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## Other Disasters and Countermeasures



Earthquakes are not the only disasters that can strike Tokyo. Many various risks can be assumed, from natural disasters such as heavy rain, storms and torrential rain, to human threats such as terrorist and armed attacks. In this chapter, we have compiled knowledge on the various risks that lurk in Tokyo and measures to deal with them. Learn about them now so you can respond calmly.





## Heavy Rain and Storms



### Importance of preparing in advance for floods and strong winds

Stationary rain fronts in early summer and fall often cause heavy rainfall. In addition, over the past 30 years (1981-2010), there has been an average of 26 typhoons a year. If these typhoons approach or land on Tokyo, extremely strong winds and heavy rainfall could result in inundation and river flooding. You should always check the latest weather information and protect yourself from disasters. Confirm in advance what places are at high risk by checking the hazard map, etc.

### Pay attention to the latest weather information



#### Advisory

The Meteorological Agency will issue advisories when there is the possibility of disasters occurring from heavy rainfall or strong winds, etc. Pay attention to evacuation preparation information announced by the municipalities. And, in districts that are easily affected by rain and wind, people who need special support in evacuating should be ready to move early.

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#### Warning

Warnings are issued when there is the possibility of a major disaster occurring, with the relevant areas called upon to exercise caution. Pay attention to evacuation information issued by municipalities, and evacuate quickly if necessary.

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#### Emergency Warning

An emergency warning is issued when there is a heightening danger of a serious disaster of a scale that occurs only once every few decades, which will far exceed the criteria for issuing a warning. You should immediately move to a safe place.

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## Weather conditions that require special caution



### Spring - mid Summer (stationary front)

During the seasonal transition from spring to mid-summer, the stationary front (Baiu front) appears from Japan to near the Chinese continent. When the ground is weakened by the long rains brought by this front, heavy rainfall could easily trigger sediment disasters.

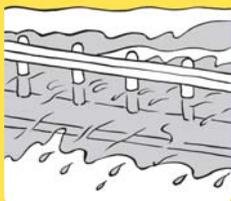
### Summer - Fall (stationary front)

In the seasonal transition from summer to fall, pressure patterns become similar to the Baiu front, with the stationary front appearing near Japan bringing about long or heavy rainfall that can result in road flooding and other incidents.



### July - October (typhoon)

The number of typhoons approaching or landing in Tokyo increases in the period from July to October, making it necessary to be cautious of heavy rainfall and strong winds. For example, Typhoon No. 15 in 2011 caused roadside trees in Shibuya and Ginza to fall over, and affected commuters by stopping train operations.



### Storm surge (coastal areas)

Tokyo is located at the innermost part of Tokyo Bay. Because the mouth of the bay is located on the southwestern side, and because the water is relatively shallow, Tokyo is very susceptible to storm surge damage. Other than storm surge due to typhoons, you should also beware of tsunamis generated by earthquakes.

## Places requiring special caution



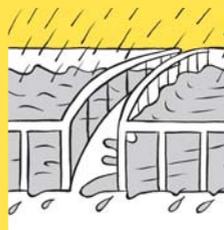
### Lowlands

The lowlands have the risk of flooding from heavy rainfall. Caution is necessary because it could become difficult to see the location of gutters, etc.



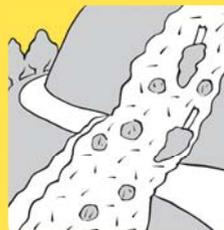
### Basements and semi-basements

Buildings that have basements or semi-basements, or are located on land that is lower than the road, are inclined to have more flooding damage due to torrential rainfall. Prepare sandbags, water stops and other items to prevent flooding, and evacuate before you feel endangered.



### Rivers

Do not approach rivers as they have the risk of overflowing from heavy rainfall. If you live along a river, listen to local disaster information, etc., and be prepared to evacuate immediately.



