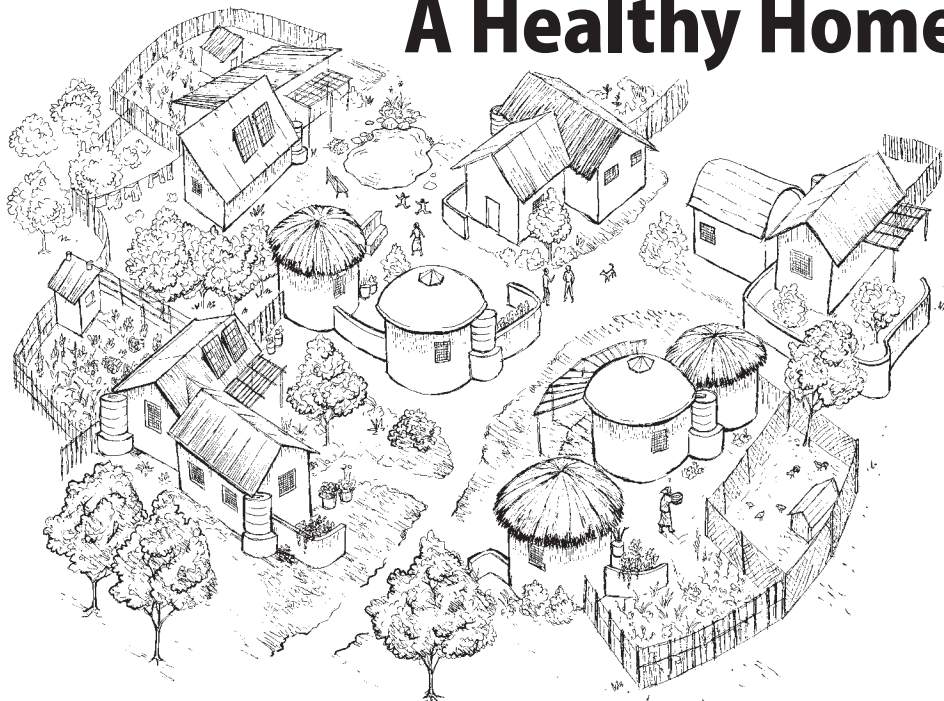


17 A Healthy Home

In this chapter:	page
Health problems at home	350
Indoor air pollution	352
Story: Improved ventilation solves many problems	353
Carbon monoxide poisoning	354
Cigarette smoke	355
Tuberculosis (TB)	356
Allergies	357
Dust and dust mites	357
Mold	358
Improved stoves	359
Story: Women improve stoves for fuel and flavor	359
Fuels for cooking and heating	363
Fire safety	365
Controlling pests	366
Toxics in the home	368
Lead poisoning	368
Asbestos	371
Toxics in furniture and fabrics	372
Home cleaning products	372
Story: Natural home cleaning protects health	374
Safe food preparation	375
Reduce food-borne illness at home	375
Do not bring work hazards home	376
Building a healthy home	377
Choosing building materials	379
Story: Teenagers produce improved building materials	380
Planning with communities	384
Story: Building homes and community	385

A Healthy Home



The ideal home is not just a building for shelter. A home should be a place free from harm, that supports physical, mental, and social well-being, and provides dignity and a sense of community. A healthy home protects against extreme heat and cold, rain and sun, wind, pests, disasters such as floods and earthquakes, and pollution and disease.

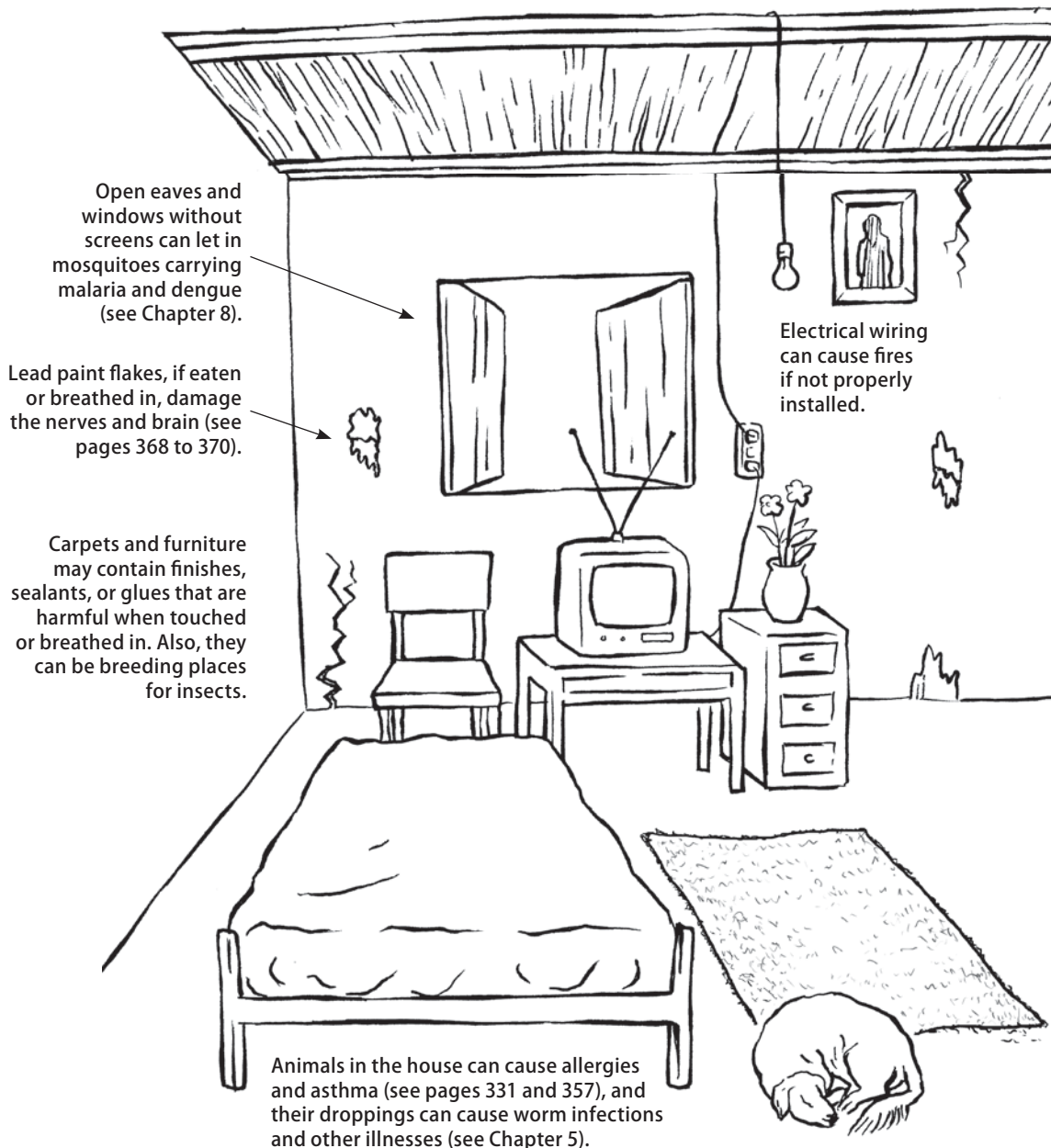
Unfortunately, many people's living conditions do not protect their health. Poor living conditions may even cause illness, or make health problems worse. Whether people live close together or spread apart, poor housing, **indoor air pollution**, pests, and toxic chemicals in household products can cause many illnesses.

As more people move from rural areas into cities and towns, the way people live and maintain their homes changes, often for the worse. People who spend a lot of time in the home, such as children, the elderly and disabled, and people with long-term health problems such as HIV, suffer the most.

How to improve living conditions by making homes safer and more comfortable depends on local traditions, available materials, and climate. Unfortunately, it also depends on income and ownership. People who rent their homes often have little control over their living conditions and must depend on their landlords to make improvements. People in shantytowns, marginal communities, or other "temporary" settlements (which too often become permanent) live in homes that rarely provide security or comfort. But whether a person owns, rents, or lives in makeshift housing, working with neighbors is the most effective way to improve living conditions in the whole neighborhood.

Health Problems at Home

Our homes are not separate from the environment. They can have many of the same environmental health problems we find in our communities and workplaces. When planning a new home or improving the home you live in, you can protect your health by considering problems caused by how and where houses are built, how they are furnished, and what work is done at home.



Air pollution from outside the home, especially in cities, industrial areas, and where large amounts of pesticides are used, causes asthma and other illnesses of the lungs, nose, throat, and eyes.

Rodents, mosquitoes, and other insects can live and breed in roof thatch and cracks in the walls and floors, spreading diseases such as Chagas (see page 367).

Cracks in foundations, floors, and walls, and unsealed roofs and windows cause heat loss and dampness. This allows mold to grow on walls, bedding, and furniture. Mold can cause breathing problems, rashes, and other illnesses (see page 358).

