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Food Safety

Purdue University

Cooperative Extension Service

West Lafayette, IN 47907

Keeping Food Safe During Emergencies

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Disasters can come in many forms, including tornados, fires, floods, and snowstorms. In any of these emergency situations, two problems commonly arise. The first is a lack of incoming supplies. The second is damage to gas and electrical power systems. This publication discusses how to handle foods before, during, and after an emergency to keep them safe and to avoid food poisoning.

How Do I Plan an Emergency Food Supply?

Frequently, emergencies arise with little or no warning. To insure an adequate diet during an emergency, keep on hand a week's supply of food that does not need refrigeration. Table 1 lists a variety of foods which can be safely stored at room temperature. Choose food based on the special needs and preferences of your family. For example, if your household includes an infant, you may need a supply of formula or food that can be easily strained or chopped. In addition to food, it's important to keep extra essential medications and supplies.

Another factor to consider when choosing emergency food is the ease of preparation. Select food that can be quickly warmed or eaten cold. Canned - goods are often a wise choice; the can serves as both cooking pot and serving dish. Dried beans are generally a poor choice. Although they are easy to store, they are not so easy to prepare.

Consider storage conditions and length of storage when planning an emergency food supply. Ideally, store food in a cool dry place at temperatures between 40F and 70F. Although canned and dehydrated food will still be safe after one year, time may reduce quality and nutritional value. For this reason, you should occasionally use stockpiled food for regular meals and purchase new items to replace it.

How Do I Prepare Food with No Power?

During an emergency, cooking and eating habits must change to fit the situation. You may have no refrigeration, no stove, and limited water. In addition, health risks from contaminated or spoiled food may increase. When preparing food, consider the following:

1. The amount of cooking time needed for a particular food. If there is limited fuel for cooking, choose food which cooks quickly or serve no-cook food.

Table 1: Assembling and Emergency Food Supply

Food Group	Amount per Person per day	Suggested Foods
Milk	2 cups (reconstituted)	Evaporated canned milk; powdered milk
Vegetables	2 servings	canned vegetables; canned vegetable juice
Fruit	2-4 servings	canned fruit; canned juice; dried fruit
Meat, poultry, fish, dry beans, eggs, and nuts	2-3 servings	canned meat, poultry, and fish; canned meat mixtures; canned or dried beans; canned soups containing meat or beans; dried meat (beef jerky); peanut butter; nuts
Bread, cereal, rice, and pasta	6-11 servings	ready-to-eat cereal; instant hot cereal; minute rice; crackers; canned spaghetti; canned soup containing noodles or rice
Fats, oils, and sweets	according to family practices	
Miscellaneous	according to family practices	coffee, tea, cocoa, powdered beverages, soft drink

2. The amount of food to prepare. If refrigeration is not available, prepare only the amount of food you need for one meal and discard any perishable leftovers. When left at room temperature, milk, meat, soups, pasta, legumes, and vegetables provide excellent growing conditions for microorganisms which cause food poisoning.

3. The cooking methods available. These include:

- a. Fireplace. You can grill food or wrap it in foil and cook it in the fireplace. Possible fuels for cooking include: wood, tightly rolled newspapers, and artificial logs made of pressed wood particles. Never use charcoal as fuel for indoor fires; the carbon monoxide from the burning charcoal is very dangerous.
- b. Camp stove. Use this type of stove, which uses propane or butane fuel, only outside the house. Propane and butane fires are difficult to extinguish and could easily get out of hand inside a home. A dry chemical extinguisher will put out gasoline or oil fires, but will not put out butane or propane fires. There is little you can do to put out a propane or butane fire except shut off the gas. Learn where the shut-off valve is before lighting a camp stove.
- c. Charcoal grill. Although usually used to prepare meats, you can also use charcoal to cook food in foil and prepare one-pot meals during an emergency. Do your charcoal cooking outside where there is plenty of ventilation. The lack of adequate ventilation makes indoor cooking with charcoal dangerous.
- d. Fondue pot or chafing dish. You can use these pieces of equipment inside as long as the fuel heating them is approved for indoor use.

