

# A Public Health Guide to Safe Disaster Recovery



Missouri Department of Health and Senior Services

# Contents

INTRODUCTION .....	1
PLANNING FOR DISASTER	
Safe Shelter .....	1
Safe Evacuation .....	2
Special Health Care Needs .....	3
RECOVERING FROM DISASTER	
Water Quality .....	4
Water for Drinking and Cooking .....	4
Disinfecting Private Water Wells - “Shock Chlorination” .....	5
Septic Tanks and Flooding .....	6
Food Safety .....	6
Refrigerated or Frozen Foods .....	6
RE-ENTERING A DISASTER AREA	
Entering Houses or Buildings .....	7
Electrocution is a Major Killer .....	8
Pumping Water Out of Your Basement .....	9
General Cleanup .....	9
Bleach Solutions for Flood Disinfection .....	9
Mold Cleanup .....	10
General Sanitation and Hygiene .....	10
Protect Children from Dangers After Disasters .....	11
Immunizations .....	11
Mosquitoes .....	11
Garbage Disposal .....	12
Dangers of Swiftly Flowing Waters .....	12
DISASTER PLANNING RESOURCES .....	13

## INTRODUCTION

Disaster can strike with no warning, giving little time to decide what to do, where to go or what to take with you. Being prepared for an emergency **before it happens** can make the difference between safety or danger and even life or death.

The Missouri Department of Health and Senior Services and many other government agencies and disaster-relief organizations strive to prevent emergencies and to plan for disasters. However, there are limits to what can be accomplished before disaster strikes. Each of us has a responsibility to protect ourselves and our families; communities must also be responsible for their own emergency planning. By planning ahead and taking sensible precautions, and by paying attention to emergency-related information, we can each do our part to safely and successfully respond when disaster strikes.

This guide can help you make some basic emergency planning and preparation decisions. Please take some time to read through this guide and begin preparing yourself and your family for the next emergency. Safely recovering from a disaster depends on what you do now to prepare.

## PLANNING FOR DISASTER

### Safe Shelter

When disaster strikes, having a safe place to stay can mean the difference between life and death. In some emergencies, such as a fire or flood, you may be told to leave your home and take shelter outside the disaster area. This might include staying with relatives or friends, seeking commercial lodging or staying in a mass-care facility. However, during a tornado or winter storm, you may have to take shelter in your home.

If sheltering at home, you may not have access to food, water or electricity for many days. You should be prepared to go with no outside assistance for at least two to three days. The following items should be part of an emergency kit and stored in a container that can be easily carried if you must leave your home:

- Bottled water (one gallon of water per person per day, to last three days)
- Canned or dried food (a three-day supply of non-perishable food items for each person—remember a manual can opener)
- Battery-powered radio
- Flashlight
- Extra batteries for radio and flashlight
- First-aid kit
- Prescription medicines



- Clean clothes and sturdy shoes
- Extra credit card
- Extra money
- Sturdy trash bags
- Formula and baby food if there is an infant in your home.

Plan to rotate or replace items in the kit as they expire. Even though mass care shelters often provide water, food, medicine and basic sanitary facilities, you should plan to take your emergency kit to assure you will have the supplies you need.

Prepare for possible sheltering in your home by having sufficient heating fuel; regular fuel sources may be cut off. For example, store a good supply of dry, seasoned wood for your fireplace or wood-burning stove. Never heat a home using a charcoal or gas grill, portable fuel-burning camping equipment or gas appliances such as ranges, ovens or clothes dryers. These can cause carbon monoxide poisoning that can cause serious illness or even death. The purchase of a carbon monoxide detector with battery backup is recommended. It is the best way to

detect this odorless, tasteless, invisible gas that kills Missourians every year.

Gasoline or diesel-powered generators should only be used outdoors where there is adequate ventilation. They should be placed where the exhaust will not flow into the home through open doors or windows.

If the disaster involves poisons in the air, you may need to seal off a room in your home. Identify the safest room in your home. It should be an interior room with few or no doors or windows and enough space to accommodate all family members.