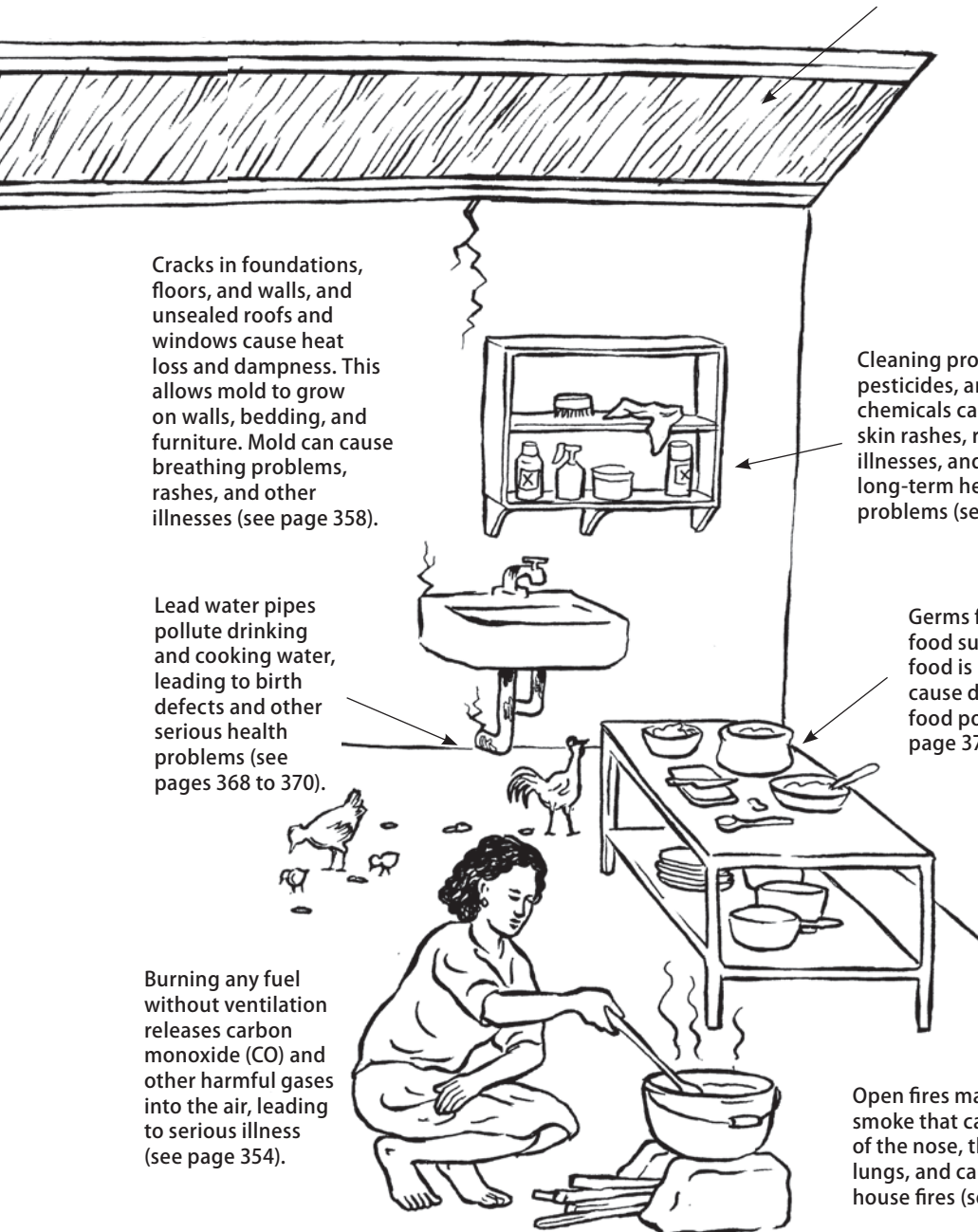
Cleaning products, pesticides, and other chemicals can cause skin rashes, respiratory illnesses, and other long-term health problems (see page 372).

Lead water pipes pollute drinking and cooking water, leading to birth defects and other serious health problems (see pages 368 to 370).

Germ from food or food surfaces where food is prepared cause diarrhea and food poisoning (see page 375).

Burning any fuel without ventilation releases carbon monoxide (CO) and other harmful gases into the air, leading to serious illness (see page 354).

Open fires make harmful smoke that causes illnesses of the nose, throat, eyes, and lungs, and cause burns and house fires (see page 365).



Indoor Air Pollution

When people burn wood, dung, coal, charcoal, gas, and crop wastes indoors for cooking or heating without good **ventilation**, smoke fills the house. This smoke contains harmful gases (**fumes**) and tiny **particulates** (soot) that cause breathing problems and other illnesses. Headaches, dizziness, and fatigue are often followed by serious illnesses such as asthma, pneumonia, bronchitis, or lung cancer. Indoor air pollution from smoking fires also increases the risk of getting TB (see page 356).

Women and children are the most exposed to harmful cooking smoke. When pregnant women are exposed to a lot of smoke every day, it can cause their children to be born very small, grow slowly, and have difficulty learning later on. In some cases, it can even cause children to be born dead.

To reduce indoor air pollution, you can:

- improve ventilation (see pages 352 to 354).
- improve stoves (see pages 359 to 362, and Resources).
- use cleaner fuels (see page 362 to 364, and Chapter 23).
- use safer cleaning products (see page 358, and 372 to 374).
- reduce air pollution from outdoors (see Chapter 20).



**When men cook more,
they will become better
cooks and burn less food.**

Poor ventilation harms health

Ventilation is the way fresh air moves into a room or building, and how old and polluted air moves out. If a house has poor ventilation, smoke and polluted air stay inside. Poor ventilation also traps moisture in the house, causing dampness and mold. The easiest way to reduce indoor air pollution is to improve ventilation. To know if your house has poor ventilation, look for these signs:

- Smoke stays in the house, or the ceilings are black from cooking or heating smoke.
- Moisture collects on windows or walls.
- Clothing, bedding, or walls grow mold.
- Bad smells from toilets or sewers stay in the house.

If you cook with gas and often suffer from dizziness and confusion, this may be a sign of poor ventilation or a gas leak.

Improved ventilation solves many problems

Ndito, a mother of 3 children, once began every morning with a terrible coughing fit. When she built a fire in the kitchen to heat water and prepare food, the house filled with smoke, causing Ndito to wheeze. Each breath was painful and labored. The smoke in Ndito's kitchen gave her asthma.

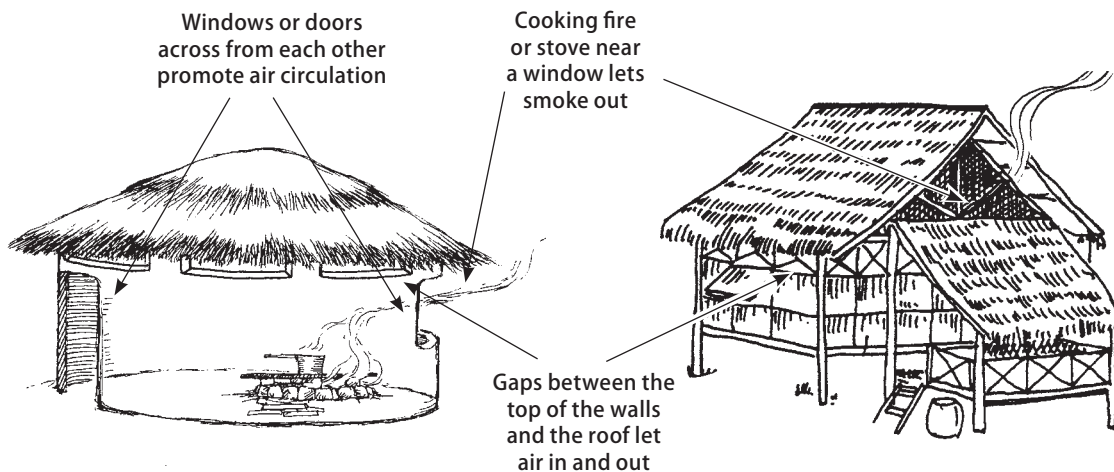
Because of her health problems, Ndito and her husband Refa agreed to join the Kenya Smoke and Health Project. Refa learned to measure the air pollution in their house, and found that the amount of smoke was very unhealthy. Refa and Ndito decided to make changes to reduce the smoke pollution.

Project workers helped Ndito build a hood over her stove with a chimney to remove smoke from the house. Also, Refa built new, larger windows to improve ventilation. With less smoke in the house, the family spends more time together. The windows also make it easier for Ndito to watch over their livestock, and they let in more light, making it easier to do beadwork.

Before these changes, Refa stayed away from the kitchen. Now he wakes up before dawn to start the fire and puts on a pot of water for tea. Ndito is relieved from waking up early and doing all the chores by herself. The new smoke hood and chimney have reduced the amount of soot, so Ndito has less to clean. Her coughing fits are less common now. Refa and Ndito had to pay for the smoke hood, but the changes they made improved Ndito's health and will protect the whole family from illness. Better health improved their livelihood, so the money they spent on the smoke hood is an investment in their future.



To improve ventilation



Carbon monoxide (CO) poisoning

Stoves or appliances that burn natural gas, liquid petroleum (LP gas), oil, kerosene, coal, charcoal, or wood may produce carbon monoxide (CO), a poisonous gas with no color, taste, or smell. CO is also produced by cars.

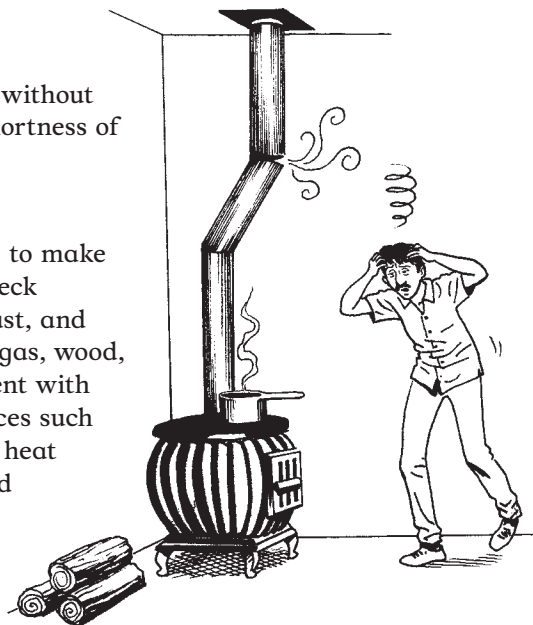
People often close a room tightly to keep warm or use less fuel. But heating without ventilation can be dangerous. In a poorly ventilated space, CO can cause serious illness, or even death.

Signs

CO poisoning seems at first like flu, but without fever. Signs include headache, fatigue, shortness of breath, nausea, and dizziness.

Prevention

The best way to prevent CO poisoning is to make sure your home has good ventilation. Check chimneys and flues for cracks, blocks, rust, and loose connections. Never burn charcoal, gas, wood, or other fuel inside a home, vehicle, or tent with poor ventilation. Do not use gas appliances such as stove tops, ovens, or clothes dryers to heat your home. Avoid using gasoline-powered tools and engines indoors. If you must use them, make sure there is good ventilation and place the engine so exhaust fumes will go outdoors.



Cigarette smoke

Smoking tobacco can cause many health problems for the smoker and for other people exposed to the smoke. Health problems from smoking include:

- serious lung diseases, such as lung cancer, emphysema, and chronic bronchitis.
- heart disease, heart attack, stroke, and high blood pressure.
- cancer of the mouth, throat, neck and bladder.



Second-hand smoke is the mixture of smoke that comes from cigarettes, pipes, and cigars, plus the smoke breathed out by the smoker. Second-hand smoke makes smoking dangerous for everyone who lives with a smoker, especially children. It causes the same health problems as does smoking.

To stop or help someone stop smoking

People who smoke become addicted to a drug in tobacco called nicotine. Without a cigarette, they may feel sick or nervous. As every smoker knows, it is difficult to stop smoking because nicotine is a very addictive drug.

