

Environmental Health and Disasters

Table of Contents

Overview	1
Preparedness	1
Water Quality	1
Water Collection and Storage	1
Water Disinfection	2
Well Water	2
New Well Casing Diameter	3
Food Safety	3
Safe Storage and Handling of Human Food	4
Sanitation and Waste Management	5
Air Quality	6
Outdoor Air Quality	6
Moulds	6
Cleaning Products	6
Combustion Fuels in the Home	6

Overview

Environmental health is critical to reducing illness in people affected by a disaster. Hazards include poor indoor air quality, contaminated water, and poor food quality. This discussion outlines the various environmental health issues that may surface due to a disaster. It also identifies way to reduce these risks.

Preparedness

Preparedness is key to minimizing the impact that an emergency can have. Public Safety Canada recommends that households prepare for 72 hours without food, electricity, or water. It has a created a guide (found at http://www.gov.nl.ca/fes/publications/WebPDFGuideENG_low.pdf) to help people prepare. An emergency kit checklist is also available, at <http://www.gov.nl.ca/fes/publications/emergencykiteng.pdf>. Fire and Emergency Services is responsible for ensuring preparedness in the province but Environmental Health can assist by providing guidance on health issues.

Water Quality

Disasters, especially a natural disaster such as a flood, may result in compromised water supplies. Microbial or chemical contamination of drinking water poses a serious health risk making it important that safe (potable) water sources be identified for use. Water, from safe sources, for human consumption, sanitation, and hygiene are essential during a disaster.

Water Collection and Storage

Maintaining a reserve of safe water is the best way to make sure water is available. Public Safety Canada suggests households keep 72 hours worth of supplies. Keep the water you are storing covered and free of contaminants to make it safe for consumption when you need it. When storing water using old/used containers (cans, jars, bottles, glasses) as vessels for water, the following recommendations should be followed:

- Clean the container surface with soap and water then rinse before use
- Clean the inside of container with a bleach solution

- Bleach solution: Add 1 teaspoon unscented household chlorine bleach (5.25% sodium hypochlorite) with 1 cup water
- Cover and allow to sit for 30 minutes. Rinse thoroughly with potable water
- Label container as “DRINKING WATER” and mark the date prepared on the label
- Store at ambient temperature, away from heat, direct sunlight and away from toxic substances, such as gasoline or pesticides

Water Disinfection

In homes on municipal water supplies under boil water advisories, tap water must be disinfected before use. Residents should listen for public service announcements or contact their municipal government about their water quality during and after an emergency to determine if tap water can be consumed. There are two basic methods for disinfecting water: boiling and chemical treatment.

- Bring water to a vigorous boil for one minute and allow to cool; this is by far the most preferable and reliable method.

Or

- Treat small amounts of water use unscented household bleach at the rate of at two drops per litre of water and allow the water to stand for 30 minutes. If the water is turbid or cloudy, double the number of drops.

Water from local springs, streams, or lakes should be considered contaminated. However, if no other supply can be found water from these sources should be disinfected, using the above steps, prior to consumption.

Well Water

After a disaster where a private well water supply may have been compromised, special precautions must be taken to ensure that the water is safe for consumption. Floods and hurricanes present the largest risk to well water quality. Heat waves may also present a risk if the well is not already properly monitored, as heat can foster the growth of microbes. Other events, like chemical spills can represent an issue depending on their scale. Contaminated well water may be identified by the following:

- If the water has a chemical or fuel odour, it should not be used until the contamination in the well has been removed
- Floating debris is present in the well. Remove using a grappling hook, net or long-handled scoop
- If sand or silt is present, remove the well pump and clean it before use

If none of these signs are present but surface water may have entered the well, water should not be consumed before disinfection.

After an emergency, well water should be tested before being consumed. Testing and disinfection of well water requires at least 48 – 72 hours, so other water sources should be used in the interim. Though clean stored water is preferable, boiled well water can be used as long as no physical contaminants (like dirt or chemicals) have found their way into the supply.