### Mountainous areas

In areas near cliffs and mountainous areas, beware of sediment disasters. Even if no warning has been issued, if you see the signs of a sediment disaster, secure your safety and evacuate.

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## Protect yourself from wind and flood damages



### Listen to information issued by the authorities

The Meteorological Agency and local governments issue disaster information over the TV, radio, and other media, and the municipalities use the wireless emergency alert system to issue evacuation advisories and orders. When your local government has issued evacuation information, secure your safety and evacuate.



### Know the location of places at risk of flooding

The Tokyo Metropolitan Government has released a map showing districts at risk of flooding to let everyone know the risk of flood from typhoons, etc., so they can prepare for floods and quickly evacuate. Make it a habit to confirm what places are susceptible to flooding.



### Check and clean drainage facilities

Trash, etc., accumulating in catch basins and gutters prevent rainwater from flowing and increase the risk of flooding. In basements and semi-basements, there is also the risk of flooding if drainage pumps malfunction. Make it a point to routinely check and clean the drainage facilities.



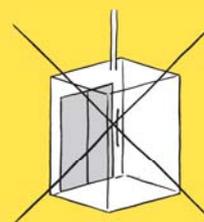
### Simple ways to prevent flooding

Use sandbags, water bags, and water stops to prepare for flooding. You can also align simple water bags, in which garbage bags are half filled with water, or use a long plank as a water stop, to prevent flooding.



### Wait until the typhoon passes

If you are outside when a typhoon is approaching, wait inside a nearby facility until it passes. If you are at home, refrain from going out. It will also be dangerous to go out to repair roofs or windows.



### Don't use the elevator

If strong winds cut power lines, the resulting power failure could trap you in the elevator. Use the stairs to all possible extent in the event of a typhoon or heavy rainfall.



### Evacuate before water comes up to your knees

Water up to your knees can be considered a yardstick for how high water can come before it becomes difficult to walk in a flood. And even though the water may not be that deep, as there is also the danger of being unable to move due to a strong flow of water, when you see water flowing in, evacuate immediately to a high place.



### Evacuate from underground to a higher place

Evacuation could become difficult if water flows into levels underground due to flooding above ground. Go to a designated evacuation area or go to the ground level and evacuate to a sturdy building nearby that is at least two stories high. In this way, evacuate to a safer place.





# Torrential Rain



## Torrential rain occurs suddenly

In general, river facilities and sewerage systems in urban areas are created to withstand rainfall of 50 mm per hour. Rainfall exceeding this level could cause urban flooding. It is said that urban flooding occurs because of a river basin's lowered capacity to contain and retain water as a result of the ground being covered by asphalt pavement and the increased use of underground space. Following signs such as a growing cumulonimbus cloud, approaching black clouds, and roaring thunder, torrential rain can strike a city in an instant.

## Protect yourself from torrential rain



### Stay away from rivers and canals

Never approach rivers or canals when a torrential downpour occurs as there is the potential for waters to rise and a powerful flow to be generated.



### Don't use roads below the ground level

When torrential rain occurs, do not use an underground walkway or an underpass—the road below ground level at a grade separated crossing—because they could become submerged.



### Evacuate basements and semi-basements

Houses with a basement or semi-basement—housing with a floor completely or partially below ground level—are prone to becoming submerged. Doors to a basement could also become difficult to open due to pressure from the water, trapping you, so evacuate to a safer place such as the second floor.



### Submerged roads are dangerous

Submerged roads and paths are dangerous because you could fall into a manhole or gutter whose cover has been displaced. If you have to go through a submerged zone, walk carefully while feeling your way with an object like an umbrella.