## Safe Evacuation

Take time to discuss a home evacuation plan with your family. Plan a second way to exit from each room or area, if possible. Determine an emergency outdoor location where your family will meet. If special equipment is needed, such as a rope ladder, mark where it is located. Also, mark the location of the emergency kit, first-aid supplies and fire extinguishers. Plan and practice the evacuation so your family is better prepared to respond appropriately and efficiently to signs of danger or to evacuation instructions.

Identify potential home hazards and know how to secure or protect them if needed. Locate electric, gas and water supply shut-offs. Determine how to properly shut off these utilities in case there is damage to

your home or if you are instructed to turn off utilities. Keep necessary tools near the shut-offs. Teach family members how to safely turn off utilities. If you turn off the gas valve, a professional should be called to turn it back on.

Learn about your community's emergency plans, warning signals, evacuation routes and the locations of emergency shelters. Know which radio and television stations broadcast emergency information and instructions. City, county and state officials have developed emergency plans. During an emergency, it is important to follow their instructions and advice. Other things to consider:

- Know the emergency and evacuation plans for your workplace.
- Learn about emergency plans at your child's school or day care center.
- Keep a small, portable emergency supply kit in your car at all times.
- Consider your pet when preparing for an emergency.

Develop a family communication plan in case a disaster strikes while the family is separated or you are unable to return to your home. Everyone should know where to go, meeting points and numbers to call.

For more information on disaster preparedness, contact your local public health agency or the Missouri Department of Health and Senior Services' Center for Emergency

Response and Terrorism at 573-526-4768 or at [health.mo.gov/emergencies/readyin3/index.php](http://health.mo.gov/emergencies/readyin3/index.php).

## Special Health Care Needs

People living at home who have disabilities or have special medical needs should identify people who can help or provide care during an emergency. Give someone you trust a key to your house or apartment, and let them know where your emergency supplies are located. Know the groups in your community that can provide assistance, such as churches, independent living centers and Meals on Wheels.

Make a list of what you need every day, such as medicines and special treatments/supplies. Make a list of your health care providers. Wear a medical-alert tag or bracelet to identify your disability in case you need medical attention. If you need dialysis or another life-sustaining treatment, know the location of more than one facility.

Notify your electric company if you are dependent on electricity to survive. Obtain or plan for access to an alternate source of power, such as a generator. Have at least one alternate way to communicate, such as a landline phone, cell phone or medical alert call system.

More information on emergency planning for seniors and

individuals with special health care needs can be found at [health.mo.gov/emergencies/readyin3/senspecneeds.php](http://health.mo.gov/emergencies/readyin3/senspecneeds.php)

## RECOVERING FROM DISASTER

### Water Quality

Except for the air we breathe, water is the most basic necessity for survival. Some disasters pose serious threats to public and private water supplies. Listen for public announcements on the safety of your community's water supply. Water from flooded or damaged private water wells should be considered unsafe and must be tested for purity. It may be necessary to disinfect the water after flood waters recede. Cloudiness or changes in taste or smell are signs of possible contamination. If there is any indication that the water supply has been breached, even without noticeable changes in taste or smell, obtain a water test kit from the Missouri Department of Health and Senior Services' State Public Health Laboratory by calling 573-751-3334, or contact your local public health agency. There is a fee for the water test, which varies depending on the services provided.

### Water for Drinking and Cooking

If you suspect your water supply was contaminated, drink only boiled,

commercially bottled or properly treated water until your supply is tested and found safe. Water contamination may reoccur after a disaster, so another test should be conducted a few weeks later.

Special precautions, such as using bottled water, should be taken for infants or immune-compromised individuals. For assistance, contact the environmental public health specialist at your local public health agency.

Listed below are some general guidelines concerning water for drinking and cooking.

- Do not use contaminated water to wash dishes, brush your teeth, wash and prepare food or make ice.
- Boiling water at a rolling boil for at least three minutes will kill most harmful bacteria and organisms.
- Rinse containers used to store water with a bleach solution before using them. Always use caution with temporary containers since some may have residual chemicals that may further contaminate the water put in them.
- Water may be treated by mixing six drops (1/8 teaspoon) of ordinary (unscented) household bleach per gallon of water. Mix the solution thoroughly, and let stand for at least 30 minutes. (This treatment will not kill parasitic organisms living in surface water.) Very cloudy water may be strained through a clean cloth before

disinfecting or boiling, but the disinfectant should be doubled.

