

## CHAPTER 3

# Nutrition

### The Need for Good Nutrition

*Good nutrition will help you to be healthy and strong.*

Good nutrition means eating enough of the right kinds of food so the food can be used by our bodies.

A healthy person is alert, active, and usually happy. A healthy child grows at a normal rate and is interested in learning new things. To be a healthy person, you need to have proper nutrition. The foods that you eat can help you to grow and to be strong and healthy.

Our Heavenly Father loves us very much. Because He wants us to enjoy good health on earth, He has given us guidelines about the foods and other things that we take into our bodies. These guidelines are found in the Doctrine and Covenants, section 89, called the Word of Wisdom. In the Word of Wisdom, we are told to eat certain kinds of foods that contribute to good health.

Your body can become weak if you do not eat enough food or do not eat the right kinds of food. This is called malnutrition. Malnutrition may cause some very serious diseases and even death. It also causes other problems. Your body loses its ability to replace skin and hair and to keep strong eyes, teeth, blood, bones, and muscles.

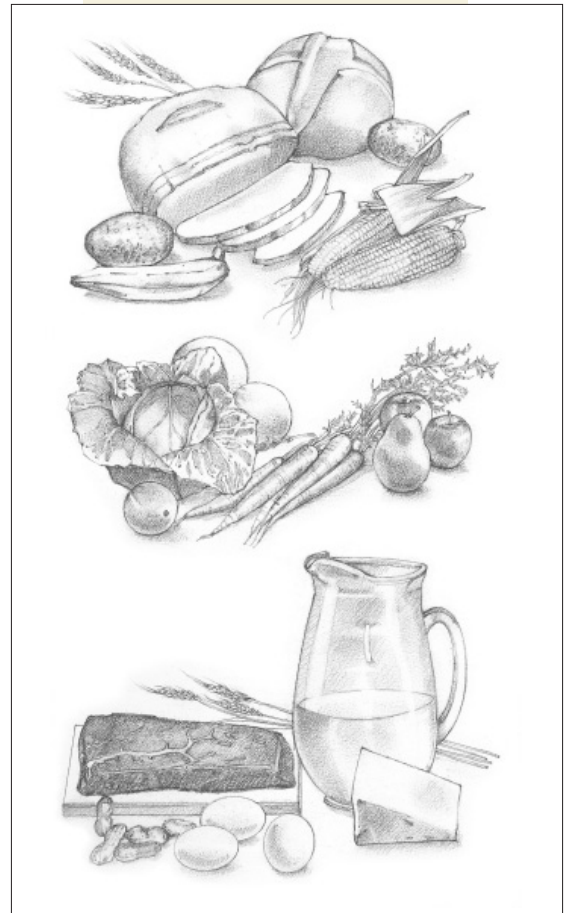
Also when you have poor nutrition, you do not have enough energy to do what you need to do. A child may be too tired to play, and students may not be able to study and learn as well as they should. Adults may not be able to work the entire day.

In the Doctrine and Covenants, the Lord said:

“Yea, all things which come of the earth, in the season thereof, are made for the benefit and the use of man, both to please the eye and to gladden the heart;

“Yea, for food and for raiment, for taste and for smell, to strengthen the body and to enliven the soul” (D&C 59:18–19).

The information in this chapter will help you understand what kinds of food you and your family should eat to keep strong and healthy.



***Every person needs energy foods, growth foods, and protection foods.***

You can improve the health of your family members by helping them eat the right kinds of food. Every member of your family needs food from three different groups.

1. *Energy foods.* Foods in the energy food group give energy to your body. Most of these foods are high in starch. They include rice, corn, wheat, millet, cassava, taro, and potatoes. Other foods that provide energy for your body are cooking oil, seeds containing oil, lard, fat, and tallow, as well as sugar, molasses, and honey.

2. *Growth foods.* Foods in the growth food group give your body protein. Your body uses protein to grow and to repair body tissues. Foods in this group include various kinds of dried beans and seeds; meats such as beef, pork, poultry, and fish; milk and milk products such as cheese and yogurt; and eggs.

3. *Protection foods.* Foods in the protection food group are high in vitamins and minerals. Most fruits and vegetables are in this group. This group has three parts: foods high in vitamin A, foods high in vitamin C, and the other fruits and vegetables.

Foods high in vitamin A include all dark green, leafy vegetables, such as spinach, sweet potato tops, and chard, and all yellow or orange fruits and vegetables, such as mangoes, carrots, and orange squash.

Foods high in vitamin C include many fruits such as oranges, pome-los, strawberries, papayas, watermelons, and tomatoes.

The other fruits and vegetables in this group give our bodies important vitamins and minerals. However, they are not high in either vitamin A or vitamin C. They include bananas, okra, eggplant, green beans, and avocados.

***You should eat some energy food, some growth food, and some protection food at each major meal during the day.***

You should try to serve all three types of food in each major meal during the day. Doing this will make these meals complete. Some of the necessary food can also be served between major meals.

Every day you should eat at least one food that has a lot of vitamin A and one that has a lot of vitamin C. These foods can be eaten as snacks. If you do not eat energy foods, you will get very tired, and your brain will not work as well as it should. If you do not eat growth foods, your mind and body will not have the protein they need to develop and work properly. You will get sick very easily. If you do not eat protection foods, you may get many serious diseases.

The amount of food people need depends on how old they are, how big they are, how much they work each day, how healthy they are, and other things. For example, a child generally needs less food than an adult needs. A large man will need more energy food than a small man does to do the same work. However, everyone needs to have some food from all three groups every day.