# Sediment Disasters

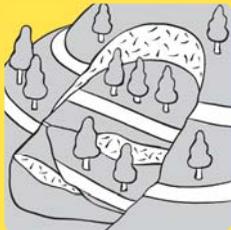


## Signs of an impending sediment disaster



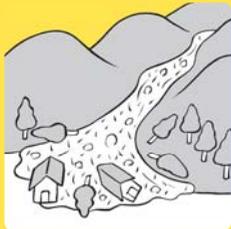
### Landslip

Signs are cracks on cliffs, small stones falling down, water welling up on cliffs, spring water stopping or becoming cloudy or muddy, being able to hear the earth rumbling, etc.



### Landslide

Signs are cracks and sinkholes in the earth, the ground developing clefts and becoming uneven, water spurting from cliffs and slopes, water in wells and streams becoming cloudy or muddy, sounds of rumbling from the earth or mountain, trees leaning, etc.



### Mudslide

Signs are sounds of rumbling from the mountain, river water suddenly becoming cloudy or muddy and containing driftwood, an unpleasant earthy smell, river level becoming lower despite continuous rainfall, sound of trees being torn and stones bumping into each other, etc.

## Protect yourself from a sediment disaster



### Confirm your evacuation area

Regularly talk with your family about your designated evacuation area and how to contact each other, and confirm your evacuation routes. When you evacuate, keep your baggage to a minimum so that you can keep your hands free.



### Prepare an emergency bag

Prepare a hazard map, a map of your evacuation area, and an emergency bag. If you feel in danger, change into clothes that are easy to move around in, and be ready to evacuate any time.



### Check for sediment disaster hazard areas

The Tokyo Metropolitan Government's Bureau of Construction's website provides a map of sediment disaster hazard areas with which you can search for hazard areas by region. Confirm in advance hazard areas in your neighborhood.

<http://www.sabomap.jp/tokyo/> (in Japanese only)



# ⚡ Lightning



## Lightning can be life-threatening

Lightning can be life-threatening. Although high places and tall, protruding objects attract lightning, more than half of those killed by lightning were actually in open areas such as a golf course, or under a tree taking shelter from the rain. If you hear thunder or see thunderclouds approaching, quickly move to a safe place, such as a reinforced concrete building, car, bus, or train.

## Areas where you must be cautious

Open areas such as a playing field, golf course, outdoor swimming pool, riverbank, beach, and on the sea can be dangerous. You also need to be on alert when you are in a high place, such as at the top of a mountain or ridge.



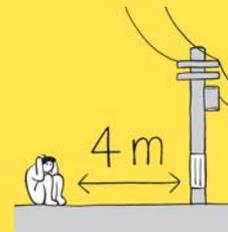
### Stay away from tall objects like trees

Lightning often strikes tall objects like trees and tall, protruding objects. Therefore, when you are close to a tree, especially, keep at least 2 meters away from the tree (trunk, branches and leaves).



### In an open space

It is dangerous to be in an open space like a playing field, because lightning could directly strike you. Quickly move to a safe place, such as a reinforced concrete building, car, bus, or train.