Because tobacco companies market their products aggressively, many people begin smoking at a young age and continue smoking because of the addiction to nicotine. Cigarette companies say smoking is a personal choice, not an addiction. **This is not true.** Understanding that smoking is a harmful addiction and not a personal choice is the first step toward stopping.

Telling people “DO NOT SMOKE,” is rarely successful in helping smokers to stop. Some ways to help break the addiction and stop smoking include:

- Practice deep breathing every time you crave a cigarette.
- Exercise daily.
- Replace smoking with a healthy habit such as drinking a cup of tea or walking.
- Drink plenty of water to flush nicotine out of the body.
- Ask for support from friends and family.



Tuberculosis (TB, consumption)

Tuberculosis (TB) is a disease that most often affects the lungs. It passes easily from person to person because when someone with TB coughs, the germs get into the air and live for many hours, letting other people breathe in the germs. TB spreads quickly in crowded homes and neighborhoods, in factories, work camps, prisons, refugee camps, and other places where people live or work closely and there is little ventilation.

Who gets sick from TB germs?

Many people have TB germs in their bodies, but only 1 out of 10 of them will get sick with TB. People are more likely to get sick if they are already weak from illnesses like asthma, malaria, or HIV, or if they are very young, very old, or malnourished. Smoking tobacco and breathing polluted air increase the risk of TB.

Signs

Tuberculosis is curable if it is treated early and completely. A person may have all or some of these signs when they first get sick:

- a cough that lasts longer than 3 weeks, often worse just after waking up
- a slight fever in the evening and sweating at night
- pain in the chest and upper back
- steady loss of weight and increasing weakness

Young children may have frequent fevers, steady weight loss, swellings in the neck or belly, or a lighter skin color.

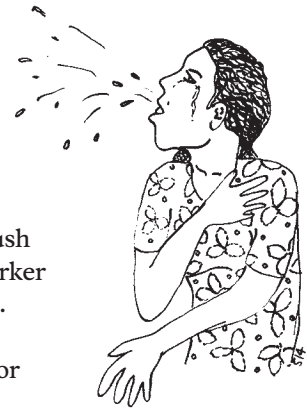
Treatment

If you think you may have TB, cover your mouth or cough into your shirt when you cough around other people, and wash your hands often. Go to a clinic right away. If the health worker finds you have TB, you will need to begin taking medicines.

To cure TB, people take 4 different medicines every day for 2 months, then, if they are getting better, 2 or 3 medicines for another 4 months. If someone in the home has TB:

- Test the whole family for TB and begin treatment for those who are sick.
- Vaccinate all children against TB.
- The person with TB should eat and sleep apart from the children if he or she has any cough at all.

TB is less of a problem when homes and workplaces are well-ventilated. But as long as people in the community have TB germs, it will be a threat. Reducing poverty and training people to recognize and treat TB are more likely to stop the spread of TB than any other solution. To learn more about the signs of TB and ways to prevent and treat it, see a health worker or a general health care book such as *Where There Is No Doctor*.



People with TB should cover their mouths when they cough and not spit on the floor.

Allergies

Allergies are signs of the body's reaction to substances it finds difficult to tolerate. Allergies are often difficult to recognize and treat because they have the same signs as many common illnesses. Common **allergic reactions** include difficulty breathing, coughing, itchy throat, runny nose, tiredness, red or itchy eyes, and skin rashes.

Many things in the home can cause allergies, such as cleaning products, chemicals in carpeting and furniture, mold, pollen, animal dander, feathers, waste, dust and dust mites, cockroaches, rats, mice, and other pests. Exposure to toxics can lead to Multiple Chemical Sensitivity (MCS), which is similar to allergies (see page 333). Some ways to prevent allergic reactions are:

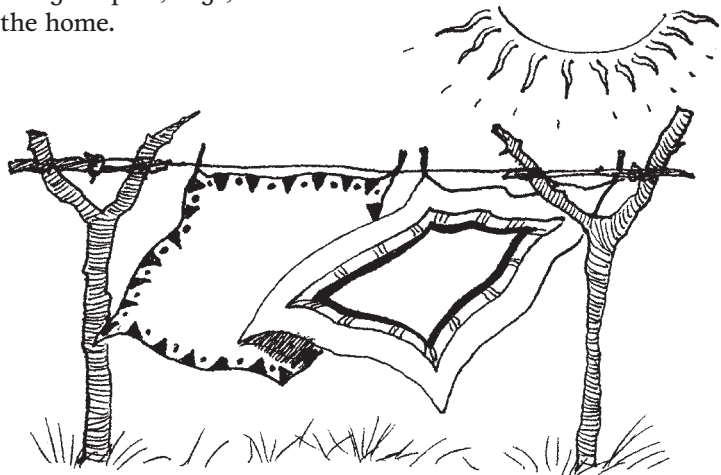
- Improve the flow of air through the house.
- Reduce contact with the pollutant causing the allergic reaction.
- Keep the house clean and free of dust.

Dust and dust mites

Dust mites are tiny, invisible bugs that are the biggest cause of indoor allergies. They irritate the eyes and nose and cause asthma attacks (see page 331). Dust mites live in warm, humid places filled with dust such as bed pillows, mattresses, carpets, stuffed toys, clothing, and furniture.

To get rid of dust and dust mites

Cleaning sleeping areas and bedding will help reduce dust, dust mites, and animal hair. Covering mattresses and pillows with tightly woven fabrics or plastic, and washing these covers in hot water regularly will help get rid of dust mites. If someone in the home is allergic to dust or dust mites, you may want to avoid having carpets, rugs, or other fabrics in the home.



Regular cleaning and airing materials outside in the sun will help to get rid of dust and dust mites.

Mold

Mold is a kind of fungus, a simple plant that grows on soil and other plants. In the home, it grows on walls, clothing, old or spoiled foods, and in any damp place. Mold is also called ‘mildew.’ Most molds and mildews look like black or yellow powder, tiny threads, or white and blue fuzz.

Outdoors, molds are important to the environment. Molds help dead things decay and turn back into soil. But mold releases tiny spores that can cause health problems for people who breathe them. Molds also destroy the things they live on, so having mold inside the home is never good.

Molds cause breathing problems, headaches, skin irritation, and can trigger asthma attacks and allergic reactions. Rarely, exposure to some molds may lead to serious health problems and death, especially in infants. People with HIV are especially vulnerable to the health problems caused by molds.

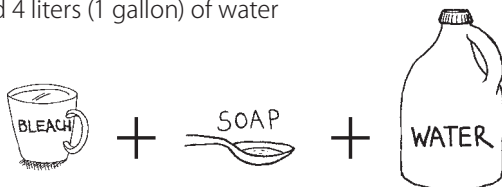
To prevent and get rid of mold

Molds grow in damp places with poor ventilation. To prevent and get rid of mold, try to do 1 or more of these things:

- Fix leaks in walls, roofs, and pipes.
- Improve ventilation. When more air passes through the home, it keeps everything drier and helps prevent mold from growing.
- Wash areas where molds grow with bleach solution.

How to make a bleach solution

Mix: 1 cup of bleach, ¼ teaspoon of liquid soap, and 4 liters (1 gallon) of water



(Adding one cup of vinegar will help this solution kill more germs along with the mold.)

Wear gloves and a face mask or cloth over your nose and mouth, and keep windows open while washing surfaces with this bleach solution. Let the solution stay on for 10 to 15 minutes, then rinse with plain water. Wipe the surfaces dry to prevent mold from growing back.



Improved Stoves

Smoky cooking stoves cause many serious health problems. Reducing smoke from stoves is an important way to improve family health.

The type of stove people use depends on what foods are cooked, what fuels and stove-making materials are available, and traditional cooking methods. To improve stoves and solve the problems of indoor air pollution, development workers and health promoters need to work together with the people who will use the stoves. Only an improved stove that pleases the cook while using less fuel and reducing smoke will be used and seen as a real improvement.

Women improve stoves for fuel and flavor

Like many women in Guatemala, Inez used to cook her family's meals on a hand-built stove that burned a lot of wood and filled the kitchen with smoke. When an organization that builds improved stoves came to her town, she went with other women to hear them speak.

People from the organization had designed a new stove that used less wood, made less smoke, and cost very little to build. They asked who wanted to try the new stove, and Inez volunteered.

Inez and her neighbors worked with the organizers, mixing clay with straw and sand to build the body of the stove. The organization provided a metal griddle that was set on top of the stove to cook tortillas. They cut wood into small pieces and lit the stove. It worked really well! Inez saw that it used much less wood than her old stove, and the chimney carried smoke out of the house. But after eating just a few meals cooked on the stove, Inez and her family realized the tortillas cooked on the metal griddle had no flavor.

Months later, when people from the stove group returned, Inez thanked them. Then, in a small voice she said, "There is one problem with the stove. I think it makes tortillas taste bad." The organizers listened, and asked why tortillas tasted different on this stove. "The old griddle was made of clay," she said. "Maybe that's the difference."

That afternoon Inez, her neighbors, and the organizers made a griddle from local clay. They molded it, let it dry a few days, and then replaced the metal griddle with the clay one. Inez let the stove heat slowly while her daughter made tortillas. When the stove was hot enough, she laid the tortillas on the griddle. When they were ready she shared them with her family. They tasted good! Now, Inez and her family truly have an improved stove.



How a good stove works

Here are simple ways to improve stoves so they will burn less fuel, produce less smoke, and cook foods more quickly.

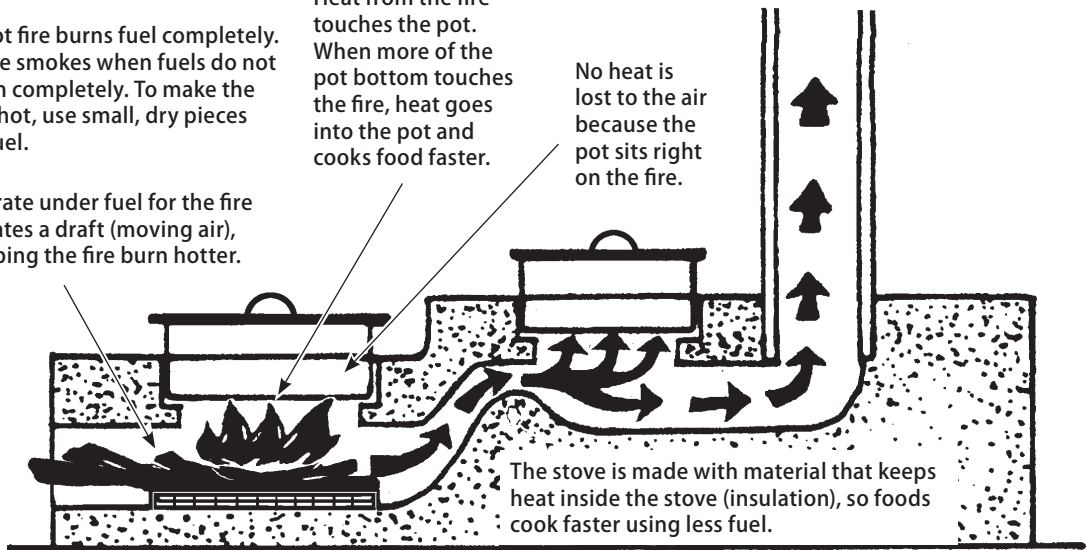
A chimney, hood, or vent to carry away smoke. This also moves air inside the stove, making the fire hotter and cooking food faster.