## Supplementary Material: Three Basic Food Groups

### Common Energy Foods

#### Starchy Foods

##### Grains

corn  
millet  
quinoa  
rice  
wheat

##### Root vegetables

cassavas  
potatoes

sweet potatoes  
taro  
yams

#### Fats and Oils

butter  
lard  
margarine  
tallow  
vegetable oil

#### Sweets

candied fruits  
candies  
honey  
jams and jellies  
molasses  
sugar

### Common Growth Foods

#### Dried Beans and Seeds

beans  
mung beans  
soybeans  
lentils  
peas  
tarhui

#### Meats

beef  
pork  
poultry  
rabbit  
veal  
fish or shrimp

#### Milk or Milk Products

cheese  
ice cream  
milk  
milk custard  
yogurt

#### Eggs and Egg Products

### Common Protection Foods

#### Foods High in Vitamin A

##### Dark green, leafy vegetables

amaranth leaves  
beet greens  
chard  
kale  
mustard greens  
spinach  
sweet potato leaves  
watercress

##### Orange fruits and vegetables

cantaloupes  
carrots  
mangoes  
orange squash  
orange yams

papayas  
pumpkins  
yellow sweet potato tubers

#### Foods High in Vitamin C

grapefruit  
guayabano  
guava  
kalamansi  
mangoes  
oranges  
papayas  
pomelos  
strawberries  
tomatoes  
watermelons

#### Other Fruits and Vegetables

avocados  
bananas  
bitter melons  
cabbage  
cucumbers  
eggplant  
green beans  
green peas  
jackfruit  
lettuce  
okra  
pineapples  
white squash  
white sweet potatoes  
white yams

## Nutrition for Women

*A woman needs very good nutrition before and during pregnancy.*

Good nutrition is very important for women of childbearing age. The health of a pregnant woman is greatly affected by what she eats before and during the pregnancy. A growing unborn baby lives on the nutrients from the food the mother eats. So the mother's diet is also very important to the health of the child she is carrying.

*Before pregnancy and after becoming pregnant, a woman needs to eat more foods that contain iron, calcium, protein, vitamin A, and folic acid.*

Foods that contain iron are very important for women before pregnancy and especially after becoming pregnant. Iron is found in many of the growth foods. Foods high in iron include liver, red meats, eggs, beans, and enriched cereal products. Iron is also found in dark green vegetables.

Foods containing a lot of calcium are also important for women before and during pregnancy. Calcium is found in milk, cheese, yogurt, ice cream, dark green vegetables, dried beans, soybeans, curd, and some seeds and nuts. Different countries have different sources of calcium. In parts of Latin America where tortillas are eaten, the lime used in soaking the corn provides calcium. In other countries, bone marrow or soft bones provide calcium. Small fish that are cooked until their bones are soft and eaten whole also provide calcium.

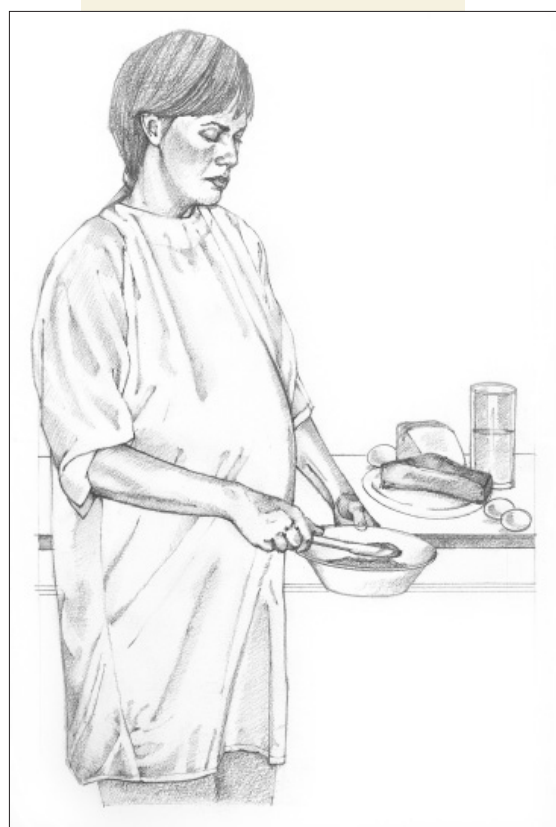
Growth foods that contain protein (see pages 29–30) are important to help prepare the body of a woman to have a baby. They are also important to help a baby grow in the womb. Some good growth foods are fish, poultry, meat, eggs, milk, yogurt, cheese, beans, and nuts.

Protection foods (see pages 29–30) are important for the mother and for the baby growing in the womb. Those containing vitamin A and folic acid are especially needed. Good sources of vitamin A are orange and green vegetables. Good foods for folic acid are beans and legumes, citrus fruits, whole grains, dark green leafy vegetables, poultry, pork, shellfish, and liver.

*A mother who is breastfeeding a baby needs even more good food than when she was pregnant and also plenty of clean water.*

The best food that can be given to a newborn baby is milk from its mother. When drinking mother's milk, the baby gets the nutrients needed from food the mother eats. If the mother eats well during pregnancy and while she is breastfeeding, her child usually needs no other food for the first six months.

While a mother is breastfeeding, she should eat even more growth foods (see pages 29–30) than when she was pregnant. She should especially eat foods that contain a lot of calcium. She also needs a lot of clean water so she can provide enough milk for her baby. Drinking plenty of clean water will help her continue to make milk.



## Supplementary Material: Iron and Calcium Sources

### *Common Iron Sources*

#### *Enriched Foods*

enriched cereals  
enriched cornmeal  
enriched flour  
enriched pasta  
enriched rice

#### *Beans*

baked beans  
black beans  
kidney beans  
navy beans  
pinto beans  
soybeans

#### *Meats*

beef  
chicken  
duck  
lamb  
liver  
mollusks  
pork  
poultry giblets  
seafood  
turkey

#### *Lentils*

#### *Tofu*

#### *Green, Leafy Vegetables*

amaranth leaves  
collard greens  
kale  
mustard greens  
spinach  
turnip greens

#### *Other Vegetables*

asparagus  
broccoli  
brussels sprouts  
parsley  
swiss chard

### *Common Calcium Sources*

#### *Milk Products*

cottage cheese  
cream  
hard cheeses  
ice cream  
milk (fresh, dried,  
or even evaporated)  
yogurt

#### *Dark Green Vegetables*

amaranth  
broccoli  
mint leaves  
spinach

#### *Dried Corn Treated by Soaking in Lime Water*

corn tortillas  
hominy  
masa

#### *Dried Beans and Nuts*

almonds  
filberts or hazelnuts  
garbanzo beans  
many dried beans  
soybeans and soy flour  
tofu (if made with calcium)

#### *Seeds or Grains*

chia  
finger or ragi millet  
teff

#### *Small Bones of Fish Cooked until Soft*

anchovies  
canned salmon  
sardines

#### *Flour Made from Small Dried Fish*

#### *Dark Molasses*

## Nutrition for Babies

### *A baby should be breast-fed from the day it is born.*

The early breast milk contains colostrum, which is very important and will protect the baby from infections in the intestines and other illnesses. For this reason, the mother should begin breast-feeding the baby from the day it is born if at all possible.