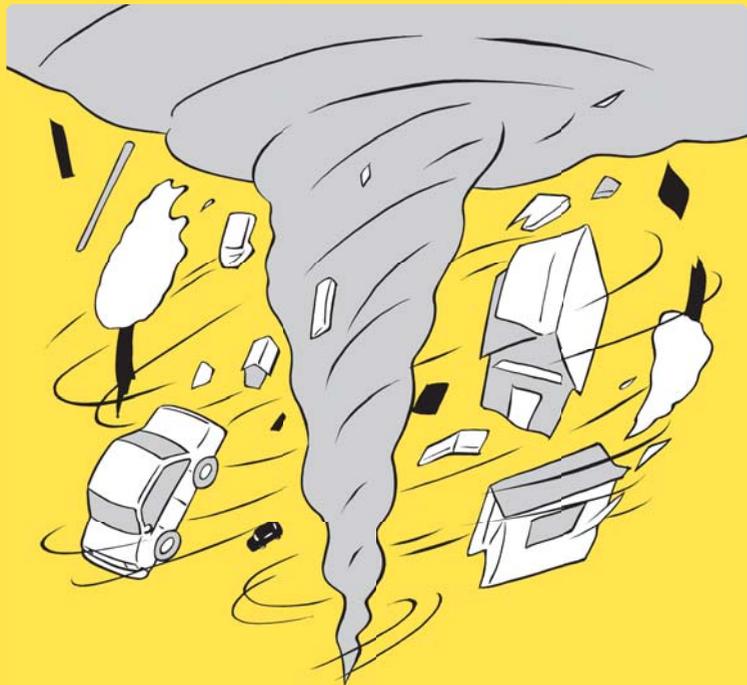


### If there's no safe place nearby

If you cannot find a safe place nearby, take shelter at least 4 meters away from any tall object such as a utility pole. Maintain a low posture and make sure that nothing in your possession protrudes into the air.



# Tornadoes



## Tornadoes can occur anywhere in Japan

Even in Japan, damage inflicted by tornadoes is occurring frequently in recent years. Although tornadoes occur at any time of year, more tornadoes are seen particularly during the typhoon season months of September and October. When a tornado forms, violent winds swirling at the center of the storm, pick up debris from the ground, including materials from buildings and signs, and turn these objects into dangerous projectiles, causing serious damage at times. To avoid danger, enter a sturdy building such as a reinforced concrete building or an underground facility and wait for the storm to pass.

## Protect yourself when a tornado strikes



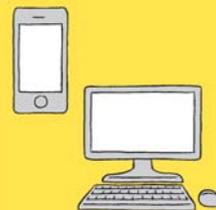
### If you are inside

In a detached home, move to a room on the first floor that has few windows in order to avoid broken window glass and projectiles. Close the storm shutters and curtains, move away from windows, and remain under a sturdy table until the tornado passes.



### If you are outside

Move inside a sturdy building or underground facility to avoid wind gusts and objects flying through the air. In the event you are not near any of these structures, take cover or hide in a ditch, and wait for the tornado to pass.



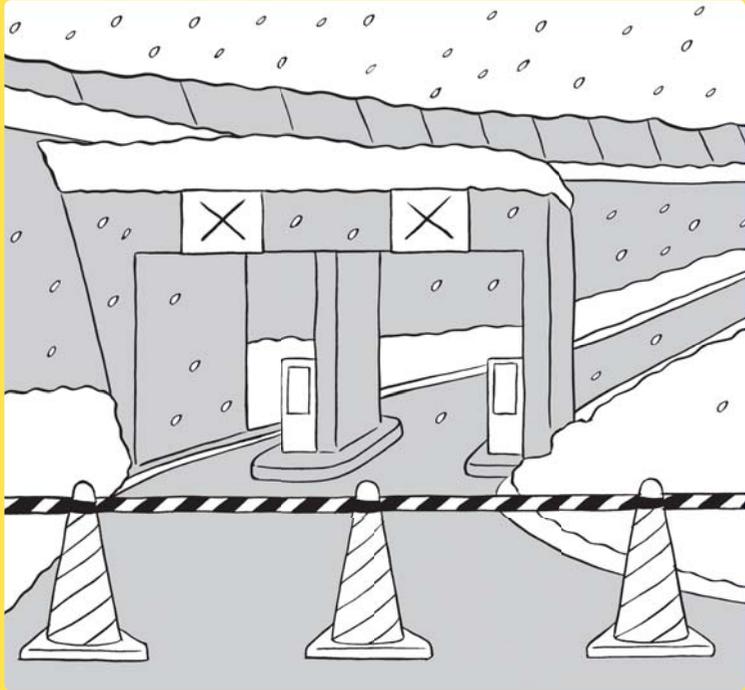
### Check the areas where tornadoes are forecast

You can check areas where there is the probability of strong wind gusts, including tornadoes, ahead of time by viewing the Radar and Nowcasts weather map on the Japan Meteorological Agency's homepage and clicking on "Tornado."