A hot fire burns fuel completely. A fire smokes when fuels do not burn completely. To make the fire hot, use small, dry pieces of fuel.

A grate under fuel for the fire creates a draft (moving air), helping the fire burn hotter.

Heat from the fire touches the pot. When more of the pot bottom touches the fire, heat goes into the pot and cooks food faster.

No heat is lost to the air because the pot sits right on the fire.

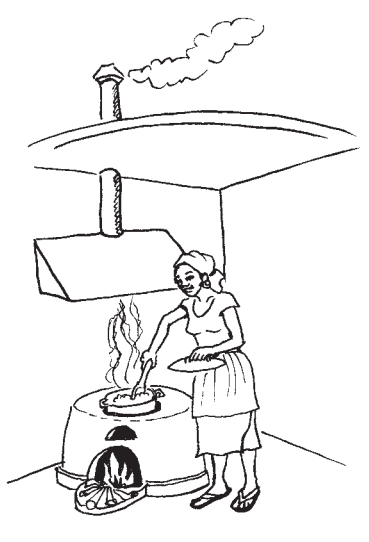


The stove is made with material that keeps heat inside the stove (insulation), so foods cook faster using less fuel.

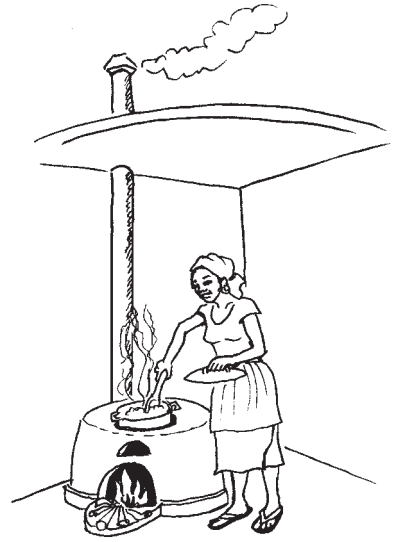
Vent cooking and heating stoves



Good: Place the stove near a window. Having 2 openings helps air move through the room.



Better: A hood with a chimney above the stove carries most of the smoke outside. A hole in the roof or a space between the wall and the eaves will also help remove smoke.

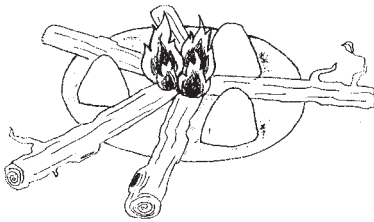


Best: A stove with a chimney attached carries most smoke out of the house.

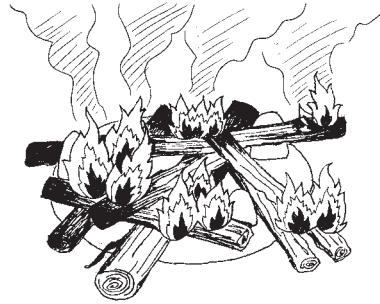
Improving open fires

The most basic “stove” is an open fire. It is sometimes called a 3-stone fire because in many parts of the world the fire is made with 3 stones to surround the burning fuel and to hold up the food or cooking pot.

With small changes, open fires can be made safer, create less smoke, and use less fuel. For example, burning only small pieces of wood which are dry and not “green” makes less smoke. Making a small wall of mud or stones around your fire pit can prevent accidents that lead to house fires or injuries from burns.



In a clean fire, just the tips of the wood burn, creating less smoke and using less fuel.



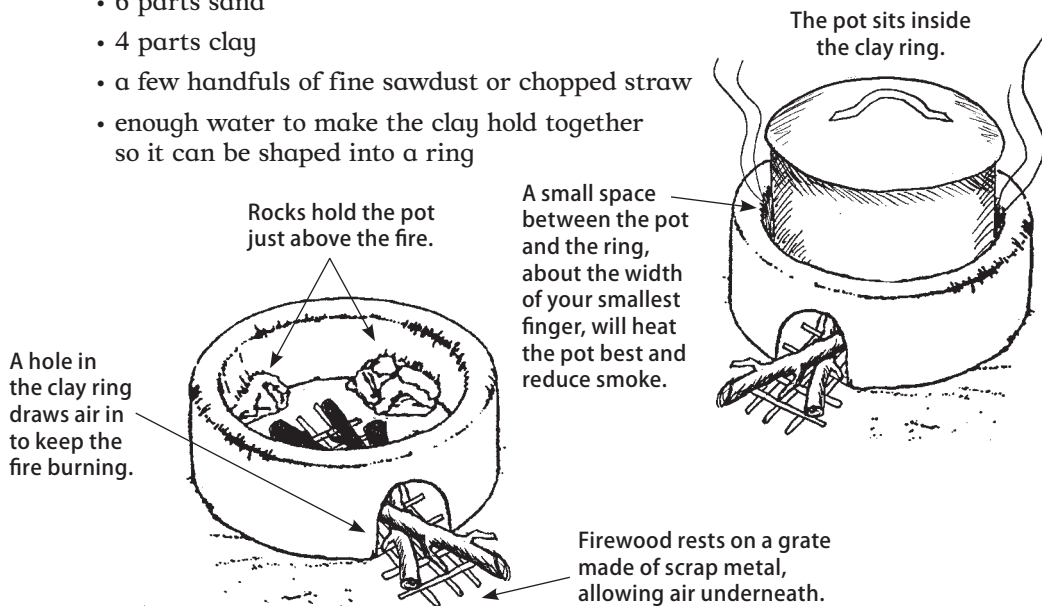
In a dirty fire, the wood burns all over, creating a lot of smoke and using a lot of fuel.

Simple clay stove

A simple clay stove with a metal grate to lift fuel off the ground takes very little material to make. It burns hot and clean, and uses less wood than an open fire.

To make a simple clay stove, mix:

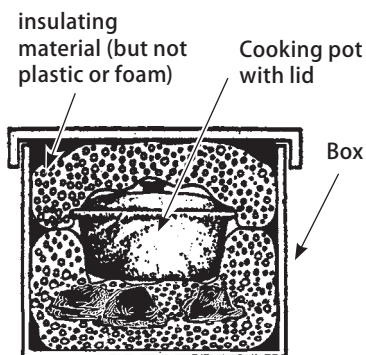
- 6 parts sand
- 4 parts clay
- a few handfuls of fine sawdust or chopped straw
- enough water to make the clay hold together so it can be shaped into a ring



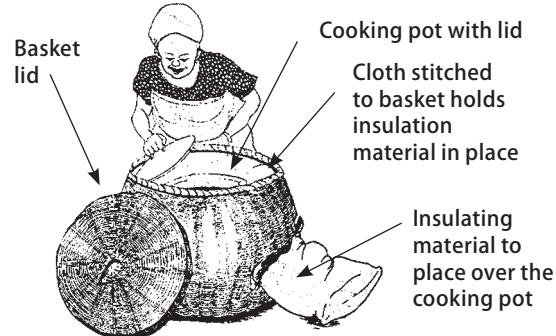
Haybox cookers save fuel

A haybox cooker is a way to prepare slow cooking foods (like stew, beans, and rice) and to keep food warm while saving fuel. A haybox cooker is made from hay or whatever insulating materials are available to you. It can be made from a cardboard box, a basket filled with straw or newspapers, or by simply wrapping your cooking pot in a heavy blanket or cloth.

After the food on the stove boils for a few minutes, remove the pot and place it in the haybox. The food will continue to cook for 2 or more hours. The more food in the pot, the more heat it will keep. Haybox cookers do not work well for small amounts of food. Let the cooker dry out after each use.



A haybox cooker made with a box.

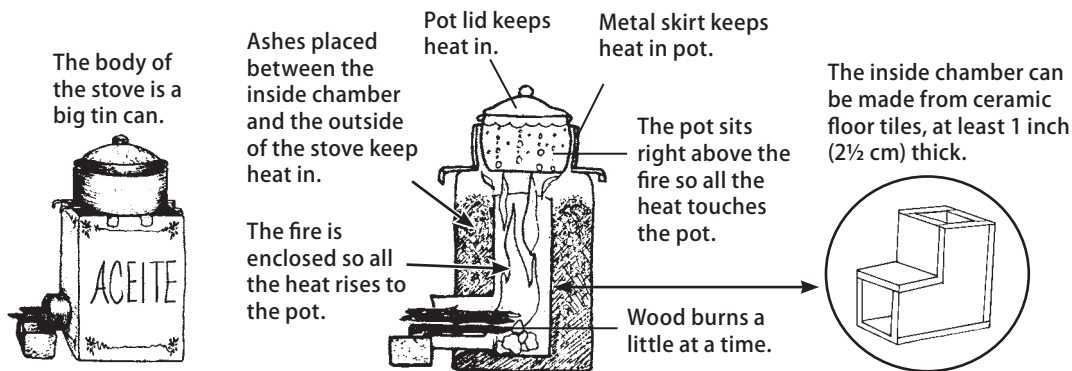


A haybox cooker made with a basket.

An improved metal stove

The rocket stove is a small metal stove that can be used in temporary living situations such as refugee camps, or any place where people do not have the resources to build a full-size stove. It burns fuel cleanly with little smoke. The rocket stove can be made from inexpensive, locally available materials. (For more detailed instructions on how to build a rocket stove, see Resources and *Where Women Have No Doctor*, page 396.)