For the first few days, the amount of milk the mother produces may not seem to be enough for the baby. The baby may nurse very little, but that may be all it needs. For these first few days, the mother should feed the baby for about five minutes on each breast at each feeding. In the next week or two, she can gradually increase the feeding to 10 or 15 minutes on each side. As she continues to nurse her baby, her supply of milk will usually increase to meet the needs of the baby. Eventually, milk from one breast may be enough for a feeding. The other breast may be used for the next feeding. Frequent breast-feeding during the first few weeks is the best way to develop a good milk supply. By the time babies are four to six weeks old, they can usually be fed every three or four hours during the day.

A baby that is getting enough milk will be satisfied after feeding and will be gaining weight. A well-nourished baby should double in weight in about five months. It should triple its birth weight in one year.

A baby can begin eating other foods at about six months. But breast milk should still be the baby's main food until at least age one. The mother should breast-feed the baby first and then offer other foods. Then she will have enough milk. When the baby is about one year old and begins to eat more and more of the other foods, it will need less breast milk. But it is good to continue breast-feeding until the baby is two or older.

### *A baby should begin eating other foods at about six months.*

At about six months or a bit earlier, a baby should begin eating foods other than breast milk. As you begin to give other foods to your child, you should remember three things:

1. Give the baby only one new food at a time and not more than one or two new foods in a week.
2. Mash or puree the food so it will be easy to eat and the baby will not choke on a piece of food.
3. Be very careful to wash your hands and prepare the food with sanitized utensils so germs do not get on the food.

The first food should be a very thin rice gruel. Other starchy gruels or pureed vegetables, fruits, or lean meats should be added next. Very ripe fruits such as bananas, avocados, papayas, and mangoes are easy to puree. Vegetables and lean meats should be cooked before they are pureed. The juice from the strained food, or water that has been purified, can be used to thin the puree and make it easy for the baby to swallow. If the food is tart, a small amount of sugar may be added.

To puree food, do the following:

- Wash hands with soap and water; also consider rinsing in sanitizing solution and purified water.



### *Sanitizing Solution*

1 liter water + 1 teaspoon  
fresh chlorine bleach (4–6%)

- Sanitize fruits or cooked vegetables to be pureed, and rinse them in purified water.
- Sanitize utensils, and rinse in purified water.
- Peel the fruits and vegetables or finely mince fresh, well-cooked meat.
- Mash the food with a fork.
- Use a spoon to force the food through a strainer into a clean bowl.
- Throw away the pulp left in the strainer.
- If needed, thin the pureed food with juice from the food or with water that has been purified.

Foods for the baby do not need to be cooked separately from those for the rest of the family. Vegetables, roots, pasta, or rice can be taken out of a pot of food for the whole family and pureed for the baby. Foods that have been salted or highly seasoned should not be given to the baby. (See the supplementary material at the end of this section for recipes for baby food.)

Fruit juices give the baby vitamin C. You can easily prepare juices from such fruits as oranges, kalamansi, pomelos, papayas, or watermelons by squeezing or mashing these fruits. Then strain the juice with a strainer or a sterile piece of cloth to remove small pieces of fruit. Add an equal amount of purified drinking water to the juice to dilute it. Add only enough sugar to make the juice taste good to the baby.

Some foods should not be given to small babies. Avoid giving babies salt or other seasonings or egg white during the first year. Avoid honey until they are one or two years old. Do not give children nuts, popcorn, or other hard pieces of food until they are more than two years old.

***A baby that is born prematurely or to a poorly nourished mother needs special feeding.***

Premature babies or babies born to poorly nourished mothers are called “at-risk” babies because it is very easy for them to get sick or even die unless they are properly cared for. At-risk babies require special feeding and care.

Breast-feeding from the first day of life is especially important for an at-risk baby. The colostrum that a baby receives from the mother’s breasts is greatly needed. If an at-risk baby cannot be breast-fed, it should be under the care of a specially trained medical person.

Breast-feeding should continue for at least the first year and longer if possible. If the baby is gaining weight at a steady rate, there is no need to add other foods until the baby is about six months old. An at-risk baby needs good nutrition but cannot take in large amounts of food. It is better to improve the mother’s diet than to try to add foods too fast to the baby’s diet.

When food is added, it should be given to the baby in very small amounts. Only one new kind of food should be added each week. When preparing foods for an at-risk baby, be very careful not to spread germs. You should wash and sanitize your hands and the utensils before preparing the food. The food should be fresh, fruit should be sanitized, and cooked foods should be boiled.

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***Purified Drinking Water***

1 liter water + 4 drops  
fresh chlorine bleach (4–6%)

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Follow the general pattern for adding foods to the baby's diet as you would for a healthy baby. Begin by adding cereal or fruit. Avoid wheat products at first, since they may cause allergies and intestinal problems.

***If breast milk is not available because the mother is missing or very ill, the baby should receive special formula.***

While breast milk is clearly best for babies, if it is not available, the next best option is commercial, iron-fortified baby formula prepared as directed. If commercial formula is not available or costs too much, then animal milk can be prepared as a formula in an emergency.

A mother must wash and sanitize her hands before she makes the formula and be very careful to use utensils and containers that are clean and have been sanitized. Only purified drinking water should be used to prepare formulas. Never add more water than directed to dilute the formula to make it last longer. If it is diluted, the baby will not get enough of the nutrients needed.

If an animal milk must be used, choose one from the following table to create the formula. Mix the amount shown of that milk with the amount of purified drinking water shown on the row below it and three teaspoons (or one tablespoon) of sugar.

<i>Animal Milk</i>	<i>Cow or Goat (Evaporated)</i>	<i>Cow or Goat (Whole)</i>	<i>Sheep or Buffalo</i>
Milk	100 mL	200 mL	140 mL
Purified water	240 mL	140 mL	200 mL
Sugar	3 teaspoons	3 teaspoons	3 teaspoons

Honey, molasses, or corn syrup sweetener should not be used in the formula. To use donkey or mare milk, thoroughly mix one teaspoon (5 mL) of vegetable oil with each 340 milliliters of milk, but do not add water or sugar.