<http://www.jma.go.jp/en/radnow/>



# Heavy Snow



## Heavy snow can paralyze a city

The Japan Meteorological Agency predicts that although snowfall frequency and amounts are decreasing, if snow does fall, there is the possibility that it will become heavy snow. When snowfall is heavy, public transportation may shut down, expressways may close, and there is even the possibility that ordinary roads will become impassable. When heavy snow is forecast, you should return home as soon as possible and avoid going out again. Heavy snowfall in February 2014 not only caused chaos for the transportation system, but also made roads in the Tama area impassable, resulting in some outlying villages becoming cut off.

## Protect yourself from heavy snow



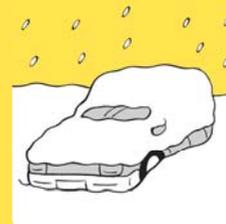
### Avoid going out

If heavy snow is forecast, stockpile enough food so that you will not need to leave home, and make preparations to stay warm without electricity in case of a power failure.



### Be careful not to slip

When it snows and afterwards, roads become extremely slippery. If you go outside, put on slip resistant footwear such as snow boots, and be very careful as you walk. Do not ride bicycles or use cars.



### When using a car

Refrain from using a car as much as possible. If you must drive, change your tires to winter tires for use on snowy and icy roads, and prepare a shovel, boots, blanket, and emergency food. Be sure to maintain at least double the distance between vehicles that you normally would, as sudden braking and abrupt steering is extremely dangerous.



### Points to be aware of when shoveling or removing snow

When shoveling snow or removing it from your roof, use equipment such as safety lines and helmets, put on slip resistant footwear, and always work in a groups of two or more. Since snow that has accumulated on the roof loosens as it melts on sunny days, take care to avoid snow that slides off the roof.



# Volcanic Eruptions

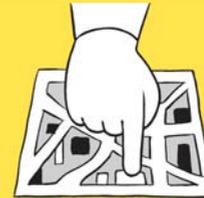


## Tokyo has 21 active volcanoes

Tokyo has 21 active volcanoes on its islands such as Izu Oshima and Miyakejima, and people are living on eight of those volcanic islands (Izu Oshima, Toshima, Nijijima, Kozushima, Miyakejima, Mikurajima, Hachijojima, Aogashima). In recent years, eruptions on Izu Oshima in 1986 and Miyakejima in 2000, led to the evacuation of all the residents from the islands. In November 2013, a phreatomagmatic eruption was observed on Nishinoshima island of the Ogasawara islands, and the lava flow increased the island's area.

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## Protect yourself from a volcanic eruption



### Confirm the dangerous areas on the disaster prevention map

In order to protect yourself from a volcanic disaster, it is important that you confirm the dangerous areas and evacuation centers beforehand using disaster prevention maps (shows dangerous spots, evacuation routes, evacuation centers, etc.) made public by the municipality or others.



### Prepare food and items for a disaster

When a volcano erupts, the ashes may affect logistics and lifelines. Prepare drinking water, food, flashlights, extra fuel, and other necessities. It would also be better if you prepare helmets, masks and goggles as protection against dust.



### Confirm the designated evacuation center beforehand

When an evacuation order or advisory is issued due to a volcanic eruption, quickly evacuate to the municipal government's designated evacuation center. Confirm in advance the location of the designated evacuation center nearest to you.





### Don't overlook volcanic warnings

When the Meteorological Agency announces a volcanic warning, restrictions on mountain entry, evacuation orders and evacuation advisories will be issued. Follow the instructions. If you feel even slightly endangered, evacuate.



### If an eruption occurs

Put on protective headwear such as a helmet, and while taking steps to prevent yourself from inhaling volcanic ash and gases such as holding a towel to your mouth, quickly move away from the mouth of the volcano.