If well water has been contaminated, the water system can be “shocked” to clear potential contaminants. It should be noted that this will not clear wells contaminated by chemicals. To shock a well follow the following steps:

- Add the amount of unscented bleach, determined according to the table, to the bottom of the well and then agitate the water.
- Connect a garden hose to a nearby tap and wash down the inside wall of the well. This will ensure thorough mixing of the chlorine and the water throughout the well.
- Open each tap and allow the water to run through all taps until a smell of chlorine is detected, then turn off the taps. If a strong smell is not detected, add more bleach to the well.
- Allow the water to sit in the system for 12-24 hours. Do not use this water because the chlorination is not healthy for consumption.
- Empty well of water through an outside hose, away from grass and shrubbery, until the strong smell of chlorine disappears. Make certain that the water does not enter any natural source. Finally, open the indoor taps until the system is completely flushed.
- Wait a minimum 48 hours, and then take a sample of the water for testing. Satisfactory results in repeat tests over a period of one to three weeks following chlorination will probably indicate that the treatment has been effective. In the meantime, find another source of water or boil the water for one minute before drinking it.

Depth of Water	New Well Casing Diameter		Existing Well Casing Diameter	
	15 cm drilled well	90 cm dug well	15 cm drilled well	90 cm dug well
1 m	100 ml	3.2 L	20 ml	0.6 L
3 m	300 ml	9.8 L	60 ml	2.0 L
5 m	500 ml	16L	100 ml	3.0 L
10 m	1000 ml	32 L	200 ml	6.5 L

More information on drink water testing and water quality is available at <http://www.health.gov.nl.ca/health/publichealth/envhealth/drinkingwater.html>.

Food Safety

Food safety can be especially important during an emergency event. For example, power disruptions can cause problems with refrigeration and food preparation. Similarly, disasters can pose a risk of flooding and reduce water quality that can in turn contaminate food items and preparation surfaces. A number of measures can be taken to reduce the risk of illness from contaminated food.

Preparedness is generally the best way to reduce the impact of a natural disaster on food safety. To prepare for an emergency be sure to acquire a number of important items:

- Purchase food that does not require refrigeration, such as canned goods and water. This includes baby food and pet food, if needed.
- Ensure that you have a hand-held can opener.
- Have a cooler with ice ready ahead of time to keep refrigerated food cold if you know that the power will be out for more than 4 hours.
- Remember to replace these emergency storage food items periodically.

Safe Storage and Handling of Food

Cold temperatures stop the growth of bacteria that may have contaminated food and reduces the risk of foodborne illness. During normal operation:

- Refrigerators should be at or below 4°C (40°F)
- Freezers should be at or below -18°C (0°F).

To ensure that food stays as long as possible during an emergency event like a power outage, consider the following steps.

- Do not open the refrigerator/freezer door unless absolutely necessary in order to maintain the cold temperature within the refrigerator/freezer. A full freezer will keep food frozen for about 48 hours. A freezer that is half full will keep food frozen for about 24 hours.
- If available, add ice to the refrigerator to keep the food at a safe temperature if the power will be out for long periods of time.
- Do not place frozen food outside, even in winter. The sun's rays could thaw frozen food even when the outdoor temperature is very cold, and animals could contaminate your food.
- If you have to place food outside, ensure that it is protected from contamination and kept at a safe temperature at all times.

Carefully inspect all food items and do not eat any food you think may not be safe. Spoiled food may not look contaminated. Remember, "When in doubt, throw it out."

Discard any thawed food that has been at room temperature for two or more hours, and any food that has an obvious unusual colour or odour. However, it is important to keep in mind that food contaminated with bacteria does not necessarily smell bad or appear spoiled.

Undamaged, commercially-prepared foods in sealed, unopened, airtight, waterproof cans, jars or pouches are entirely safe to use. However, these cans and/or pouches must be carefully inspected, cleaned and disinfected before use if they are believed to have come in contact with contaminated food or water. This is also true of cooking preparation surfaces and utensils. Households may decide to use single-service eating and drinking utensils if the means to clean these items is not available.

As always, it is important, during an emergency, to follow proper food handling procedures.

- Wash hands thoroughly before handling food, or use clean disposable gloves during food preparation.
- Refrigerate perishable food. When refrigeration is not available, perishable food should be obtained on a daily basis and should be used as soon as possible.
- Prepare only a quantity of food sufficient for immediate use. Leftovers will need to be avoided if there is limited refrigeration.

Observe temperature controls for potentially hazardous foods. Monitor temperatures so that:

- Prepared hot food is kept at $\geq 60^{\circ}\text{C}$;
- Prepared cold food is kept at $\leq 4^{\circ}\text{C}$.
- Avoid contact between raw and ready-to-eat foods and keep food preparation surfaces clean.

- All food preparation and serving areas should be cleaned prior to use and food contact surfaces should be sanitized. Two (2) teaspoons of household bleach (5.25% sodium hypochlorite) in 1 gallon of water is equivalent to 100 ppm available chlorine and adequate for sanitizing surfaces.