- Store disinfected water in clean, covered containers. A distinct chlorine taste will be noticeable after treatment; this taste is harmless, but indicates that enough of the disinfectant has been used to treat the water.

### Disinfecting Private Water Wells - "Shock Chlorination"

If a well has tested positive for coliform or other bacterial contamination, a simple and relatively inexpensive procedure known as "shock chlorination" can be performed. Shock chlorination involves placing a strong chlorine solution into the complete water source and distribution system to kill any harmful bacteria and disease-producing organisms. If you are not familiar with the mechanics of your water supply system, contact a

qualified professional to do the job. If you have questions, contact the environmental public health specialist at your local public health agency.

**Always remember to wear gloves and protective clothing when disinfecting a well.**

Listed below are the procedures for shock chlorination of a private water well:

1. Remove any cover over the well casing to allow access to well water.
2. Introduce the prescribed amount of chlorine. To mix an effective chlorine solution, add household bleach or granular chlorine to five gallons of water in a clean, non-metallic container. See table below for the specific amounts to add.
3. Turn on outside hose and rinse down the sides of the well to help circulate the water. Run hose until you smell chlorine.
4. Turn on all inside faucets until

### Bleach Required for Private Water Well Disinfection

(for each 10 feet of water depth in well)

Well Diameter	Amount of Chlorine Granules (to be added to 5 gallons of water)	Amount of Laundry Bleach (to be added to 5 gallons of water)
2-8 inches	1 ounce	1 pint
10-14 inches	3 ounces	3 pints
16-20 inches	7 ounces	7 pints
22-26 inches	12 ounces	12 pints
28-30 inches	16 ounces	16 pints
36 inches	24 ounces	24 pints



chlorine is detected then turn them off.

5. Let chlorine stand in system at least four hours or preferably overnight.
6. Turn on outside hose and run water until the smell of chlorine is gone. This method will keep the septic system from becoming overloaded and from adding too much chlorine to the system.
7. Open all faucets and allow the water to run until no chlorine odor is detected.

It is important to warn everyone who may use the water supply system that it is being disinfected, and that it is not safe to drink at this time.

Always retest your water supply after shock chlorination before using it for drinking or cooking purposes.

## Septic Tanks and Flooding

Septic tanks should not be pumped during periods of high water tables or flooding. If a septic tank is pumped, it may “float” due to water pressure



from groundwater. This may damage the septic system pipe connections. If your septic system is not working, you should use a portable toilet system or public facilities if available. The septic system’s drain field must be given time to become functional again.

## Food Safety

Discard any food that may have been touched by flood waters, except for commercially canned foods. Undamaged, commercially canned foods can be saved if you remove the can labels, thoroughly wash the can and then disinfect with a solution of one cup of bleach per five gallons of water. These cans can be relabeled, using a permanent marker. Foods with twist off caps (soda, juices, sauce) should be discarded, because these lids do not keep out flood waters.

## Refrigerated or Frozen Foods

If your refrigerator or freezer was not exposed to flood waters, you may be able to salvage part or all of its contents. A refrigerator will keep food safely cold for about four hours if it is unopened. Food in a fairly full freezer can be kept safe for up to two days without power if the door is unopened. Check carefully for any signs of spoilage. If meat, poultry, fish or shellfish have been partially or completely thawed, they should not

be refrozen. Fruits and vegetables that are still firm to the touch can be refrozen. Any foods that have been at room temperature for more than two hours, or any foods that have an unusual odor, color or texture should be discarded.

If your refrigerator or freezer has been without power:

- Divide your frozen foods among friends’ freezers if they have electricity;
- Seek freezer space in a store, church, school or commercial freezer that has electrical service; or
- Use dry ice—25 pounds of dry ice will keep an average-sized freezer below freezing for three to four days. Use caution when handling dry ice, because it can damage your skin. Wear dry, heavy gloves to avoid injury.

Thawed food can usually be eaten or refrozen if it is still “refrigerator cold,” or if it still contains ice crystals.

Your refrigerator will keep foods cool for about four hours without power. Add block or dry ice to your refrigerator if the electricity will be off longer than four hours. The U.S. Department of Agriculture operates a food safety hotline to answer questions about food safety. The hotline number is 800-535-4555. The hotline normally operates Monday through Friday from 10 a.m. to 4 p.m. Eastern Standard Time. A good rule of thumb is “When In Doubt—Throw It Out.”