Is My Water Safe?

A disaster may disrupt the electricity needed to pump water in the home and/or contaminate the water supply. Planning ahead can assure there is enough safe water for drinking, preparing food, brushing teeth, and keeping clean.

You can store water ahead for use in emergencies. Boiled water, stored in sterilized containers will keep for six months

to one year. While the water may taste flat, it is safe to drink or use in cooking.

Your hot water heater or water pressure tank could supply many gallons of safe water during an emergency. Before using water from the water heater, switch off the gas or electricity which heats the water. Leaving the power on while the heater is empty could cause an explosion or burn out the elements. After turning off the power source, open the drain valve at the bottom of the tank. Do not turn the water heater on again until the water system is back in service.

Unless you are absolutely certain your water supply is not contaminated, purify all water before using it for drinking, preparing food, brushing teeth, or washing dishes. If the water contains sediment or floating material, strain it through a cloth before purifying it. If you have access to heat or power, water can be made safe by boiling; if not, you will have to treat it with chemicals.

Boiling:

Boil water at a rolling boil for ten minutes to kill any disease-causing bacteria. Add a pinch of salt to each quart of boiled water to improve the taste.

Chemical treatment:

Any of the following three (3) chemical treatments will purify water.

1) Chlorine bleach. Household bleach is a good disinfectant for water. Before using, check the label to be sure hypochlorite is the only active ingredient in the bleach. Do not use bleach that contains soap. Since the amount of chlorine in bleach is variable, use the following table to determine the appropriate amount needed to purify water. Mix the bleach thoroughly in the water and let it stand for 30 minutes. The water should have a slight chlorine odor. If it doesn't, repeat the dose and let the water stand for an additional 15 minutes.

Percent chlorine	Add per gallon water
1%	40 drops
2 to 6%	8 drops
7 to 10%	4 drops
unknown	10 drops

2) Iodine. Household iodine from the medicine cabinet will purify water. The iodine should be 2% United States Pharmacopeia (U.S.P.) strength. Add 20 drops per gallon of clear water and 40 drops per gallon of cloudy water.

3) Water purification tablets. Water purification tablets will also purify water. These tablets are available at drug stores. Follow the manufacturer's instructions.

What Do I Do When the Refrigerator and Freezer Stop?

Most home refrigerators and freezers stop running at least once during their lifetimes. Whether due to a power outage or a broken appliance, a power failure brings with it the risk of food spoilage.

Bacteria are present all around us -on our bodies, in food, and on cooking utensils. In small amounts, these bacteria are harmless. In large numbers, these bacteria may cause food poisoning. At temperatures below freezing, most bacteria that cause foodborne illness survive, but do not grow. Refrigeration at 40F or below allows only slow growth of bacteria. As the storage temperature of perishable food rises above 40F, the rate of bacterial growth increases. After these foods are left more than two hours above 40F, there is a strong chance that the number of bacteria has risen to a level which can cause food poisoning. The information below will help you keep food safe longer and evaluate the safety of foods affected by a power failure.

How do I keep my food frozen?

Once the freezer fails, the length of time food in it will stay frozen depends on:

1. The amount of food in the freezer. A full freezer, if not opened, will stay cold enough to keep food frozen for about two days, even in the summer. In a freezer that is half full, food will stay frozen for only one day.
2. The kind of food in the freezer. Foods which have a higher water content will stay frozen longer. For example, a freezer full of meat will not warm as quickly as a freezer full of bread.
3. The temperature of the food before the power failure. The colder the food, the longer it will stay frozen. Keep your freezer set at 0F or lower.
4. Freezer insulation. A well-insulated freezer will keep food frozen much longer than one with little insulation.
5. Size of the freezer. The larger the freezer, the longer the food will stay frozen.

As soon as you discover a freezer failure, call the utility company to find out when power might be restored or the appliance repair service to find out when the freezer can be worked on. If there is a chance the freezer will be out of service for some time, you may need to take steps to prevent food loss.