How the rocket stove works:



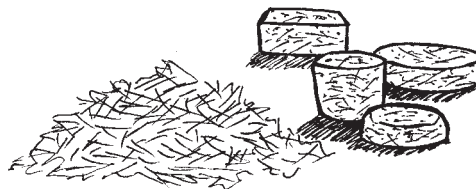
Fuels for Cooking and Heating

Wood, crop wastes, coal, dung, and charcoal are the most widely used cooking fuels. But when they burn, they can all cause pollution and breathing problems. And in many places, wood and charcoal are scarce resources.

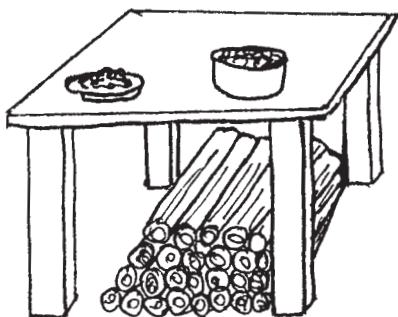
Many people are turning to other cooking fuels such as sunlight, processed plant wastes (rice husks and other crop wastes made into pellets or briquettes), and **biogas** (a gas produced by rotting plant matter and human and animal waste).

Crop wastes (residues)

Dried crop wastes, such as rice and maize husks and coconut shells are used as fuel in many places. When these materials are used without processing, they cause smoke that can lead to health problems. Chopping the material and pressing it into blocks (fuel briquettes) can make it burn longer and cleaner.



Mixing chopped crop wastes with water, and pressing and drying them, makes a cleaner burning fuel.



Stacking wood in the house helps it dry and burn with less smoke.

Making fuel briquettes requires some machinery and an energy source, both of which can be costly. Some people do not like the taste of food cooked with briquettes. But in areas where there is a shortage of fuel, or where people want to limit the use of coal and charcoal, briquettes may be a good choice.

Firewood

Wood is one of the best sources of fuel, but it is scarce in many places. To conserve valuable forest resources and reduce smoke, use dry wood, cut into small pieces.

Biogas

Biogas, a natural gas that is mostly methane, is a valuable source of energy. By turning the organic matter in human, animal, and plant waste into energy, biogas turns waste products into a resource less harmful to the environment and community health than other fuels. (To learn more about biogas, see page 540, and Resources.)

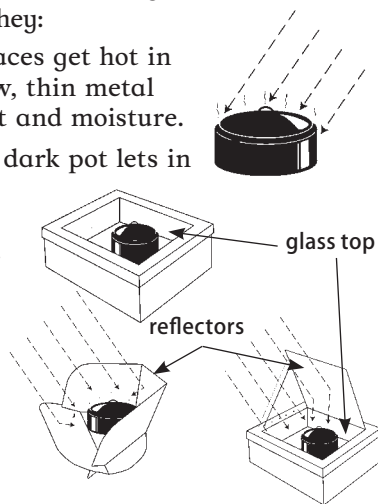
Cooking with sunlight

You can use the sun's heat to cook in solar cookers. Solar cookers require changing your regular cooking habits, and many solar cookers cook more slowly than a fire or a stove. But by using the solar cooker when the sun shines brightly, and using the regular household stove at night or when the weather is cloudy, you can save fuel. Some cookers can pay for themselves in just a few months because they reduce expenses for charcoal, gas, or firewood. Solar cookers can also be used to disinfect water for drinking (see page 98).

Guidelines for cooking with sunlight

There are many kinds of solar cookers you can make or buy (see Resources). All of them work in basically the same way. They:

- **change sunlight to heat energy.** Dark surfaces get hot in sunlight. Food cooks best in dark, shallow, thin metal pots with tight-fitting lids to hold in heat and moisture.
- **retain heat.** A clear heat trap around the dark pot lets in sunlight and traps heat. Use a glass top, an upside-down glass bowl, or a clear, heat-resistant plastic bag marked HDPE.
- **capture extra sunlight.** Shiny surfaces reflect extra sunlight onto the pot to help cook food faster. Aluminum foil mounted on cardboard provides a good, low-cost shiny surface. Sheet metals and metallic paints are not reflective enough to work well.

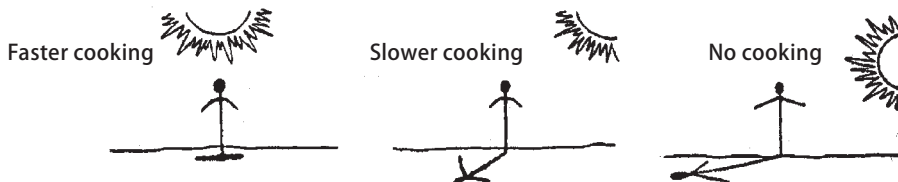


IMPORTANT: Never look directly into the sun or at the shiny surface of a solar cooker while it is cooking. This can damage your eyes.

When building a solar cooker, do not use materials that will melt or give off fumes, such as styrofoam, polyvinyl, or some plastics.

How to use a solar cooker

Use a black pot with either a black or clear glass top. To help it cook faster, cut food into small pieces and add a small amount of water. Place a blanket or other insulation under the oven and place the oven in full sun just before and during the hottest part of the day. Be sure that the solar collector opening faces toward the sun. Turn the oven every 30 minutes or so to face directly into the sun. If the sun goes behind a cloud, surround the oven with more insulation. If the the food is hot but not cooked, finish cooking the food on a stove or fire.

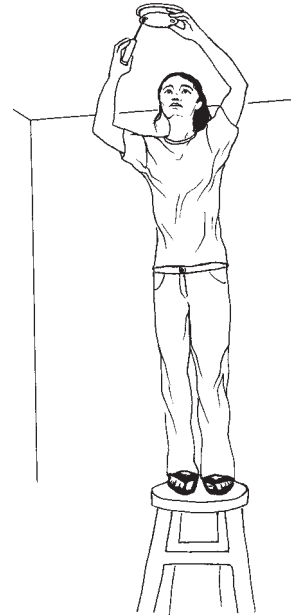


Fire Safety

An important part of a healthy home is preventing fires.

- Keep cooking fires enclosed.
- Keep fires away from children, and keep children away from fires.
- Keep flammable and toxic materials (such as gasoline, paint, paint thinner, solvents and kerosene) out of the house and in well-sealed containers. If such materials are in the house, keep them far from any heat source.
- Make sure electrical connections are safe.
- Keep a covered water bucket, a bucket of sand or dirt, or a fire extinguisher near the stove.

IMPORTANT: DO NOT put water on a fire caused by cooking grease. This will make the fire spread! Grease fires are put out by stopping them from getting air. To put the fire out, cover it with a blanket or heavy cloth, or throw sand or dirt on the grease.



Smoke alarms warn if a fire has started, and are available at low cost in some countries.

Electricity

Even a small amount of electricity makes a big improvement in people's lives, for cooking, light, refrigeration, and so on. But unsafe electric wires can cause electric shocks and fires. To prevent harm:

- Make sure electric lines are properly installed and grounded.
- Never run electric wires under carpets.
- Avoid connecting many electric extension cords together to form one long cord. If they are not designed to be connected, they can cause fires.
- Do not install outlets or switches where they can get wet from water pipes, taps, or sinks.

Electric transmission wires

High-voltage electrical cables give off large amounts of electric radiation that can cause headaches, stress, irritation, and may lead to more serious health problems such as cancer of the blood (**leukemia**). Just as light from a candle becomes dimmer as our eyes get farther away from it, the harm from electricity grows weaker with distance. To reduce the danger:

- Build houses 50 to 70 meters away from high-voltage power lines.
- Utility companies should not build power lines or cellular telephone towers near schools or hospitals.
- Power lines should be buried when possible, rather than run above ground.

Controlling Pests

Pests, such as cockroaches and rodents (rats and mice), live wherever there are food crumbs, trash, and places to hide. They carry illnesses and are a common cause of allergies and asthma attacks. Unfortunately, the sprays often used to get rid of insects and rodents also cause asthma attacks and other health problems.

Many people use chemical pesticides to control insects and rodents in the home. Pesticides are poison (see Chapter 14). If they are used at all they should be used, handled, and stored with great care.

The best way to control household pests is to get rid of the conditions that attract them:

- Sweep and clean regularly to get rid of food scraps, crumbs, and materials in which rodents can nest.
- Clean and dry surfaces where food is prepared after cooking and eating.
- Store food in tightly covered containers.
- Fix leaking pipes and keep sinks dry. Cockroaches and other insects like water.
- Keep household waste in covered containers, and remove it regularly.
- Fill holes and cracks in walls, ceilings, and floors to prevent pests from entering. Fill small holes with materials such as steel wool, fine mesh screens, mortar, sheet metal, etc.

Many pests can be driven away using organic materials that are less harmful and less costly than chemical pesticides.



Pest control without chemicals

Sometimes keeping the house clean is not enough, and more active pest control is needed.



For cockroaches, make a mixture of sugar and boric acid or baking soda. Sprinkle it on surfaces where cockroaches crawl. They will eat it and die. OR, mix boric acid with water to make a thick paste. Add corn flour and make little balls. Leave them around the house, but take care that children do not eat them!

For ants, sprinkle red chili powder, dried peppermint, or crushed cinnamon where they enter.



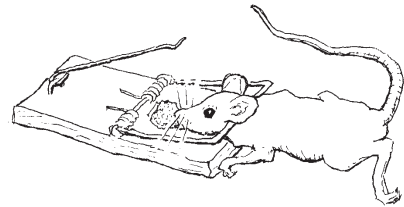
For fly maggots, soak crushed basil leaves in water for 24 hours. Filter and spray onto maggots.



To learn how to make a simple fly trap, see page 57.

For termites, make sure wooden building materials do not come into direct contact with the soil. Do not store firewood next to the house.

To kill rodents, use traps. Poisons should be used only by people trained in their use, with great care, and with good safety equipment.



Some insect pests, such as “chinch” that cause Chagas’ disease in Mexico, and Central and South America, live in cracks in the floors, walls, and roofs of houses, especially those made from mud, adobe, and thatch. Sealing wall cracks with plaster, and plastering the walls completely or even just the bottom meter of wall, will help prevent insect breeding. (To make earth plaster, see page 382.) Replacing thatch roofs with tile, metal, or cement, or lining the inside of the roof will also keep the insects out.

How to make a simple roach trap

- 1 Fill the bottom of a jar with beer, boiled raisins, or some other sweet substance.
- 2 Smear a band of petroleum jelly inside the jar below the rim to prevent roaches from crawling out.
- 3 To kill the captured roaches, dump them in hot, soapy water.