## RE-ENTERING A DISASTER AREA

Wait until authorities have declared a disaster area safe before re-entering it. Wear thick, high rubber boots with no cracks or holes, rubber or dry leather gloves and a hard hat when entering a flood area. Watch for downed electrical wires that are touching water and other electrical devices that may still be energized. They are extremely dangerous and you should stay at least 50 feet away from them. Keep a minimum distance of 10 feet away from utility wires and poles that are not broken or underwater. NEVER smoke in a flooded area; standing water may contain flammable chemicals.

Watch for debris (broken glass, metal, wood) on the ground.

## Entering Houses or Buildings

Houses and other buildings that are still holding flood water are very dangerous and you should use extreme caution when entering them. Before entering a house or building in a disaster area, you should:

- Check with the electric and gas companies to see if utilities have been turned off to prevent electrical shock, fire or explosions. If you smell gas, turn off the main gas valve, open the window and immediately exit the house.

DO NOT turn on the lights or do anything else that could cause a spark. Contact your local gas company, police or fire departments and DO NOT re-enter the house until they tell you it is safe to do so.

- Try to return to your home during the daytime so that you do not have to use any lights. Use battery powered flashlights and lanterns, rather than candles, gas lanterns or torches.
- Walk around the building's perimeter, watching for signs of cave-ins, shifting or collapse. DO NOT enter the building if it does not appear structurally sound.
- Determine if there has been any structural damage to the inside of your home. Are there any loose or buckled floor boards, or holes in the flooring? Are any of the floors or ceilings sagging? Are there any shifted stairs, slanting floors or walls? You might need professional help in making this decision.

## Electrocution is a Major Killer

Your home electrical system may be damaged. If there is frayed wiring or sparks visible, or an odor of something burning but no visible fire, immediately turn off the power at the circuit breaker if possible. DO NOT do this if wet or while standing in water. Electrical current can travel through water, so be careful to avoid



downed power lines or wading in standing water.

It is advisable to consult your utility company about using electrical equipment, including power generators. DO NOT connect generators to your home's electrical circuits without the proper automatic interrupt devices. If a generator is on line when the power is turned back on, it could represent a major fire hazard.

All electrical equipment and appliances should be completely dry before returning them to service. If possible, have a qualified electrician check them before using. DO NOT operate any gas-powered equipment indoors or near outdoor air intakes to avoid carbon monoxide exhaust. Camp stoves and charcoal and gas grills also produce dangerous fumes.

Whether you have a gas, electric or wood heating system in your home, make sure it has been thoroughly inspected by a qualified technician before using it again. If such systems have been soaked, replace the blower

motor, switches and controls. Flooded forced-air heating ducts and return-duct pans should be cleaned or replaced. Replace filters and insulation inside of the furnace or water heater.

Even if there is no apparent electrical damage, use extreme caution. Do not enter rooms where outlets are underwater or loose wires touching the water. Under flood conditions, the water can allow electricity to continue running through the system, so an electrical field could exist in standing water even if the main circuit breaker is turned off. This can cause standing water to be electrified, presenting a shock hazard.

## Pumping Water Out of Your Basement

If your basement is flooded, make absolutely sure that the power is shut off before entering it. Do not

try to pump out all of the water at one time. If water is pumped out too quickly, walls may be pushed in or floors pushed up by the sudden release of pressure. Try to remove about one third of the water every day. After the water has been removed, any dirt deposited by the flood should be shoveled or swept up. The walls and floor of the basement should be hosed down with water and then washed with a solution of one-third cup of bleach per gallon of water. Open the basement windows to allow ample air circulation when using the bleach solution.

