



Hurricanes and Your Health and Safety

The great majority of injuries during a hurricane are cuts caused by flying glass or other debris. Other injuries include puncture wounds resulting from exposed nails, metal, or glass, and bone fractures.

State and local health departments may issue health advisories or recommendations particular to local conditions. If in doubt, contact your local or state health department.

Water Quality

Hurricanes, especially if accompanied by a tidal surge or flooding, can contaminate the public water supply. Drinking contaminated water may cause illness. You cannot assume that the water in the hurricane-affected area is safe to drink.

In the area hit by a hurricane, water treatment plants may not be operating; even if they are, storm damage and flooding can contaminate water lines. Listen for public announcements about the safety of the municipal water supply.

If your well has been flooded, it needs to be tested and disinfected after the storm passes and the floodwaters recede. Questions about testing should be directed to your local or state health department. Information on disinfecting wells is available below.

Water for Drinking, Cooking, and Personal Hygiene

Safe water for drinking, cooking, and personal hygiene includes bottled, boiled, or treated water. Your state or local health department can make specific recommendations for boiling or treating water in your area. Here are some general rules concerning water for drinking, cooking, and personal hygiene. Remember:

- Do not use contaminated water to wash dishes, brush your teeth, wash and prepare food, wash your hands, make ice, or make baby formula. If possible, use baby formula that does not need to have water added. You can use an alcohol-based hand sanitizer to wash your hands.
- If you use bottled water, be sure it came from a safe source. If you do not know that the water came from a safe source, you should boil or treat it before you use it. Use only bottled, boiled, or treated water until your supply is tested and found safe.
- Boiling water, when practical, is the preferred way to kill harmful bacteria and parasites. Bringing water to a rolling boil for 1 minute will kill most organisms.
- When boiling water is not practical, you can treat water with chlorine tablets, iodine tablets, or unscented household chlorine bleach (5.25% sodium hypochlorite):
 - If you use chlorine tablets or iodine tablets, follow the directions that come with the tablets.
 - If you use household chlorine bleach, add 1/8 teaspoon (~0.75 mL) of bleach per gallon of water if the water is clear. For cloudy water, add 1/4 teaspoon (~1.50 mL) of bleach per gallon. Mix the solution thoroughly and let it stand for about 30 minutes before using it.

Note: Treating water with chlorine tablets, iodine tablets, or liquid bleach will not kill parasitic organisms.

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Use a bleach solution to rinse water containers before reusing them. Use water storage tanks and other types of containers with caution. For example, fire truck storage tanks and previously used cans or bottles may be contaminated with microbes or chemicals. Do not rely on untested devices for decontaminating water.

Disinfecting Wells

If you suspect that your well may be contaminated, contact your local or state health department or agriculture extension agent for specific advice. Here are some general instructions for disinfecting wells.

To Disinfect Bored or Dug Wells

1. Use [Table 1](#) to calculate how much bleach (liquid or granules) to use.
2. To determine the exact amount to use, multiply the amount of disinfectant needed (according to the diameter of the well) by the depth of the well. For example, a well 5 feet in diameter requires 4½ cups of bleach per foot of water. If the well is 30 feet deep multiply 4½ by 30 to determine the total cups of bleach required ($4\frac{1}{2} \times 30 = 135$ cups). There are sixteen cups in each gallon of liquid bleach.
3. Add this total amount of disinfectant to about 10 gallons of water. Splash the mixture around the wall or lining of the well. Be certain the disinfectant solution contacts all parts of the well.
4. Seal the well top.
5. Open all faucets and pump water until a strong odor of bleach is noticeable at each faucet. Then stop the pump and allow the solution to remain in the well overnight.
6. The next day, operate the pump by turning on all faucets, continuing until the chlorine odor disappears. Adjust the flow of water faucets or fixtures that discharge to septic systems to a low flow to avoid overloading the disposal system

Table 1. Bleach for a Bored or Dug Well

Diameter of well (in feet)	Amount of 5.25% laundry bleach chlorine per foot of water	Amount of 70% chlorine granules per foot of water
3	1½ cups	1 ounce
4	3 cups	2 ounces
5	4½ cups	3 ounces
6	6 cups	4 ounces
7	9 cups	6 ounces
8	12 cups	8 ounces
10	18 cups	12 ounces

Source: Illinois Department of Public Health. Recommendations may vary from state to state.

To Disinfect Drilled Wells

1. Determine the amount of water in the well by multiplying the gallons per foot by the depth of the well in feet. For example, a well with a 6-inch diameter contains 1.5 gallons of water per foot. If the well is 120 feet deep, multiply 1.5 by 120 ($1.5 \times 120 = 180$).

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- For each 100 gallons of water in the well, use the amount of chlorine (liquid or granules) indicated in [Table 2](#). Mix the total amount of liquid or granules with about 10 gallons of water.
- Pour the solution into the top of the well before the seal is installed.
- Connect a hose from a faucet on the discharge side of the pressure tank to the well casing top. Start the pump. Spray the water back into the well and wash the sides of the casing for at least 15 minutes.
- Open every faucet in the system and let the water run until the smell of chlorine can be detected. Then close all the faucets and seal the top of the well.
- Let stand for several hours, preferably overnight.
- After you have let the water stand, operate the pump by turning on all faucets continuing until all odor of chlorine disappears. Adjust the flow of water from faucets or fixtures that discharge into septic tank systems to a low flow to avoid overloading the disposal system.