The milk must also be sterile. Boil the formula, and let it cool at room temperature in a sterile container protected from dust and flies.

### **Supplementary Material: Recipes for Baby Food**

The water from unsalted cooked vegetables or broth from cooked meat is nutritious and safe. You can use it to make foods. Make gruel from boiled rice in the following way:

<i>Food</i>	<i>Amount of Boiled Rice</i>	<i>Amount of Water</i>	<i>Boiling Time</i>	<i>Yield</i>
Thin gruel	½ tablespoon	½ cup	10 minutes	5 tablespoons
Thick gruel	4 tablespoons	1 cup	10 minutes	12 tablespoons
Soft rice	1 cup	1 cup	5 minutes	1½ cup

You can make other gruels from corn or oats as well as from starchy roots such as cassava, potato, and yam. Wheat does not make a good gruel for babies under the age of one year, since it causes allergies.

### ***Purified Drinking Water***

1 liter water + 4 drops  
fresh chlorine bleach (4%–6%)

### ***Egg Yolk–Rice Gruel***

- ½ cup unsalted meat or chicken broth
- 2 tablespoons of boiled rice
- 1 egg yolk, beaten
- 1 tablespoon of milk or evaporated milk

Add broth to rice and mash with the back of a spoon. Bring to a boil. Combine egg yolk and milk. Add to the rice-broth mixture. Lower heat, and cook three minutes. Let cool. Give to babies seven to eight months or older.

### ***Mixed Vegetable and Bean Puree***

- ¼ cup of water from unsalted cooked vegetables (or purified water)
- ¼ cup of boiled beans, mashed
- ¼ cup of tender greens
- 1 tablespoon of milk or evaporated milk

Add water to greens, and boil for five minutes. Add beans and heat to boiling. Remove from fire, mash well, and pass through a sieve. Add milk, and cook two minutes, stirring constantly. Let cool. Give to babies seven to eight months or older.

### ***Fish or Shrimp Powder or Flour***

Toast small fish such as fresh anchovies and small shrimp over a low fire until they are crisp (20 to 30 minutes depending on the size of the fish). Powder them, and pass them through a fine sieve. You can keep the powder for a week and use it in gruel and pureed vegetables as a growth food. Give to babies six months or older.

### ***Starchy Root Cooked with Coconut Milk***

Add cooked sweet potato, yam, cassava, or potato to an equal amount of thick coconut milk. Mash into a gruel. Cook it over medium heat for three minutes, stirring constantly. Let cool. Give to babies six months or older.

### ***Peanut-Banana Mash***

Blend a ripe banana with ¼ cup of smooth peanut butter. Give to babies six months or older. If you do not have peanut butter, toast ¼ cup of shelled peanuts (without molds) until golden brown. Remove skins, and pound or grind finely. Be sure there are no small pieces of peanut that may cause the baby to choke.

## Stretching the Food Budget

*If you shop wisely, you can save money.*

When you buy food, you pay for much more than the value of the food itself. Here are some things you pay for:

- The cost of the food itself.
- The cost of the fuel you use to prepare the food.
- The cost of your travel to buy the food.

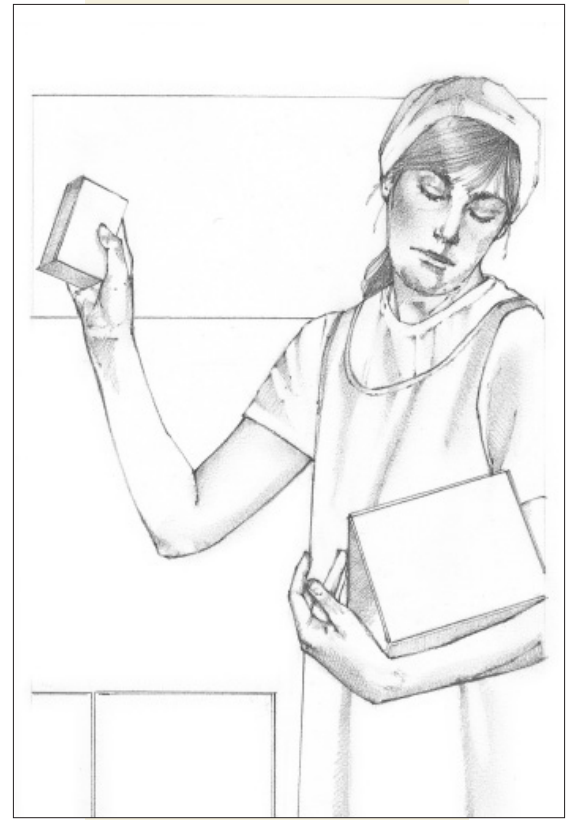
Sometimes you can reduce the cost of food by buying a lot of food at once rather than small amounts. It is usually best to do this during the harvest season, when the food is at its lowest price.

If you buy large amounts of food, you must store the food well so that it will not spoil. You must think about what foods will store well without spoiling for a week, two weeks, or a month. Grains, seeds, sugar, cooking oil, dried fish, and whole squash may be good for storage.

Buying food in the less expensive markets can also help you save money. Sometimes you can buy things for a lower price by going to a large marketplace in the central city. However, you must also remember the cost of transportation. You need to learn where you can shop to get the lowest price for good food.

Another way to pay less for food is to learn to get the best value for the least money. For example, there are many different kinds of growth foods (see pages 29–30), but they do not all cost the same. You can plan your meals to use more of the less expensive foods.

You can save money by avoiding foods that do not help the body grow or stay healthy. In many parts of the world, people drink a lot of soda pop and eat puffed rice, puffed pasta, fried chips, and candies. These kinds of foods do not provide good nutrition. Also, they waste money that should be used on food to make a complete and balanced diet. For example, candy and soda pop provide only energy, and they usually cost much more than the value of sugar. The amount of money spent on one soda pop could provide something much more nutritious.



*You can save money and keep the nutrients in food by the way you cook.*

The cost of the fuel needed to cook food can raise the cost of the food. But many foods must be cooked well to kill germs. You may spread germs if you try to save fuel by just warming the food instead of cooking it fully. However, there are ways to use less fuel and still have sanitary food.