## General Cleanup

Walls, hard-surfaced floors and many other household surfaces should be cleaned with soap and water and disinfected with a solution of one cup of bleach to five gallons of water. Be careful to thoroughly disinfect surfaces that may touch food, such as counter tops, pantry shelves, and

### Bleach Solutions for Flood Disinfection

The following table is a guideline to use for disinfecting items or areas affected by flood waters:

Purpose:	Solution:
Canned Food Disinfection	1 cup bleach per 5 gallons of water
Refrigerator/Freezer Disinfection	1/2 cup bleach per gallon of water
Basement Wall and Floor Disinfection	2/3 cup bleach per 2 gallons of water
Household Wall and Floor Disinfection	1/2 cup bleach per gallon of water
Toy Disinfection	1/8 cup bleach per 2 gallons of water

refrigerators. Carefully clean areas where small children play. Wash all linens and clothing in hot water, or dry clean them. Items that cannot be washed or dry cleaned, should be discarded.

If there has been a backflow of sewage into the house, wear rubber boots and waterproof gloves during clean up. Remove and discard contaminated household materials that cannot be disinfected, such as wall coverings, cloth upholstered furniture, rugs and drywall.

## Mold Cleanup

If mold is present, use these techniques for cleanup:

- Scrub mold from hard surfaces with detergent and water, then dry completely.
- If the water damage is from sewage backup or floodwater, disinfect by spraying or wiping the area with a diluted bleach solution (one part bleach to 10 parts water). Avoid breathing bleach fumes or getting bleach on skin or in your eyes. Note: Do not mix bleach with other cleaners!
- Mold can grow on or fill in the empty spaces and crevices of porous materials, so the mold may be difficult or impossible to remove completely. Absorbent or porous materials, such as ceiling tiles and carpet, may have to be thrown away if they become moldy.
- Avoid exposing yourself or others to mold by wearing protection,

such as long-sleeved shirts and long pants, as well as a face mask and eye goggles.

- Do not paint or caulk moldy surfaces. Clean off the mold and dry the surfaces before painting. Paint applied over moldy surfaces is likely to peel.

Mold may cause staining and cosmetic damage. It may not be possible to clean an item so that its original appearance is restored.

If you are unsure about how to clean an item, or if the item is expensive or of sentimental value, you should consult a specialist. Specialists in furniture repair, restoration, painting, art restoration and conservation, carpet and rug cleaning, water damage, and fire or water restoration are commonly listed in phone books. Be sure to ask for and check references. Look for specialists who are affiliated with professional organizations.

## General Sanitation and Hygiene

One result of a disaster may be a lapse in basic hygiene during the emergency period. It is critical for everyone to practice basic hygiene. You must wash your hands with soap using water that has been boiled or disinfected:

- Before preparing or eating food;
- After toilet use;
- After participating in flood cleanup activities; and

- After handling articles contaminated with flood water or sewage.

Flood waters may contain human waste from overflowing sewage systems, as well as agricultural and industrial byproducts. Although skin contact with flood water does not, by itself, pose a serious health risk, there is some risk of disease from eating or drinking anything contaminated with flood water. If you have any open cuts or sores that will be exposed to flood water, keep them as clean as possible by washing well with soap to control infection. If a wound develops redness, swelling or drainage, seek immediate medical attention.

## Protect Children from Dangers After Disasters

It is important to keep children away from disaster-affected areas. During clean-up and recovery operations, there are many dangers for children, such as drowning, heavy equipment removing debris and waterborne illness. Do not allow children to play in flood waters or flood water areas, wash children's hands frequently (especially before meals) and do not allow children to play with flood water-contaminated toys that have not been properly disinfected. Toys can be disinfected with a solution of one-eighth cup of bleach per two gallons of water.

## Immunizations

Outbreaks of disease after disasters are unusual. However, rates of diseases present before a disaster may increase because of lowered sanitation or crowding among displaced persons. Increases in infectious diseases that were not present in the community before the disaster are not usually a problem. If you receive a puncture wound or a wound contaminated with feces, soil or saliva, have a doctor or qualified health department staff determine whether a tetanus booster is necessary based on individual records. Specific recommendations for vaccinations should be made on a case-by-case basis. Specific recommendations concerning vaccinations should be referred to the Missouri Department of Health and Senior Services' Bureau of Immunization Assessment and Assurance at 573-751-6124 or toll free at 866-628-9891.

## Mosquitoes

After floods, pooled water can become breeding grounds for mosquitoes. The majority of these mosquitoes will not carry diseases. However, mosquitoes can carry West Nile virus and other diseases. You should protect yourself from mosquitoes by using screens on doors and windows, wearing long-sleeved and long-legged clothing and by using insect repellents containing DEET or permethrin. These are the most effective insect repellent



chemicals found in many common repellent products.