Table 2. Bleach for a Drilled Well

Diameter of Well (in inches)	Gallons per foot of water
3	0.37
4	0.65
5	1.0
6	1.5
8	2.6
10	4.1
12	6.0

Table 3. Amount of disinfectant required for each 100 gallons of water

Laundry Bleach (5.25% Chlorine)	3 cups*
Hypochloride Granules (70% Chlorine)	2 ounces**
*1 cup = 8-ounce measuring cup	
**1 ounce = 2 heaping tablespoons of granules	
<i>Source: Illinois Department of Public Health. Recommendations may vary from state to state.</i>	

Food Safety

Do not eat any food that may have come into contact with contaminated floodwater. Discard any food not in a waterproof container if there is any chance that it has come into contact with contaminated floodwater. Undamaged, commercially canned foods can be saved if you remove the can labels, thoroughly wash the cans, and then disinfect them with a solution consisting of one cup of bleach in five gallons of water. Re-label your cans, including expiration date, with a marker. Food containers with screw-caps, snap-lids, crimped caps (soda pop bottles), twist caps, flip tops, snap-open, and home canned foods should be discarded if they have come into contact with floodwater because they cannot be disinfected. For infants, use **only** pre-prepared canned baby formula. Do not use powdered formulas prepared with treated water.

Frozen and Refrigerated Foods

If you will be without power for a long period:

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- ask friends to store your frozen foods in their freezers if they have electricity;
- see if freezer space is available in a store, church, school, or commercial freezer that has electrical service; or
- use dry ice, if available. Twenty-five pounds of dry ice will keep a ten-cubic-foot freezer below freezing for 3-4 days. Use care when handling dry ice, and wear dry, heavy gloves to avoid injury.

Your refrigerator will keep foods cool for about four hours without power if it is unopened. Add block or dry ice to your refrigerator if the electricity will be off longer than four hours.

Thawed food can usually be eaten if it is still "refrigerator cold," or re-frozen if it still contains ice crystals. To be safe, remember, "When in doubt, throw it out." Discard any food that has been at room temperature for two hours or more, and any food that has an unusual odor, color, or texture.

Sanitation and Hygiene

It is critical for you to remember to practice basic hygiene during the emergency period. Always wash your hands with soap and water that has been boiled or disinfected:

- before preparing or eating
- after toilet use
- after participating in cleanup activities; and
- after handling articles contaminated with floodwater or sewage.

If there is flooding along with a hurricane, the waters may contain fecal material from overflowing sewage systems and agricultural and industrial waste. Although skin contact with floodwater does not, by itself, pose a serious health risk, there is risk of disease from eating or drinking anything contaminated with floodwater. If you have any open cuts or sores that will be exposed to floodwater, keep them as clean as possible by washing them with soap and applying an antibiotic ointment to discourage infection. If a wound develops redness, swelling, or drainage, seek immediate medical attention.

Do not allow children to play in floodwater areas. Wash children's hands frequently (always before meals), and do not allow children to play with floodwater-contaminated toys that have not been disinfected. You can disinfect toys using a solution of one cup of bleach in five gallons of water.

Immunizations

Outbreaks of communicable diseases after hurricanes are unusual. However, the rates of diseases that were present before a hurricane may increase because of a lack of sanitation or overcrowding in shelters. Increases in infectious diseases that were *not* present before the hurricane are not a problem, so mass vaccination programs are unnecessary.

If you have wounds, you should be evaluated for a tetanus immunization, just as you would at any other time of injury. If you receive a puncture wound or a wound contaminated with feces, soil, or saliva, have a doctor or health department determine whether a tetanus booster is necessary based on individual records.

Specific recommendations for vaccinations should be made on a case-by-case basis, or as determined by local and state health departments.

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Mosquitoes

Rain and flooding in a hurricane area may lead to an increase in mosquitoes. Mosquitoes are most active at sunrise and sunset. In most cases, the mosquitoes will be pests but will not carry communicable diseases. It is unlikely that diseases which were not present in the area prior to the hurricane would be of concern. Local, state, and federal public health authorities will be actively working to control the spread of any mosquito-borne diseases.

To protect yourself from mosquitoes, use screens on dwellings, and wear clothes with long sleeves and long pants. Insect repellents that contain DEET or Picaridin are very effective. Be sure to read all instructions before using DEET. Care must be taken when using DEET on small children. Products containing DEET or Picaridin are available from stores and through local and state health departments. More information about these and other recommended repellents can be found in the fact sheet "Updated Information Regarding Insect Repellents" at www.cdc.gov/ncidod/dvbid/westnile/RepellentUpdates.htm.

To control mosquito populations, drain all standing water left in open containers outside your home.

For more about West Nile virus, visit the CDC West Nile Virus website at www.cdc.gov/westnile.

Mental Health

The days and weeks after a hurricane are going to be rough. In addition to your physical health, you need to take some time to consider your mental health as well. Remember that some sleeplessness, anxiety, anger, hyperactivity, mild depression, or lethargy are normal, and may go away with time. If you feel any of these symptoms acutely, seek counseling. Remember that children need extra care and attention before, during, and after the storm. Be sure to locate a favorite toy or game for your child before the storm arrives to help maintain his/her sense of security. Your state and local health departments will help you find the local resources, including hospitals or health care providers that you may need.

For more information, visit www.bt.cdc.gov/disasters/hurricanes
or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).

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