Make plans with a local meat locker plant before an emergency arises. If freezer failure occurs, call the locker plant to see if it is open and has room for your food. During transport to the locker, insulate the food by wrapping it in newspapers or blankets.

If there is no locker space and the freezer will be without power for more than one day, dry ice may be helpful. The more dry ice you use, the longer the food will stay frozen. Twenty-five pounds of dry ice added soon after a power loss should keep the food in a half-full, medium-sized (10-cubic-foot) freezer frozen for two to three days. In a full freezer of the same size, twenty-five pounds of dry ice should keep foods frozen for three to four days. Place the dry ice on a piece of cardboard on top of the food packages. To protect your skin, always wear gloves when handling dry ice.

Finding a source of dry ice may take a little work. Check the yellow pages under "dry ice." Call local dairies, cold storage warehouses, or other businesses that might use dry ice.

Other tips to reduce loss of frozen food include:

1. Keeping the freezer door closed.
2. Placing food outdoors if the temperature is below 0F.
3. Covering the freezer with blankets or quilts. Be sure to pin or fasten the covering so the air vent openings are not blocked. The power may return without warning.

Table 2: Evaluating Freezer Foods

	Partially frozen- some ice crystals	Completely thawed -still cold (below 40F)	Completely thawed -warm (above 40F)
meats			
beef		cook and serve	
veal	refreeze	or	discard
lamb		cook and refreeze	
pork			
poultry	refreeze	cook and serve or cook and refreeze	discard
organ meats	use within 48 hours;	cook and serve	discard
liver	do not refreeze		
kidney			
heart			

fish and shellfish	refreeze	cook and serve or cook and refreeze	discard
combination dishes	cook and serve	cook and serve	discard
stews	or		
casseroles	cook and refreeze*		
meat pies			
dairy items	refreeze	refreeze or refrigerate	discard
cream			
cheese			
butter			
produce	refreeze	cook and serve	discard
vegetables			
fruit			
juices	refreeze	refreeze	discard
baked goods			
bread	refreeze	refreeze	serve
fruit pies	refreeze	refreeze	discard
plain cakes	refreeze	refreeze	serve

 *Refreeze only those dishes containing raw ingredients.
 Do not refreeze previously cooked dishes.

How do I keep my refrigerated food cold?

Food will remain chilled for four to six hours in a refrigerator without power. To keep temperatures cool longer, add bags of regular ice. Place the ice on upper shelves and pans to catch the melting ice on lower shelves. The more ice you use, the longer the temperature will stay cool. Open the door only to add ice. Place a thermometer in the area furthest from the ice. Check the refrigerator temperature when adding ice and as soon as the power returns to be sure that food has been kept below 40F.

Is my food still safe?

Once your freezer and/or refrigerator are working again, evaluate the safety of the affected food. For frozen food, consider the type of food and the extent of thawing. For refrigerated food, consider the temperature inside the refrigerator before the return of power, the type of food, and the time these foods have been stored above 40F. Use Tables 2 and 3 when deciding which foods may safely be kept and which ones should be thrown out. Remember, when in doubt, throw it out.

Table 3: Evaluating Refrigerated Foods

Milk	Discard if held above 40F over two hours.
Fruit juices cloudy,	Generally safe unrefrigerated until power returns, but discard if moldy, or fermented.
Eggs fresh or hard-boiled	Discard if held above 40F over two hours.
Hard cheeses, butter, margarine or	Generally safe unrefrigerated if well-wrapped, but discard if mold or rancid odor develops.
Fresh fruits and vegetables mold,	Generally safe unrefrigerated until power returns, but discard if yeasty odor, or slimy texture develops.
Fresh meats and poultry	Discard if held above 40F over two hours.
Lunch meats and hot dogs	Discard if held above 40F over two hours.
Mayonnaise (opened)	Discard if held above 40F over two hours.
Opened containers of jelly, jam, mustard, ketchup, pickles, and olives	Safe unrefrigerated until power returns.

How do I get rid of odors?