Toxics in the Home

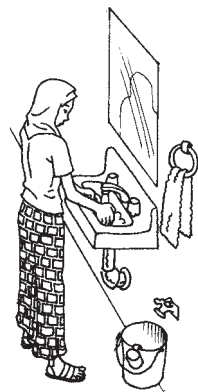
Building materials, paint, furniture, cleaning products, and other things used at home may contain harmful chemicals. Asbestos and lead paint have been banned in some countries, but other toxics are still common.

Lead poisoning

Lead is a toxic metal found in common products such as paint, water pipes, some glazed ceramic pots, dishes, and floor tiles, tin cans, gasoline (petrol), and engine exhaust. A single high dose of lead can cause severe health problems. But it is more common for lead poisoning to build up slowly from repeated exposure to small amounts of lead. There may not be any obvious signs of lead poisoning, but over time it causes serious health problems.

Lead poisoning is more harmful to children than adults because it affects children’s developing nerves and brains. The younger the child, the more harmful lead can be. Over time, even low levels of lead exposure can harm a child’s mental development. (For more about how toxics affect children, see page 322.)

Ways people are exposed to lead



Lead pipes



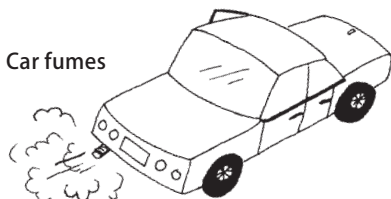
Some glazed pottery



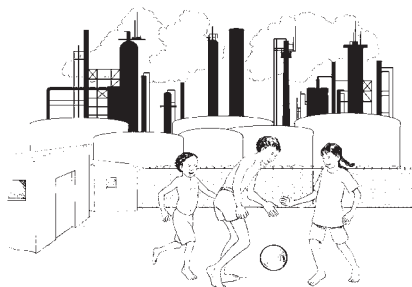
Lead paint



Contaminated soil



Car fumes



Industrial pollution

Like other toxics, lead gets into the body through eating or drinking, or being absorbed through the skin. Lead can damage the kidneys and blood, nerves, and digestive system. Very high levels of lead in the blood may cause vomiting, staggering, muscle weakness, seizures, or coma. Health problems get worse as the level of lead in the blood gets higher.

Signs

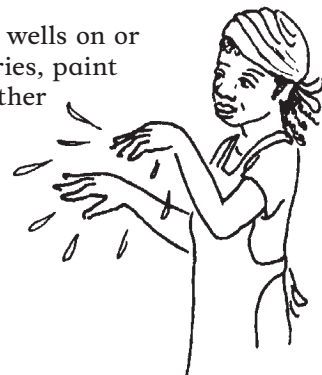
If you think someone has lead poisoning, test her blood at a health center or clinic. By the time a person has signs of lead poisoning, there is already a lot of lead in the person's blood. This is why it is important to prevent lead poisoning before it starts. Signs of lead poisoning include:

- being angry all the time.
- low appetite and low energy.
- difficulty sleeping.
- headaches.
- when young children lose skills that they had before.
- **anemia** (weak blood).
- constipation (difficulty passing stool).
- pain and cramping in the belly (this is usually the first sign of a high, toxic dose of lead poison).

Prevention

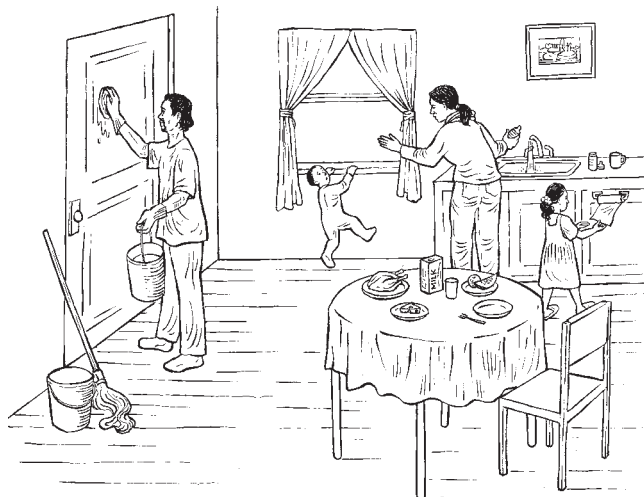
Preventing exposure to lead is the best treatment:

- Find out if local health authorities test water for lead. If your water is high in lead, find a different water source for drinking and cooking.
- Let tap water run for a minute before drinking or cooking with it.
- Do not use pottery with lead glazes for eating or cooking.
- Avoid foods from cans that may be sealed with lead.
- Throw out old painted toys if you do not know if the paint contains lead.
- Do not store liquids in lead crystal containers, as lead can leach into the liquid.
- Avoid growing food, building houses or digging wells on or in soil that may contain lead. If you find batteries, paint flakes, oil drums, and other industrial waste either on or buried in the soil, it is a sign that the soil may be contaminated.
- Wash hands before eating, especially if you have been working or if children have been playing outside.



Prevent poisoning from lead paint

When paint becomes old or is poorly applied, it breaks down and often peels or flakes off of walls, railings, and furniture. These flakes can be easily breathed in or swallowed by small children. If the paint has lead in it, this is very harmful. The best way to prevent lead poisoning from old paint is to remove it from surfaces and repaint with paint that does not contain lead.



Cleaning surfaces often with a wet cloth will help reduce exposure to dust and flakes from lead paint.

When removing old paint:

- Always wear gloves, masks, and safety glasses.
- Keep children away from work areas or from playing in areas that may be contaminated.
- To keep paint dust out of the air, wet surfaces with water as you sand and scrape.
- Clean up all paint dust carefully after each work session. Use damp mops and rags, not a broom.
- Collect paint flakes and dust in a tin can or other strong container, seal in plastic bags, and bury in a safe burial pit (see page 438).

Prevent poisoning from lead water pipes

Some signs that your water may be contaminated with lead are rust-colored water and stained dishes and laundry. Water from lead pipes should never be used to prepare infant formula, and if possible lead pipes should be replaced with pipes made of iron, copper, or plastic.

Because lead from pipes dissolves in hot water more easily than it does in cold water, it is better not to use hot water from lead pipes for cooking or drinking. Let the water run until it is as cold as possible before using it. Some water filters will filter out lead (see Resources).

IMPORTANT: Boiling water does not get rid of lead, it makes it worse!

To prevent lead poisoning from outside air pollution

To trap some dust from outside that may contain lead, put damp rags under doors and in windows. To reduce lead poisoning in the air, governments and industry must work together to reduce the use of lead in industrial products and restrict how much air pollution industries are allowed to create.

Asbestos

Asbestos is a material that was once commonly used for insulation and fire-protection in buildings, paint, and in some appliances (especially older ones) such as toasters, ovens, broilers, and refrigerators. Asbestos is made of tiny fibers that get into the air and are easily breathed into the lungs where they cut and scar the lung tissue, causing permanent damage many years after the fibers are breathed in. Because asbestos is so dangerous, many governments no longer allow it to be used in new buildings or industrial products. But it remains in many older ones.

Exposure to asbestos leads to **asbestosis** (a disease that scars and damages the lungs), and lung cancer. Early signs of these illnesses are coughing, shortness of breath, chest pain, weight loss, and weakness.

How are people exposed to asbestos?

When asbestos gets old, it begins to break down. If asbestos is used when a house is built, but is sealed off and not touched or moved afterward, it does no harm. When materials or appliances that have asbestos in them are moved or taken apart, dangerous fibers are released into the air. This causes great harm to anyone who breathes them. People who mine asbestos (see Chapter 21) also have a high risk of asbestosis.

Prevention

Asbestos can be removed from buildings and building materials, but only at great cost. Because removing asbestos can lead to exposure, it must be done by people with proper training and protective equipment.

IMPORTANT: Do not try to remove asbestos without professional help and proper protective equipment.

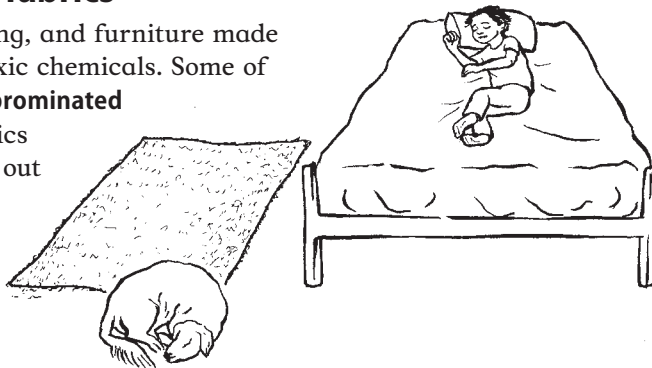
Treatment

Once asbestos is breathed into the lungs, it cannot be removed. It takes years for signs of asbestosis or lung cancer to appear, and these diseases cannot be reversed once they have started. Treatments can make a person have less pain, but will not cure the disease.



Toxics in furniture and fabrics

Some carpets, curtains, clothing, and furniture made with fabrics are made with toxic chemicals. Some of these chemicals, called **BFRs (brominated flame retardants)**, prevent fabrics from catching fire or wearing out quickly. However, they can be harmful to our health when our skin is in contact with them for long periods, when we breathe dust that carries them, or when they burn and we breathe the fumes. (To find out more about these chemicals and ways to reduce harm from them, see Chapters 16 and 20.)



Children, and also household pets, spend a lot of time on carpeting and furniture, and can develop health problems if these contain toxic chemicals.

Home cleaning products

Many cleaning products are made with toxic chemicals that make people sick. When these toxic products are breathed in, swallowed, or absorbed through the skin, they can cause health problems right away or illnesses that may appear years later, such as cancer.

The labels on most products do not say if they are toxic, or how to protect yourself. Some labels sometimes say “caution” or “keep out of the reach of children.” That is a good sign you may want to change to a different product. But lack of a warning on the label does not mean you should not be careful.

Usually, if a product smells very strong and makes your eyes water, your chest hurt, or creates a bad taste in your mouth, it is toxic. The best way to get rid of the health risks from chemicals used in the home is to safely get rid of the chemicals (see page 410) and use safer cleaning products. Often, cleaning with soap and water is just as good, safer, and less costly than using harmful products.



Some common home cleaning products are harmful to health.

Safer cleaning products

Unlike some chemical cleaners, natural cleaners work more effectively when you let them soak in before scrubbing, use tools like scrubbers and spatulas to lift grease and scum, and apply the cleaner more than once.