One way is to cook vegetables in a container above a steaming pot of rice or beans during the last few minutes of cooking the rice or beans. The vegetables do not need to be mixed with the cooking food, just exposed to the steam above the food being cooked in the pot. The vegetables should be in a container that is the same size as the pot so heat will not be lost around the sides. The water in the pot should be just barely boiling so heat is not wasted.

Another good idea is to soak grains and seeds in water before cooking them. This will shorten the cooking time. Rice needs to be soaked for about an hour, but beans should be soaked for at least 12 hours before cooking.

The instructions for soaking rice are as follows:

- Measure the rice and wash it once.
- For every three cups of rice, use four to five cups of water.
- Soak the rice in the water for one hour. Drain off the water into a cooking pot.
- Bring the drained water to a boil.
- Cook the rice in the boiling water as usual.

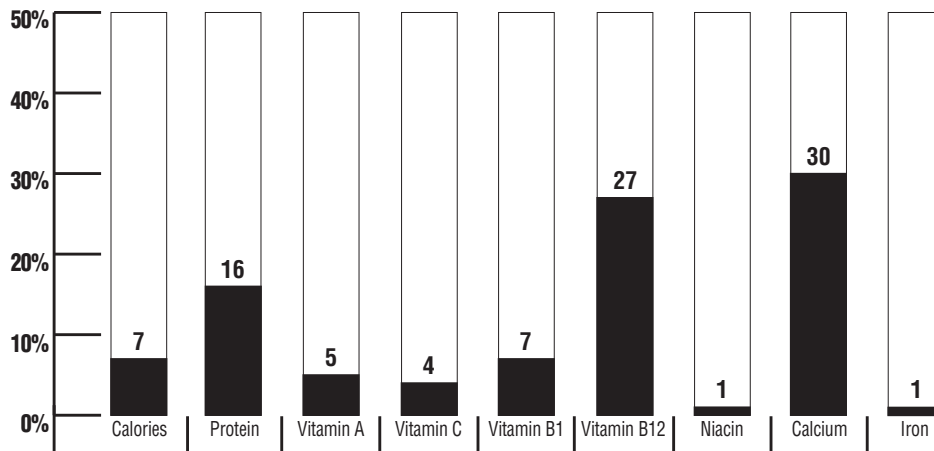
The rice will be cooked in less time and with less fuel.

Some of the nutrients in food are destroyed or lost when food is cooked or washed. Here are some things you can do to reduce the loss of nutrients in food:

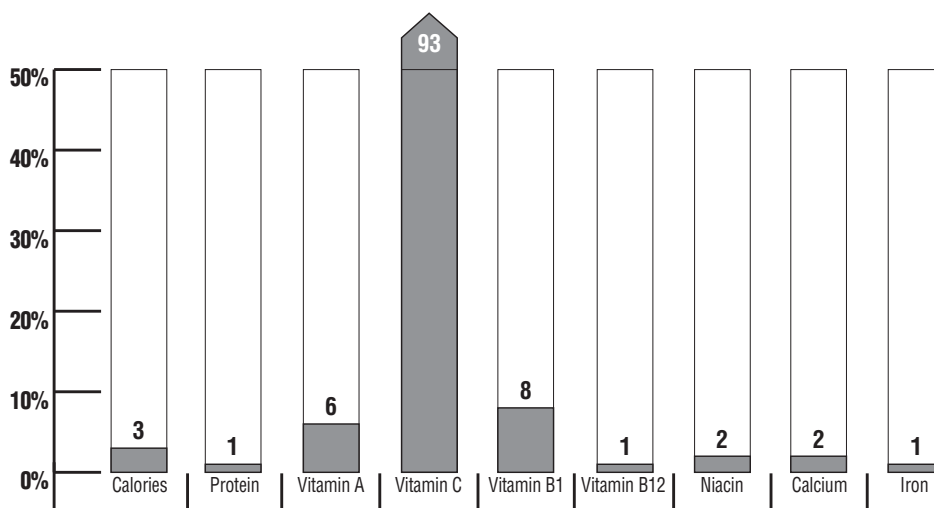
- Wash enriched grains only once before cooking. Cook them for a short time in very little water.
- Do not cut or slice vegetables until just before cooking.
- Steam vegetables rather than boiling them, or boil them in small amounts of water.

## Supplementary Material: The Nutrition in Soda Pop Compared to Milk and Juice

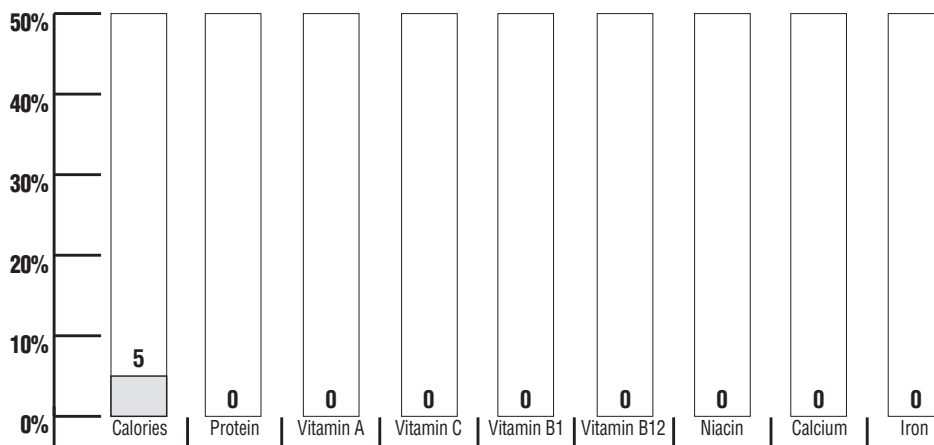
Based on 50 Percent of Recommended Daily Allowance



1 Cup  
Whole Milk



1/2 Cup  
Orange Juice



1 Cup  
Soda Pop

## Food Storage

*You should store food that will provide good nutrition for your family.*

We have been counseled to store food so that we will be able to provide good nutrition for ourselves at all times. Many fruits and vegetables are available only at certain times of the year. You can buy them during the harvest season when prices are low and store them. You will be able to eat the food you store during times when fresh foods are not available.

Having a supply of food can also be of great importance to you in times of emergencies such as fires, floods, earthquakes, famines, typhoons, or other times when food is difficult to get. If you were ever unable to earn money to buy food for your family because of illness or unemployment, it would be very helpful to have some food stored.