### Volcanic alert level

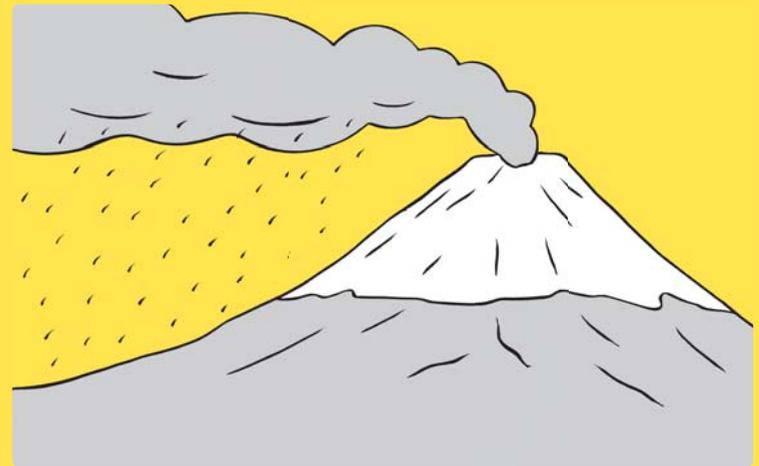
The volcanic alert levels in volcanic forecasts/warnings are classified from 1 to 5 according to the degree of danger. Take actions suitable to the level.

Level 5	Evacuate from the residential area
Level 4	Prepare to evacuate from the residential area
Level 3	Do not enter the danger zone near the residential area
Level 2	Do not enter the area around the crater
Level 1	No special response is necessary but caution is required



### Be careful of volcanic ash

When the volcano erupts, volcanic ash will fall along with large and small cinders. Breathing in ash will affect the respiratory system causing coughing or breathing difficulties, and will also cause eyes to become itchy, painful or bloodshot. Protect yourself with dust masks and goggles. Since volcanic ash could also cause malfunctioning of the sewage system, do not flush ashes down the sewer.



### Risk of Mt. Fuji erupting and expected damage

If Mt. Fuji erupts as it did in 1707, volcanic ash will fall on a wide area of the Kanto region, and it is estimated that a few centimeters to 10 centimeters of ash will fall on Tokyo. Ashes will not only affect the transportation system, lifelines, and the agriculture, forestry, and fisheries industries, but could also affect health. If Mt. Fuji erupts, confirm the ash fallout forecasts on the Meteorological Agency website and others, and make preparations in advance if you are in an area that will have a large volume of ash fallout.



# Terrorist and Armed Attacks

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## Danger of terrorist and armed attacks

As Tokyo is the center of government and economy, it could become the target of terrorist and armed attacks. The Act Concerning the Measures for Protection of the People in Armed Attack Situations, etc. (“Civil Protection Act,” Act No. 112 of 2004) was enacted with the aim of protecting the lives and assets of the citizens of Japan. Based on this act, in the event of an attack, the public will be warned through the municipalities’ wireless emergency alert systems. Make a note to listen to information broadcast over the TV, radio, and from publicity cars as well, and follow the instructions.



## Attack by insurgents or special forces

Such an attack can result in sudden, unpredictable damages. If the target of an attack is a nuclear facility, the damages could be huge.



## Missile attack

It would be extremely difficult to identify the target of the attack, and it is estimated that the time to impact will be short.



## Landing invasion and air attacks

In an invasion, landing operations are likely to target the coastal areas, and air attacks are also assumed to target major facilities in urban areas.



## Attacks using chemical agents, etc.

Attacks using chemical or biological agents, or nuclear materials will have health effects, requiring special response.



## Protect yourself from a terrorist or armed attack



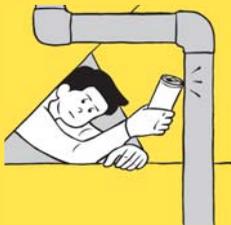
### If an explosion occurs

If an explosion occurs, quickly get low and hide under something like a sturdy table. Explosions could continue, so evacuate to a safe place.