Soap is better than detergent because it is not made from petroleum and does not leave toxins in the water. Borax and washing soda (sodium carbonate) are safe for cleaning surfaces. White vinegar or lemon juice can be used to clean away kitchen grease, and vinegar and baking soda to unclog drains. These cleaners can be stored more easily because they are safe, do not go bad, and do not need to stay cold. But they still should be kept out of the reach of children.

Cleaning without toxic chemicals leaves the house smelling good, and it doesn't harm my health!



How to make safer cleaning products

► All-purpose cleaner

Ingredients

1 teaspoon liquid soap, 1 quart of water, plus ¼ cup undiluted white vinegar or washing soda to clean away grease

Directions

Mix all the ingredients and store in a spray bottle or a bottle with a lid. Shake until mixed. Use for cleaning walls, stoves, cooking or food preparation areas, carpets, and upholstery.

► Glass cleaner

Ingredients

1 quart water plus ¼ cup white vinegar or 2 tablespoons lemon juice

Directions

Mix ingredients and store in a spray bottle.

► Laundry starch

Ingredients

Corn or yucca starch, 1 pint cold water

Directions

Put starch in a bottle with a small amount of water and shake until all the starch dissolves. Fill the bottle with water and shake again. Seal bottle with a sprinkle cap or lid to store. Sprinkle damp clean garment with starch, lay flat or hang to dry.

► Surface disinfectant

Ingredients

½ cup borax, 2 liters water

Directions

Dissolve borax in water. Wipe the surface that needs cleaning with the solution on a sponge or rag, followed by water. To prevent mold or mildew from forming, do not rinse off the borax solution.

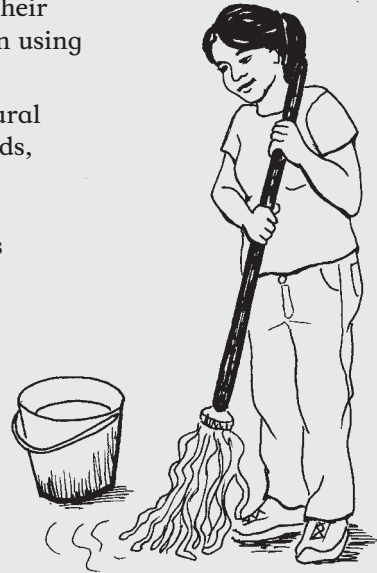
Natural home cleaning protects health

When Maribel came to the United States from Nicaragua, she found a job with a cleaning company. Every night she cleaned 3 offices, washing floors and windows. Sometimes she got dizzy, nauseous, and confused after several hours of work. She went to a doctor who gave her some medicine that only made her feel worse. As long as she worked, her sick feeling did not go away.

One day her job ended. Though she was out of work, she soon began to feel better. Then she learned about another cleaning company, the Natural Home Cleaning Professionals, which used nontoxic cleaning products. The women at Natural Home Cleaning said that many cleaning products people used were harmful and made people feel ill. Suddenly Maribel knew what had made her sick!

Natural Home Cleaning is a worker-owned cooperative. The women who are the cleaners own the business, so they decide what products to clean with. The workers decided to use only healthy products like vinegar, baking soda, liquid soap, and warm water. With practice, they learned how to make these materials more effective by using cleaning tools like spatulas and scrubbing sponges. As part of their work, they also trained other women to clean using natural methods.

When Maribel started working with Natural Home Cleaning, she told her neighbors, friends, and even strangers at the market how to replace toxic cleaners with natural ones. Cleaning with natural products is sometimes harder than working with chemicals, but it is healthier. While she works, Maribel remembers how her grandmother used to clean, and she wants to hand this knowledge down to her sons and daughters. For Maribel, training people in natural home cleaning is not just part of her job. It is now an important part of her life as well.



Safe Food Preparation

Preparing food for the family is the center of home life. But food itself, and the surfaces on which it is prepared, can carry many kinds of germs.

Eating food or drinks contaminated with germs can cause food poisoning, stomach pain, cramps, diarrhea, swollen belly, parasites, fever, hepatitis, typhoid, weakness and dehydration, constipation, and other problems.



Because germs are invisible, they can cause illness even in kitchens that look clean.

Reduce food-borne illness at home

Spoiled food — Throw away food that smells bad, or has mold on it, or strange textures. Do not eat food from cans that are dented or bulging because the food inside is spoiled by germs that are already inside the can.

Food handling — Wash hands before and after preparing food.

Food surfaces — Clean dishes, pots, and surfaces where food is prepared with hot water and soap before and after preparing food and eating. To remove germs from cloths used to clean kitchen surfaces, wash the cloths with soap and hang them in the sun to dry, or iron them.

Fruits and vegetables — Wash or peel all fruits and vegetables before eating.

Cooking — Heat kills germs. To make sure food is safe, make sure it is well-cooked, and eat it soon after it is prepared. Cook meats until they are no longer bloody or red in color. Cook eggs until the yolks and whites are firm. Cook fish until it flakes easily with a fork.

Meat handling and storage — Because germs from raw meat, chicken, and seafood spread easily to other foods, store meat separately or wrap it carefully so juice does not drip onto other foods. Use a separate cutting board and knife when preparing meat, and clean cooking tools well with hot water and soap before cutting other foods. It is not safe to place cooked food on a plate or surface that held raw meat.

Safe food storage — Store leftover food safely in secure containers in a cool and dry place, and dispose of trash right away. (See Chapter 12 and Chapter 15 for ways to safely store food and crops.)

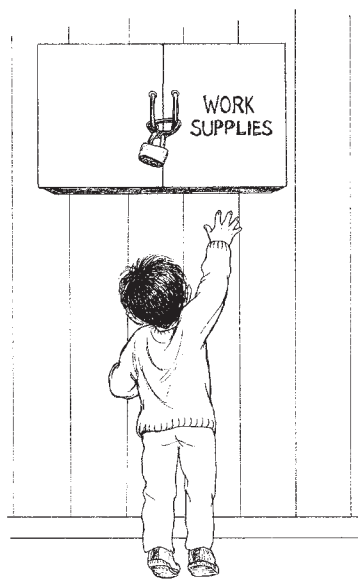
Do Not Bring Work Hazards Home

People who use toxic materials in their jobs in farm labor, mining, health care, and factory work often bring toxics home on their clothes and bodies. This can harm the workers and everyone in their homes. (To avoid these risks, see Chapters 14, 20, and 21.)

Many health problems are caused by jobs done at home with toxic materials and dangerous machinery, such as assembling electronics or textiles, or taking apart batteries or computers (see page 464). Doing these kinds of work in the home is especially dangerous because companies usually do not provide people who work at home with protective equipment. Nor do they pay fair wages or other rights that all workers deserve. This dangerous work also exposes other family members, especially children, to toxic materials.

When working at home with dangerous materials, take precautions.

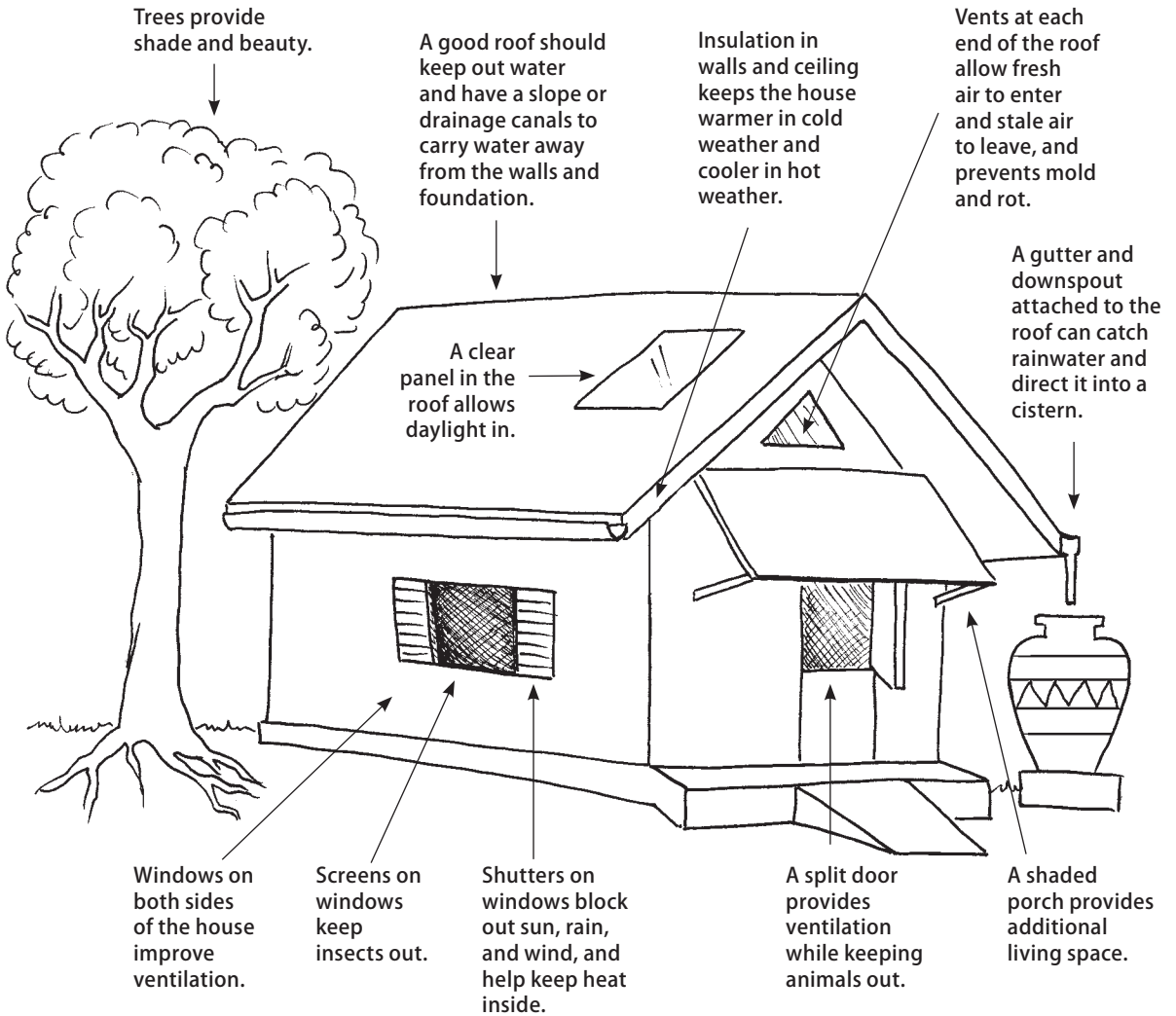
- Know what chemicals you are using and how to handle them safely.
- Make sure there is proper ventilation (see page 352 to 354).
- Use protective equipment if you can get it (see Appendix A).
- Keep children away from work areas and materials.
- Try not to work long hours that make you tired, and make the work more dangerous.
- Talk to other people who do similar work, and organize to demand your rights to health and safety.