If you decide to store food, you should make sure that it will provide good nutrition for you and your family.

Store food from each of the three basic food groups: some energy foods, some growth foods, and some protection foods (see pages 29–30).

The body must have energy foods constantly. It is very important for your family to store a supply of some energy foods.

It is also important to store growth foods. When people eat growth foods regularly, their bodies can grow and repair themselves. Growth foods are most important for infants, children, pregnant or nursing women, and people recovering from an illness.

Most fruits and vegetables are good protection foods. Some are very important because they have a lot of vitamin A or vitamin C.

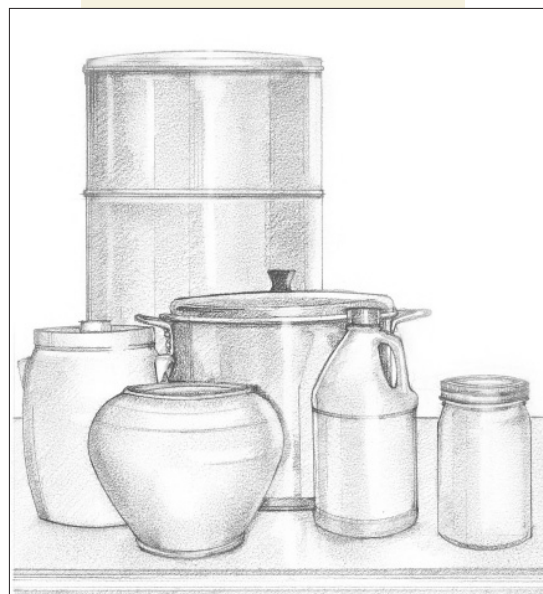
Remember to store foods that your family members are used to eating and like to eat. In an emergency, if they have to eat food that they do not like or are not used to, they could get sick.

*Store the amount of food that will be right for your family.*

The amount of food you store depends on many things, including the size of your family, the cost of food, the climate, and local laws for food storage. Many people are able to store only enough for one or two weeks. Others are able to store enough food to last from one harvest season to the next or even for a full year. You should determine for yourself how much your family should store.

You should be wise as you store food and water. Do not go to extremes; it is not prudent, for example, to go into debt to establish your food storage all at once. With careful planning, you can, over time, establish a home storage supply.

*Three-month supply.* Build a small supply of food that is part of your normal, daily diet. One way to do this is to buy a few extra items each week to build a one-week supply of food. These items should be rotated regularly to avoid spoilage. If money is scarce and you cannot afford to purchase extra food, you can take a handful of the uncooked food you prepare daily and store it in a glass jar. You will soon have a reserve of your most basic food, whether it is rice, beans, wheat, or cornmeal. Then you can gradually increase your supply until it is sufficient for three months.



*Longer-term supply.* For longer-term needs, and where permitted, gradually build a supply of food that will last a long time and that you can use to stay alive, such as wheat, white rice, and beans. These items can last 30 years or more when properly packaged and stored in a cool, dry place. A portion of these items may be rotated in your three-month supply.

Stored foods do not last indefinitely. You should rotate them by eating older stored foods first and replacing them with freshly preserved foods. This rotation plan is a continuing process. One way to assure proper rotation of foods is by marking the date on packages of food as they are purchased or stored. Put recently purchased or preserved food on the shelf behind foods that you purchased or preserved earlier. As you prepare meals, this will make it easier for you to use the older foods first.

***Choose the best method for you to preserve the types of food you eat.***

There are many different ways to preserve and store food. They include the following:

- Storing under the ground level
- Smoking or curing
- Drying fruit, vegetables, and meat
- Canning or bottling
- Salting or brining
- Fermenting or pickling
- Cold storage or freezing
- Dry food storage in PETE containers or glass bottles

When selecting a method of preserving food, consider expense, need for special equipment, and dependability of the method. Consider whether it is a new method in your area or one that has been used successfully by many people for a long time.

***Once foods are preserved, they must be stored in a way that will keep them clean and safe to eat.***

Regardless of the method you use to preserve foods, you should always follow these requirements:

1. Keep foods cool. Store them in a dark or shady place, away from sunlight.
2. Protect foods from moisture. Dried foods will spoil if they get wet before they are used. Food preserved by other methods may spoil from excess moisture.
3. Protect foods in packages or containers. The best containers prevent dust from reaching the food and make it difficult or even impossible for insects and animals to eat the food.

(See the supplementary material at the end of this chapter for additional information on preserving and storing food.)

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***Store some purified water in case of emergencies.***

Natural disasters such as earthquakes, typhoons, or floods often cause water supplies that are normally clean to become dirty and full of germs. It is a good idea to have a small supply of purified water stored in case of such emergencies. Each family member needs about four liters of purified water every day.

Before you store water, if it is not clear you may want to pass it through a filter. You should purify it by adding four drops of strong chlorine bleach (4 to 6 percent sodium hypochlorite) to each liter.

Store your purified water in a plastic or glass container. Clean the container very well with soap, and rinse it with sanitizing solution. If you use glass bottles, put them in larger containers or pad them to keep them from breaking in case of an earthquake.

Check the containers every month to see if a lid is beginning to rust or if a plastic bottle is beginning to split and leak.

Another way to provide pure water in case of emergencies is to store a bottle of bleach that could be used to purify water.

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***Purified Drinking Water***

1 liter water + 4 drops  
fresh chlorine bleach (4–6%)

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***Sanitizing Solution***

1 liter water + 1 teaspoon  
fresh chlorine bleach (4–6%)

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## Supplementary Material: Food Storage

### Making a Food Cooler

An evaporative cooler will keep meats, fruits, vegetables, milk, and butter cool. It costs very little to build and nothing to operate. The following directions will provide a general outline of how to make it. Use local knowledge and materials to make the refrigerator useful for your area. Please note, however, that it will not cool effectively in a humid environment and in such circumstances may encourage the growth of mold, germs, and mosquitoes in the containers of water.

Make a wooden frame, approximately 140 centimeters high by 30 centimeters wide by 35 centimeters deep. Cover it with screen wire or hardware cloth, preferably the kind that will not rust. If you cannot get such wire, you can use woven grasses or branches. The top of the frame should be covered with wire, but the bottom may be solid. Make a door for one side and mount it on hinges or leather thongs. Fasten it with a wooden button or latch.