### If a fire breaks out

If a fire breaks out due to a terrorist or armed attack, cover your mouth and nose with a handkerchief, etc., to keep from inhaling smoke, and quickly evacuate while keeping yourself as low as possible.



### If you're trapped

Tap on pipes or other things nearby to let others know where you are. Calling out loudly for help should be the last resort since this could cause dust to be breathed in.



### Evacuation from an attack by insurgents

Damages from an attack by insurgents will generally be limited to a relatively small area, but the damages may spread. First evacuate indoors and then follow the instructions of the authorities.



### Evacuation from a missile attack

Since it will be difficult to identify the area where the missiles will hit, if you are outdoors, evacuate into a strong building, underground shopping area, or other indoor areas nearby. Afterwards, follow the instructions of the authorities.



### Evacuation from chemical or biological attacks

Cover your mouth and nose with a handkerchief, and leave the area immediately. Evacuate to a safe place that is unlikely to become contaminated such as a closed-off place indoors or high ground upwind.



### Evacuation from a nuclear explosion or radioactive contamination

If there is a nuclear explosion, hide behind cover and evacuate to an underground facility or strong building. An explosive called a "dirty bomb" will cause radioactive contamination of the area. Follow the instructions of the authorities and consult a physician.



# Infectious Diseases



## If an epidemic is forecasted

Infections occur when pathogens such as viruses or bacteria enter your body and multiply, resulting in symptoms such as fever, diarrhea, and cough. Infectious diseases from influenza to Ebola virus disease, from those with relatively mild symptoms to those with a high risk of death, are designated under the Act on Prevention of Infectious Diseases and Medical Care for Patients Suffering Infectious Diseases (Act No. 114 of 1998). If proper response is not taken, these diseases can spread rapidly in Tokyo with its high population density. If you think you might be infected, immediately get proper treatment at a medical institution.

## Protect yourself from infection



### Wash your hands and gargle

Washing your hands and gargling are fundamental to prevent infection. Wash your hands thoroughly with soap, including your fingertips and under your nails.



### Wear gloves

Use gloves to protect yourself when you might come in contact with a patient's blood, body fluids, secretions, excreta, etc.



### Use a mask

Wear a mask when you are coughing or sneezing so that you do not infect others.





### Pay attention to your health after returning from abroad

If you feel unwell after returning from abroad, there is the risk that you have contracted an infectious disease. Be careful if you have symptoms such as diarrhea or fever after your return. Go to a medical institution as soon as possible. Inform the doctor of details such as the travel destination, itinerary, and activity during the trip, and follow the doctor's instructions.



### Know the danger of a pandemic

A pandemic is a global epidemic of an infectious disease. The WHO (World Health Organization) classifies pandemics into six phases according to its spread. If you hear about a pandemic on TV or other sources, avoid going out unless it is essential or going to places that attract crowds. Schools and other facilities may be closed.

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### Measles

Some 10 to 20 days after infection, a fever of about 38 degrees Celsius or common cold symptoms continue for about 2 to 3 days, followed by a high fever of over 39 degrees Celsius and the appearance of a rash. This could become serious if the patient develops encephalitis. Since the body's immune system is weakened, the patient could also develop pneumonia or an ear infection. As there is no specific treatment for this disease, treatment is given to lighten the symptoms.

### Norovirus

The main symptoms are nausea, vomiting, diarrhea, stomach pain, and a slight fever. After these symptoms continue for about one to two days, the disease is cured with no aftereffects. However, in children or the elderly, the symptoms could become serious, with the possibility of death resulting from accidentally choking on vomit. As there is no specific treatment for this disease, symptomatic treatment such as intravenous fluids is given.

