISTICS

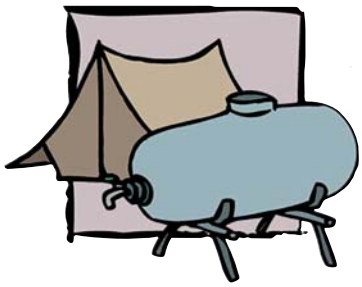
1. Supervise Shelter/Sanitation and Food/Water teams.
2. As necessary establish groups to coordinate: Communications, Supplies, Transportation, Volunteers, Security
   a. Identify alternative methods of communication. (wireless, telephone, e-mail, radio, trunk radio, t.v.)
   b. Identify alternative methods of transportation and volunteers.
   c. Identify supply needs of all teams.
   d. Organize traffic flow if necessary.
   e. Provide food and beverages to all teams.
   f. Maintain contact with the Command Post.

IV.1. Food & Water

1. Organize food and beverage storage.
2. Provide snacks and beverages to all teams.
3. Organize provision of snacks and beverages.
4. Organize provision of meals.

IV.2. Shelter & Sanitation

1. Identify and set up safe and secure locations for shelter and sanitation.
2. Establish shelter from weather.
3. Check on previously identified vulnerable populations (school children, disabled, elderly)
4. Maintain names and addresses of people in shelter.
5. Establish temporary toilets.
6. Maintain contact with Command Post.

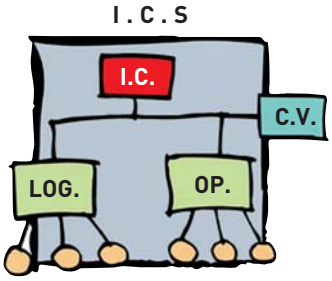


IV.3. Psychosocial Support And Supervision

1. Establish safe area and begin triage.
2. Care for psychological needs of bereaved and traumatized.
3. Organize activities to occupy young children and elderly.
4. Maintain contact with First Aid team

These features of Standard Emergency Management Systems make it especially useful for disaster planning:

- may be adapted to different situations
- unified command structure
- shared terminology
- flexibility
- centralized communications
- effective action planning
- management of resource allocation
- manageable span of control
- redundancy planning
- cross-disciplinary training
- sections only mobilized as necessary



PLANNING COMMITTEE
- Neighborhood Inventory
- Risk Assessment
- Public Education

INCIDENT COMMAND CENTER
- Incident Commander
- I.C. Deputy
- Wireless Radio Operator

ADMINISTRATION AND COMMUNICATION BRANCH
- Record Keeping
- Internal Communications
- External Communications
- Public Information

OPERATIONS BRANCH
- Hazard Identification and Control
- Damage Assessment and Light Search and Rescue
- Disaster First Aid and Medical Operations
- Small Fire Suppression
- Security (eg. student release from schools)

LOGISTICS BRANCH
- Supplies and Equipment
- Water and Food
- Traffic Control and Transportation
- Shelter and Sanitation
- Psychological Support and Supervision
- Volunteers

COMMUNITY DISASTER VOLUNTEERS

The AKUT and Istanbul Community Impact Project Community Disaster Volunteers program was modeled on the Los Angeles Fire Department and FEMA Community Emergency Response Team (CERT) courses.

CERT was originally developed because of the need for a well-trained civilian emergency workforce. These teams will assist by responding during disaster situations when conventional emergency services are overwhelmed.

The training program provides greater community self-sufficiency through the development of multi-functional response teams who will act as an adjunct to government emergency services during major disasters.

Through this unique program, people from neighborhood and community organizations will receive training to support teams and to perform as individual leaders by directing untrained volunteers in the initial phase of an emergency.

Community Disaster Volunteers receive 28 hours of training (7 sessions, 4 hours each). To become a trainer, an additional 100 hours of instructor training is required.

The ability to effectively recover from the devastating effects of an earthquake requires the active participation, planning, and cooperation of all levels of the population. The fundamental responsibilty for preparednes, however, lies wth every individual.

By encouraging preparedness efforts and hazard mitigation, the effects of a disaster can be minimized considerably.

The benefits of this program are numerous. It will increase our overall level of disaster readiness, provide emergency skills that people may use in day-to-day emergencies, enhance the bond between government and community, increase community spirit, and improve the quality of life for the people of our city.

COMMUNITY DISASTER VOLUNTEERS COURSE SYLLABUS

CLASS 1: Introduction, Earthquake Awareness

Registration. Introduction. Earthquake Threat in Turkey. Personal and Family Preparation. Nonstructural Hazard Mitigation. "ABCD Basic Disaster Awareness Training"

CLASS 2: Disaster Fire Suppression Techniques

Fire Chemistry, Fire Extinguisher Use, Utility Control, Ventilation, Creative Firefighting Techniques, Hazardous Materials.

CLASS 3: Disaster First Aid Operations (Session 1)

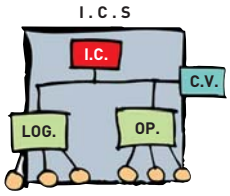
Recognizing & Treating Life-Thretening Emergencies, Triage, Treatment Area Management.

CLASS 4: Disaster First Aid Operations (Session 2)

Head-to-Toe Evaluation, Recognizing & Treating Non-Life-Thretening Emergencies.

CLASS 5: Light Search & Rescue Operations

Evacuation, Damage Assessment, Search Technique, Rescue Methods.



CLASS 6: Team Organization And Management

Developing a Response Team, Incident Command Systems, Size-Up, Disaster Psychology.

CLASS 7: Course Review & Disaster Simulation

Disaster Simulation. Critique.

NOTES

B.U. KANDILLI OBSERVATORY & EARTHQUAKE RESEARCH INSTITUTE
ISTANBUL COMMUNITY IMPACT PROJECT

Çengelköy 81220 İstanbul tel: 0216.308 05 11 / 345 fax: 0216.332 90 94 e-mail: iahep@boun.edu.tr internet: www.iahep.org