Strong food odors may develop as a result of food spoilage during a power failure. Because the refrigerator or freezer must be empty and unplugged when cleaning, the best time to combat these odors is before restocking foods. Below are some ideas for removing unwanted odors:

1. Use one of the following solutions to wash the interior walls of the refrigerator or freezer. Rinse with water and dry. Do Not combine any two of these household chemicals; toxic fumes, which may be fatal, may result.

Vinegar-one cup per gallon of water; Household Ammonia-one cup per gallon of water; Chlorine bleach -one-half cup per gallon of water

2. Take out all removable parts and wash with mild soap and water.
3. Fill a large shallow container with vinegar. Set in refrigerator or freezer several hours. If odor persists, let set two to three days, changing vinegar every eight hours.
4. Try activated charcoal, available at a drug store or pet supply store, to absorb lingering odors. Place the charcoal in large shallow pans or paper in the bottom of the refrigerator or freezer. Leave for several days, changing the charcoal every few days. After the odor disappears, rinse and dry the interior before replacing food.

Is Food That Has Been in a Flood Safe?

Flood waters may carry silt, raw sewage, oil, or chemical waste. Being prepared is the key to keeping food safe during a flood. Prevent flood water from coming into contact with food by:

1. Raising refrigerators and freezers by placing cement blocks under their corners.
2. Moving food from low cabinets.
3. Moving canned goods and other food stored in the basement, upstairs.

Once food has come into contact with flood waters, use the following chart to determine its safety.

Discard:

- *Meat, poultry, fish, and eggs
- *Fresh produce
- *Unopened jars with waxed cardboard seals (mayonnaise and salad dressing)
- *All food in cardboard boxes, paper, foil, cellophane, or cloth
- *Spices, seasonings, and extracts
- *Home-canned food
- *Opened containers and packages
- *Flour, sugar, and other staples in canisters
- *Cans that are dented, leaking, bulging, or rusted

Save:

*Undamaged canned goods and commercial glass jars of food. These foods are safe if you sanitize the containers using the instructions below.

Instructions for sanitizing flooded canned foods

1. Mark contents on can or jar lid with indelible ink.
2. Remove labels. Paper can harbor dangerous bacteria.
3. Wash jars and cans in a strong detergent solution with a scrub brush.
4. Immerse containers for 15 minutes in a solution of 2 teaspoons chlorine bleach per quart of room temperature water.
5. Allow containers to air dry before opening.

You must also sanitize dishes and cookware that have come into contact with flood waters. Treat dishes and glassware using the instructions for canned goods. Disinfect metal pans and utensils by boiling them in water 10 minutes. Discard and replace wooden spoons, plastic utensils, and baby bottles.

Can I Eat Food That Has Been in a Fire?

Fires can seriously compromise the safety of food. Three factors can affect food that has been exposed to fire—the heat of the fire, smoke fumes, and chemicals used to fight the fire. Food in cans or jars may seem "okay," but may, in fact, be inedible since high temperatures can activate food spoilage bacteria. One of the most dangerous elements of a fire is the toxic fumes released from burning materials. These fumes can contaminate food. Chemicals used to fight fires also contain toxic materials and can contaminate food and cookware. Below are some guidelines for checking the safety of food after a fire:

1. Throw away any food stored in permeable packaging—cardboard, plastic wrap, screw-topped jars and bottles, etc. Toxic fumes and chemicals can penetrate the packaging and contaminate the food.
2. Discard any raw foods stored outside the refrigerator, like potatoes or fruit, which could be contaminated by fumes or chemicals.
3. Check for odors in the refrigerator and freezer. Because the seal is not airtight, fumes can contaminate foods within. If foods from your refrigerator or freezer have an off-flavor or smell, throw them away.
4. Decontaminate canned goods and cookware exposed to chemicals or fumes using the instructions for sanitizing after a flood.

Where Can I Get Additional Information?

While most people think natural disasters will never strike them, over 800,000 Americans are affected by such catastrophes each year. Loss of electrical power and refrigeration, as well as chemical and bacterial contamination, can jeopardize food and put people at risk for food poisoning. If you have additional questions on how to safely store food before an emergency and how to handle food safely during and after an emergency, please contact your county's Cooperative Extension Office.

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