### Tuberculosis

Even now, over 20,000 people contract this disease each year. Go to a medical institution as soon as possible if coughing or phlegm continues for over two weeks or, in the case of senior citizens, if ailments such as fatigue or loss of appetite continue. If you are diagnosed to have tuberculosis, in most cases this can be cured if medicine is properly taken every day for six months.

### Avian flu

You could become infected if you have close contact with a bird with avian flu. Symptoms such as high fever and cough will appear if you are infected. This could rapidly cause multiple organ dysfunctions, and result in death. If you have had contact with a bird with avian flu and have symptoms that could be influenza, see a doctor and inform him/her of the situation.

### Ebola virus disease

Symptoms such as sudden fever, headache, fatigue, muscle pain, sore throat, vomiting, diarrhea, chest pain, and bleeding (blood in vomit, blood in stool) appear. As there is no specific treatment for this disease, treatment for the symptoms will be given. If you come down with a fever within about a month after returning from a country where this disease was spreading, do not go to a local medical institution, but contact the public health center and follow its instructions.

## Symptoms of major infectious diseases and response

### Influenza

General symptoms (e.g. headache, joint and muscle pains) and specific local symptoms (e.g. sore throat, runny nose, sneezing, cough) suddenly appear, and it can be fatal. If influenza antiviral drugs are first taken within 48 hours of the onset of symptoms, a reduction of the symptoms can be expected. Go to a medical institution as soon as possible.





Tokyo's active volcanoes with magma activity

## Nothing to fear if you can grasp the warning signs

### Magma is active on a volcanic island

Tokyo has 21 active volcanoes. Eight of these volcanic islands (Oshima, Toshima, Niijima, Kozushima, Miyakejima, Mikurajima, Hachijojima, and Aogashima) are inhabited by a total of 30,000 residents and many tourists visit as well.

High levels of volcanic activity can be observed on Oshima and Miyakejima (see p. 251), and the volcano on Hachijojima almost erupted in 2002. And earthquake and tectonic movements are still observed on Niijima and Kozushima. Even if movements cannot be felt on the surface, magma is steadily building up power underground.



1986 Izu Oshima ©T. Miyazaki (top);  
2000 Miyakejima (bottom)

### Become conscious of warning signs of an eruption

But there is no need to always live in fear. **Unlike earthquakes, warning signs of an eruption can be seen in almost all cases.** When volcanic activity builds up, phenomenon that cannot be captured by a seismograph occur. Noticing such signs will allow safe evacuation.

For instance, residents living near a volcano might notice **smoke, sounds, smells and other conditions that are different from usual.** If they contact the municipal office right away when they notice such things that are out of the ordinary, the authorities can **bolster their observations and prepare for an eruption.** Moreover, it would be desirable for people to gain “literacy” on volcanoes such as using a disaster protection map to decide where to evacuate if it becomes necessary.

(talk by Hidefumi Watanabe, Professor Emeritus, University of Tokyo)

## Disaster Preparedness Quiz

- Q 1** | What is the difference between an advisory, warning, and emergency warning for heavy rain or strong wind issued by the Japan Meteorological Agency? Answer → p. 145
- Q 2** | What types of places are easily affected by heavy rain or typhoons and require special caution? Answer → p. 147
- Q 3** | What areas should you not approach during torrential rain? Answer → p. 151
- Q 4** | Name three warning signs of a sediment disaster. Answer → p. 152
- Q 5** | When you are in an open space such as a playing field, how can you protect yourself from lightning? Answer → p. 155
- Q 6** | What time of the year should you be cautious of tornadoes, and what should you do to protect yourself from them? Answer → p. 156
- Q 7** | What should you do when a heavy snow forecast is issued? Answer → p. 159
- Q 8** | How many active volcanoes are there in Tokyo? Answer → p. 160
- Q 9** | What is the name of the law to protect the public from terrorist and armed attacks? Answer → p. 164
- Q10** | What is the word used when an infectious disease spreads over a wide area? Answer → p. 170