Sanitation and Waste Management

Disasters that contribute heavy rains or excessive overland runoff can cause the ground water level to exceed the height of the soil. This is known as flooding. Flooding can affect systems in your home that rely on a consistent ground water level. On site water and sewer systems need a dry layer of soil above the ground water table to function safely. Similarly, water wells need this dry layer to filter out contaminants present in surface water. Septic systems use this layer to cultivate helpful bacteria to digest pathogens and decontaminate water. When the water table rises into this dry layer, both of these systems are unable to function correctly.

Flooded septic systems can be identified by:

- Slow plumbing that makes strange noises.
- Water backs up into a basement through the floor drains.
- The ground around the septic system is covered with water.

A flooded septic system should be repaired with the help of professionals. However, homeowners can take precautions to reduce the damage from this occurrence.

- Do not pump the tank while the flooding is ongoing or if the ground is saturated.
- If the tank is pumped and floats out of the ground, the associated pipes will have to be dug up and re-installed to ensure the proper system grade.
- Do not use heavy equipment around the system while it is flooded. This equipment may easily damage the system when the ground is saturated.
- Do not add excessive water to the system.
- Sub-pumps, roof drains, French drains & surface water runoff may have to be diverted downhill or away from the septic system.
- Flushing toilets, doing laundry, automatic dishwashers and using garbage disposal devices will add solids to your system. This should be reduced as much as possible during flood events.
- When flooded, water moves very slowly through the septic system.
- Solids will settle out in the pipes and cause blockages which will have to be dealt with after the flood.
- If water levels get high enough, then water will flow in reverse, back into your house via the septic system.
- This water will carry mud and silt which can block your septic pipes and fill your tank. Professional service is your only option in this situation

Prevention

- During the onset of a flood event, basement floor drains can be temporarily blocked off to prevent water from entering your home.
- Installing a simple, cheap backflow preventer on your septic system can also help prevent flooding.
- Keep children and pets away from the area of the septic system.
- All flood waters must be treated as if contaminated with sewer discharge.
- Remove soiled clothing and observe hand washing practices to avoid contamination.

Air Quality

Air quality can be severely affected by disasters. Forest fires decrease outdoor air quality while mould can have the same effect on indoor air quality. Both can have a negative effect on health but there are ways to limit exposure.

Outdoor Air Quality

Most disasters will have a limited effect on outdoor air quality but forest fire and, potentially, chemical spills, can cause health problems. The most common and effective measure to minimize health impacts during a smoke episode is to stay indoors. Keep your house cool. Close windows and shutters. Listen to the radio or television for information on air quality. The health effects of outdoor air quality are generally transient but can be worse for elderly individual as well as people with asthma or cardiovascular disease.

Moulds

Moulds are fungi, a group of organisms which also includes mushrooms and yeasts. They grow indoors in wet or damp areas. While most moulds are not harmful to healthy individuals others can cause reactions depending on overall health, age, and the amount of time an exposed person spends in the home.

The most common health problems associated with exposure to mould are:

- Eye, nose and throat irritation
- Runny nose, sinus congestion, frequent cold symptoms
- Increased asthma attacks
- Allergic reactions

The elderly, pregnant women, infants and young children, people with allergies, chronic respiratory illness and/or chemical sensitivities and those with weakened immune systems are most likely to experience health effects from mould.

Small areas of mould, one or two spot of less than a meter in diameter, can be cleaned using a household cleaning product. Scrub the area clean with a soapy solution of water and cleaning product and dry. Larger areas of mould should be cleaned by professionals. Once the mould is disposed of it is important to address the cause of the mould itself to prevent the problem from returning. This may include fixing water damage or an excess of moisture.

Cleaning Products

Cleaning is important to decontaminating homes but it can also reduce indoor air quality. A number of steps can be taken to reduce the effect that cleaning can have on the home's air quality.

- Use unscented cleaning products.
- Choose detergents and water solutions over bleach.

Combustion Fuels in the Home

Combustion of fossil fuels like diesel, propane, and gas create carbon dioxide and carbon monoxide. Carbon monoxide is especially dangerous because, though colourless and odourless, it can lead to death if there is no air flow. The presence of these gases is not a large problem to health when outside because there is lots of airflow but can be dangerous indoors. During an emergency the risk of carbon monoxide poisoning can increase because of the use of combustion fuels indoors for generators, air compressors used in cleaning, or cooking with grills or barbecues. To avoid reducing indoor air quality use combustion fuel consuming appliance outdoors.