You can make adjustable shelves out of light wooden frames covered with poultry wire mesh or woven grass or other plant material. Put these shelves on side braces.

Paint the woodwork and the shelves. If this is not possible, oil the wooden parts with linseed oil, coconut oil, or cooking oil, and let them dry for a few days before using.

Make a cover of flannel, burlap, or other heavy, coarse, water-absorbent cloth to fit the frame. Put the smooth side of the fabric on the outside. Button the cover around the top of the frame and down the side on which the door opens. Use buggy hooks and eyes or large-headed tacks and eyelets, or simply lace cord through worked eyelets.

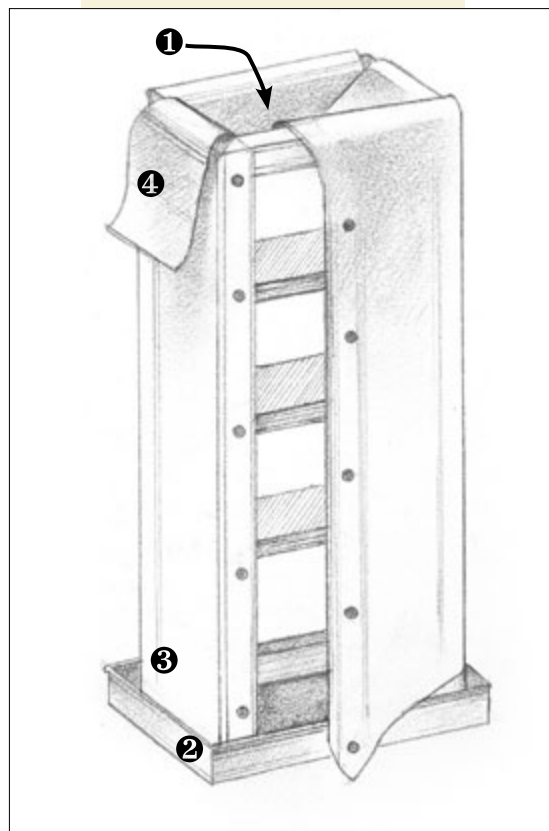
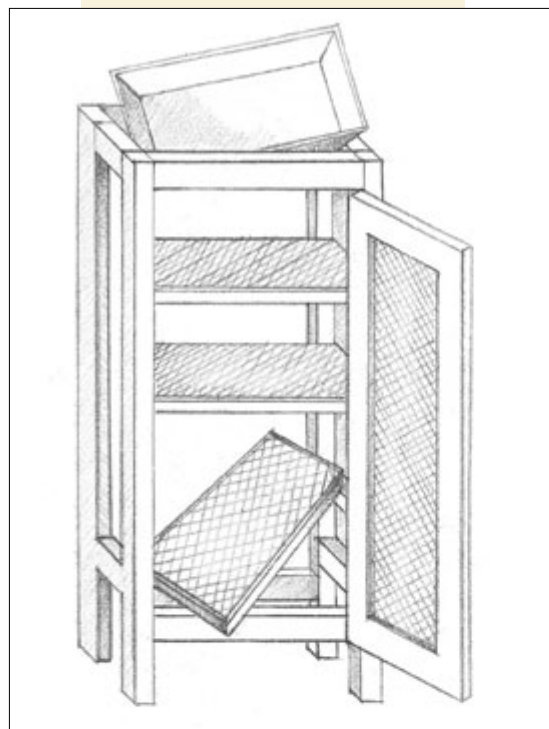
Place a pan 10 centimeters deep or a shallow bucket on top of the frame (1). Put the frame in a larger container of water (2). Both containers should be painted. The bottom of the cover (3) should extend down into the lower pan. Sew four doubled strips of cloth (4), 20 to 25 centimeters wide, to the upper part of the cover. These strips form wicks that dip over into the upper pan.

The operation of this refrigerator is simple. Keep it in a shady place where the wind can blow over it. Keep the upper pan filled with water. The water is drawn through the wicks, and it saturates the cover. Cooling starts more quickly when the cover is dampened by dipping it in water or throwing water on it. The greater the evaporation, the lower the temperature inside the refrigerator.

Regularly clean the refrigerator and put it in the sun. It is a good idea to have two covers so that a fresh one can be used each week while the soiled one is washed and put in the sun to be dried and sanitized.

### Ways to Preserve and Store Foods

*Storing under the ground level.* This method is good for some root vegetables and certain fruits and green, leafy vegetables. Fruits and vegetables should not be stored together. If green, leafy vegetables are stored, there must be good drainage and not too much rain. They can be stored only if in a cool, dry place, such as a cellar. Some examples of vegetables and fruits that can be stored are carrots,



potatoes, dry beans, cabbage, celery, grapes, onions, oranges, pears, peas, pumpkins, squashes, and turnips.

*Smoking or curing.* A type of drying using smoke increases the storage life of food. Curing involves a combination of curing agents and smoking to preserve the food. Commonly used for preserving meats and fish, these methods greatly alter the flavor of the original product. Smoked or cured foods keep only for a few months. You must be very careful to use the right amount of curing agents, such as nitrates and nitrites. Please consult local authorities for smoking and curing recommendations for your area.

*Drying fruits, vegetables, and meats.* Foods such as fruits, vegetables, and meats can be stored by drying them first in the sun. The basic requirements for food drying are heat (from sunlight), circulating air, and protection from dust, dirt, and animals. The food should be cut into fairly thin sections and placed on a screen of thin cloth that allows the air to circulate. The food should be dried until there is no apparent moisture when the food is bent.

*Canning or bottling.* Heat-processed foods that are sealed in a closed container, such as a glass bottle, can be stored for a year or more. However, appropriate containers, equipment, and fuel are necessary for this process and may be expensive. Low-acid foods, such as vegetables and meats, may cause severe illness and death if they are improperly processed. Canning must be done in a steam or water bath and cannot be done in the oven. Please consult your local authorities for the best canning practices for your area.

*Salting or brining.* Salt may be used in the drying process to increase storage time of some foods, such as fish. Salt and water brines may be used to prevent the growth of spoilage organisms in some foods. Excess salt may be washed away before the salted food is used.

*Fermenting or pickling.* Fermented or pickled products include pickles, sauerkraut, fermented soybean curd, and pickled eggs and olives. These methods make it possible to store vegetables for several months.