Also, drain all standing water from containers around your home, an effective measure for controlling the mosquito population in the weeks that follow. Local, state and federal public health authorities will be actively monitoring the situation to control the spread of any mosquito-borne diseases. Recommendations for mosquito and related insect control can be obtained by calling the Missouri Department of Health and Senior Services' Section for Disease Control and Environmental Epidemiology at 573-751-6141 or toll free at 866-628-9891.

## Garbage Disposal

A disaster will no doubt tax refuse removal efforts in the affected area. Discard food and other items that could spoil. Do not allow garbage to build up; garbage piles will cause yet another health hazard by attracting animals and insects. Contact your local refuse removal company for information about special pick-up times, locations and other related details.

## Dangers of Swiftly Flowing Waters

If you enter swiftly flowing water, you risk drowning regardless of your ability to swim. Swiftly moving shallow water can be deadly, and



even shallow standing water can be dangerous for small children.

Cars or other vehicles do not provide adequate protection from flood waters. Cars can be swept away in as little as six inches of swiftly moving water or may break down in moving water. **DO NOT DRIVE THROUGH FLOODED AREAS;** more people drown in their cars than anywhere else. **DO NOT** drive around road barriers, or traffic barricades—the road or bridge may be washed out.

## DISASTER PLANNING RESOURCES

The following list of government agencies and disaster-relief organizations may be contacted regarding disaster recovery efforts.

### Missouri Local Public Health Agencies

[health.mo.gov/living/lpha/index.php](http://health.mo.gov/living/lpha/index.php)

### Missouri Department of Health and Senior Services

[health.mo.gov](http://health.mo.gov)  
Division of Community and Public Health

### Section for Disease Control and Environmental Epidemiology

573-751-6141 or 866-628-9891

### Center for Emergency Response and Terrorism

573-526-4768 or 800-392-0272

### Ready in 3

[health.mo.gov/emergencies/readyin3](http://health.mo.gov/emergencies/readyin3)

### State Public Health Laboratory

573-751-3334

### Missouri Department of Social Services

Division of Financial and Administrative Services  
Emergency Management Section  
573-751-3870 or 800-347-8898

### Missouri Department of Social Services Local Offices

[www.dss.mo.gov/offices.htm](http://www.dss.mo.gov/offices.htm)

### Missouri Division of Fire Safety

573-751-2930  
[www.dfs.dps.mo.gov](http://www.dfs.dps.mo.gov)

### Missouri Department of Natural Resources

### Division of Environmental Quality

800-361-4827

[www.dnr.mo.gov/disaster.htm](http://www.dnr.mo.gov/disaster.htm)

### State Emergency Management Agency (SEMA)

573-526-9100

[sema.dps.mo.gov/semepage.htm](http://sema.dps.mo.gov/semepage.htm)

### Centers for Disease Control and Prevention

### National Center for Environmental Health

### Natural Disasters and Severe Weather

[www.cdc.gov/nceh/hsb/extreme/](http://www.cdc.gov/nceh/hsb/extreme/)

### U.S. Department of Agriculture Food Safety Hotline

800-535-4555

### American Red Cross

[www.redcross.org](http://www.redcross.org)

### The Salvation Army

[www.usc.salvationarmy.org](http://www.usc.salvationarmy.org)

### Humane Society of Missouri

[www.hsmo.org](http://www.hsmo.org)

Parts of this publication reprinted with permission from the Nebraska Department of Health and Human Services.





**Missouri Department of Health and Senior Services**

P.O. Box 570, Jefferson City, Missouri 65102-0570

Phone: 573-526-4768 Fax: 573-522-8636

Email: [info@health.mo.gov](mailto:info@health.mo.gov)

[health.mo.gov](http://health.mo.gov)

To report a public health emergency, call 1-800-392-0272.

This toll-free phone number is staffed 24 hours a day, seven days a week.

Alternate forms of this publication for people with disabilities may be obtained by contacting the office listed above.

Hearing-impaired citizens telephone 1-800-735-2966.

AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER

Services provided on a nondiscriminatory basis.