*Cold storage or freezing.* Refrigeration and freezing are useful ways to preserve many foods. However, these methods usually take a great deal of space and fuel consumption unless the food can be stored outside in very cold climates.

*Dry food storage in PETE containers or glass bottles.* To keep dry foods from spoiling, you must protect them from moisture, pests, or other contamination. In addition, foods will be better quality and more nutritious if they are protected from heat and light.

### *Selecting Storage Containers*

A good container may be made of glass, metal, rigid plastic, wood, or clay, depending on storage conditions. It should retain moisture and natural food odors while keeping out additional moisture, rodents, insects, microbes, dust, air, and light. Where moisture is a problem, avoid wooden or paper containers.

Rodents and insects can penetrate wood, cardboard, and thin plastic. In the right storage area, polypropylene and polyethylene bags and containers are safe, but not all plastic materials can be used to store food. Buckets that have been used for food products may be used again, but after many years the plastic may decompose, crack, and emit odors, making the containers unsuitable for storage. Use metal containers only in a dry storage area, and protect glass containers from breaking. Containers must be airtight and capable of being tightly sealed.

In summary, the principles for how to store foods are:

- Store foods so as to avoid the effects of air, light, heat, moisture, insects, and rodents.
- Choose storage areas according to the types of food you store. Remember that cool, constant temperatures and low humidity are preferable.
- Store food in durable containers that best suit the conditions in your storage area. Any container that will keep out air, heat, moisture, and pests is suitable.
- Control insect contamination by keeping the storage area clean and by treating insect-infested foods.

### *Storing Bulk Dry Foods*

The following recommendations apply to dry foods such as grains, beans and other legumes, dehydrated fruits and vegetables, and non-fat powdered milk. Before storage, the foods need to be clean, dried to a moisture level of about 10 percent or less, and low in oil content. You will want to choose whole grains and legumes of excellent quality for storing. Because the grain must be dry, you can either dry it in the sun or in an oven.

If you use an oven, heat the oven on low heat for 10 minutes and turn the oven off. Place the grain or beans on a toasting pan or tray, and put them inside the slightly warm oven for 10 minutes.

To test the dryness of your grain or beans after drying, place one grain or bean on a hard surface and smash it with a rock. If the grain or bean fractures or breaks into pieces, then it is dry enough. If it is still bendable and does not fracture into pieces, then it needs to be dried more before storing.

Plastic bottles such as used soda pop or juice bottles that have only held food items are often used to store dry foods. Glass bottles with metal gasket lids can also be used.

### *PETE Bottles for Longer-Term Storage*

Bottles made of PETE (polyethylene terephthalate) plastic can be used with oxygen absorbers to store products such as wheat, corn, and dry beans. PETE bottles can also be used without oxygen absorbers, using the alcohol method to reduce the amount of oxygen in the PETE bottle. PETE bottles are identified on the container with the letters PETE or PET.

PETE bottles can also be used for shorter-term storage (up to five years) of other shelf-stable dry foods such as white rice.

### *Packaging in PETE Bottles*

1. Use PETE bottles that have screw-on lids with plastic or rubber lid seals. You can verify that the lid seal will not leak by placing a sealed empty bottle under water and pressing on it. If you see bubbles escape from the bottle, it will leak.
2. Clean used bottles with dish soap and rinse them thoroughly to remove any residue. Drain out the water and allow the bottles to dry completely before you use them for packaging food products.
3. Place an oxygen absorber in each bottle. The absorbers can be used with containers of up to one-gallon capacity (four liters).
4. Fill bottles with wheat, corn, or dry beans.
5. Wipe top sealing edge of each bottle clean with a dry cloth, and screw lid on tightly.
6. Store the products in a cool, dry location, away from light.
7. Protect the stored products from rodents.
8. Use a new oxygen absorber each time you refill a bottle for storage.

*The alcohol method.* If you do not use an oxygen absorber, then you can follow these simple instructions to reduce the amount of oxygen in your PETE bottles:

1. Fill the bottle to about three fingers from the top with a grain or legume, such as beans, peas, lentils, wheat, beans, popcorn, soybeans, oats, chickpeas, bulgur wheat, or hominy. As you fill the bottle, make sure to tap the sides so that all the contents settle and there is no additional trapped air.
2. Make a funnel with aluminum foil and place it inside the PETE bottle. You can use your fingers to make a hole in the grain to make room for the funnel.
3. Place a small piece of cotton with a tiny amount of rubbing alcohol on it inside the aluminum foil funnel in the PETE bottle.
4. Ignite the small piece of cotton and immediately cap the bottle. The fire will consume the oxygen inside the bottle.
5. Tape around the lid at least three times to seal the bottle.

Other methods for storing grain and beans in PETE bottles include using garlic cloves, bay leaves, or oil.

*The garlic method.* Fill the PETE bottle up to the height of three fingers of grain or beans, and then add three garlic cloves with the skin intact. The cloves should have the entire shell without cracks and should be small enough to fit through the opening of the PETE bottle. Then fill the PETE bottle to the next height of three fingers, and add three garlic cloves with skin intact. Repeat this process until you fill the PETE container to the neck. You should feel that the bottle is airtight and is hard like a rock. Then place the lid on the PETE bottle, and tape securely to seal the lid. You should not use more than nine cloves per PETE bottle. Shelf-life is one to two years.

*The bay leaf method.* Start by placing three bay leaves or laurel leaves at the bottom of the PETE bottle. Then fill the PETE bottle to the height of three fingers, settle the grain or beans, and place another three bay leaves or laurel leaves on top of the grain or beans. Repeat the process of adding a layer of grain or beans, settling the contents, and adding three more bay leaves or laurel leaves until you reach the neck of the bottle. The PETE bottle will be hard like a rock if you have done it correctly. If it is not hard, then you need to start over. When you have finished filling the PETE bottle, place one last bay leaf or laurel leaf on top of the grain or beans, and place the lid on the PETE bottle to secure it. Then seal it with tape.

*The oil method.* This process should be used with one pound of grain or beans at a time. After drying the beans or grain, mix them with one tablespoon (15 mL) of vegetable oil. Keep the beans or grain in plastic bags. The plastic bags can then be stored in durable containers such as plastic bottles or cans. This will help to reduce insects or rodents.