Keeping toxic work materials in a locked cupboard will help keep children safe.

Building a Healthy Home

Homes designed with care contribute to communities that are safe and healthy. Putting a house in a place that takes advantage of sun and shade can help with heating, cooling, lighting, and ventilation. Choosing building materials right for your climate is also important.

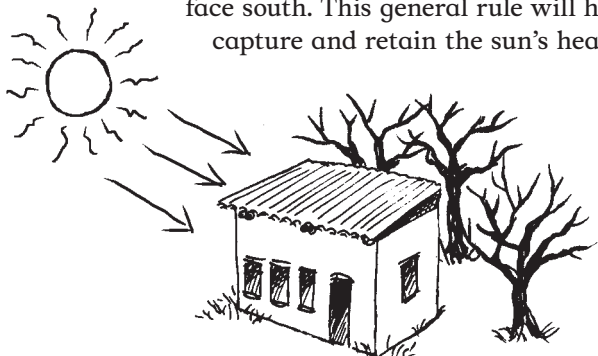


A foundation and platform provide stability and protection from dampness, flooding, and pests. Platforms can be built with a ramp instead of a step, making it easier for children, the elderly, and people with disabilities to get in and out of the house.

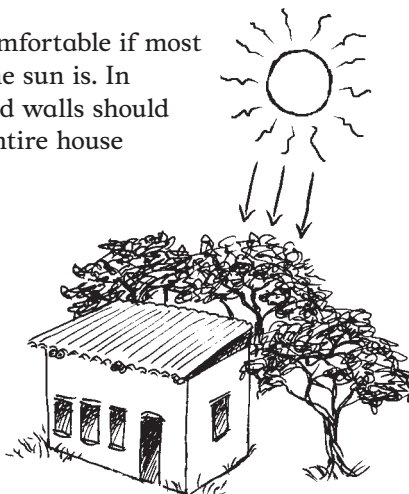
Make best use of sunlight

When building a house or a settlement, consider where the sun will be at different times of the year in order to make best use of the sun's heat. In hot months, the sun rises high overhead at noon and provides direct heat for much of the day. In colder months, the sun is lower in the sky, gives little heat, and travels a different path through the sky.

In southern countries, houses will be more comfortable if most windows and exposed walls face north, where the sun is. In northern countries, most windows and exposed walls should face south. This general rule will help the entire house capture and retain the sun's heat.



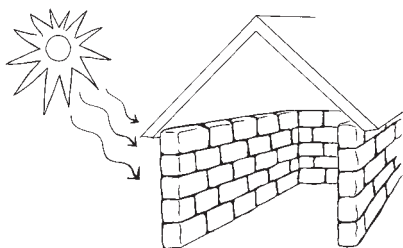
In the cold season, the low sun shining on exposed walls and windows helps keep a house warm.



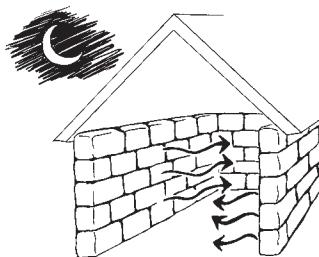
In the hot season, trees planted on the side of the house where afternoon sun shines will help keep the house cool.

Choose materials for warmth

In places that get cold, some building materials help capture and store heat in the house. Materials with more thickness store heat best. Stone, brick, and blocks made of mud and straw store heat better than wood or unfilled concrete blocks. Filling concrete blocks with earth or concrete helps them store heat better. Using any of these materials, the best wall thickness for storing heat is 4 to 5 inches.



When the sun shines on the house, heat collects in the walls and floor.



When the sun sets and the air cools, the walls and floor release heat into the room.

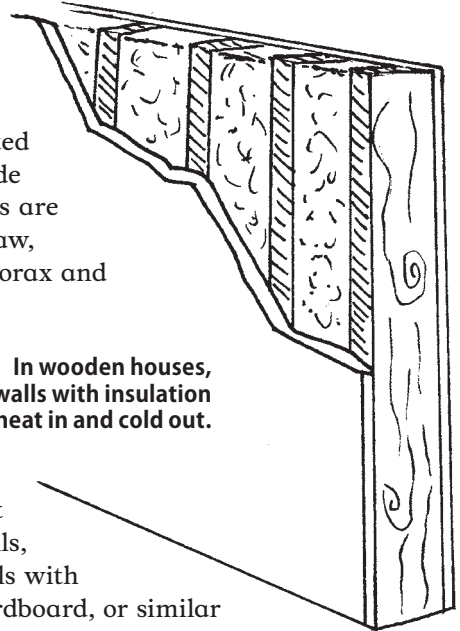
Protect against heat and cold

Insulation is material that protects against heat and cold. Rather than having a single thin wall and a roof without a ceiling, a well-insulated house has a space between the outside and inside walls, and a ceiling below the roof. These spaces are filled with materials such as sawdust, wool, straw, cork, or cardboard or paper soaked in diluted borax and dried (to prevent termites from eating it).



Sealing cracks in the walls makes a big difference in keeping cold out and heat in.

In wooden houses, double walls with insulation between keep heat in and cold out.



If you cannot build double walls, cover inside walls with paper, foam, cardboard, or similar materials. This will add some insulation.

Thatch roofs give good insulation. So do floors of brick and compacted earth. To keep heat in or out of the house, seal cracks or holes around windows and doors. Cover windows to help keep the home cooler during the day and to retain heat at night. Windows that open will also allow air to flow for good ventilation.

Choosing building materials

The materials used to build a house can make the difference between an uncomfortable shelter and a healthy, beautiful one. But when forests and watersheds are damaged, natural building resources such as wood, thatch, and other plant materials are lost. And when large amounts of concrete and other “modern” materials become available, traditional materials and knowledge of how to build with them is lost, or is no longer valued by many people. The best building materials:

- come from the earth, and can be reused or returned to the earth when the life of the building is over.
- are harvested and produced locally, and fit the local climate.
- do not contain harmful chemicals or require large amounts of energy to produce.

Teenagers produce improved building materials

In the neighborhood of Santo Antonio on the outskirts of Brasilia, the capital of Brazil, most houses are built in a few days using clay bricks and concrete blocks that are bought outside the community. There are few skilled builders and no one has much money, so residents build their houses with the help of unskilled workers.

Because of this, materials are often poorly prepared, by adding too much water to make cement, or by leaving out reinforcing steel.

Rosa Fernandez, an architect, visited Santo Antonio and saw how the lack of skills led to poor planning and building. She set out to improve the situation. With the help of government funding, she trained a group of teenagers in Santo Antonio to make compressed earth blocks. These were made from 2 parts sand to 1 part clay, with a small amount of cement, and then were pressed in a simple hand-operated machine. After the teenagers had learned to make the blocks, Rosa taught others in the community how to build with them, and the teenagers began a business of making and selling the blocks.

Now, many new houses are built with this safer, stronger building material. The money people use to buy the blocks stays in the community and helps to build a stronger future. And with all the practice and training the teenagers received, Santo Antonio now has many skilled builders.



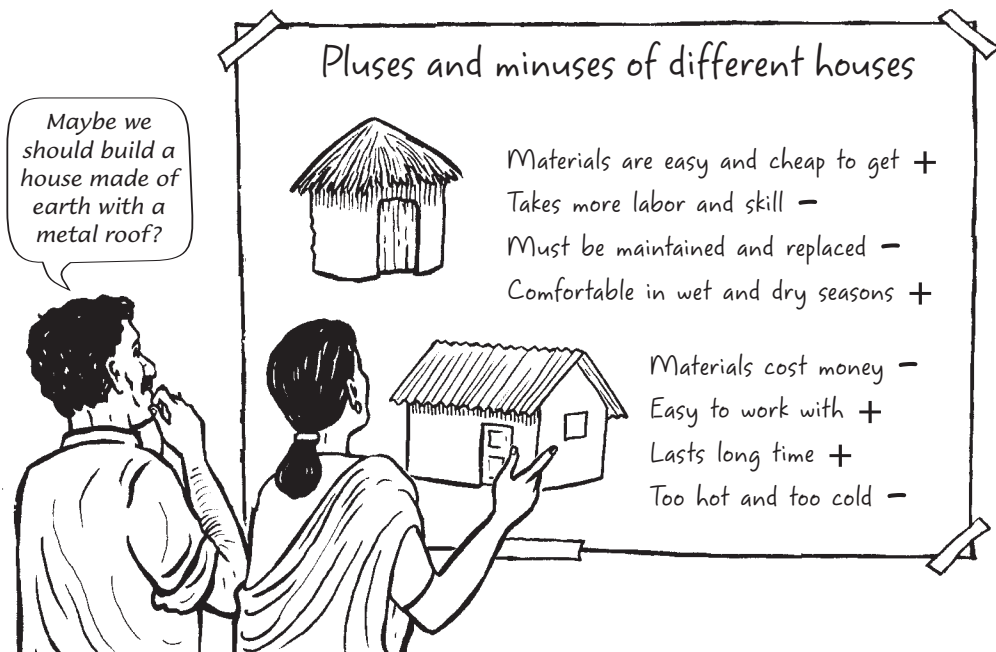
Traditional and modern building materials

Most traditional buildings use combinations of mud, sand, clay, stone, straw, wood, and plant materials such as bamboo, thatch, and vines for roofs and walls. These materials are strong, locally available, and cost little or nothing. But they also have some problems. Mud walls may erode in the rain, thatch roofs can become homes for insect pests, and buildings that use only these materials may not last long.

Factory-made materials such as concrete blocks and metal roofing have replaced traditional materials in many places. People often use concrete because it is easy to handle and a house can be built in stages, with additions built on as the family earns more money. For some people, building a concrete home means economic success and a modern lifestyle.

But houses built with factory-made materials may not be best for peoples' health or the environment. Often they are not well insulated for cold weather. Making concrete requires a lot of water and a lot of energy. If they are not reinforced, concrete block buildings collapse easily in earthquakes. Also, these materials are costly, and often are only available to people in large towns and cities.

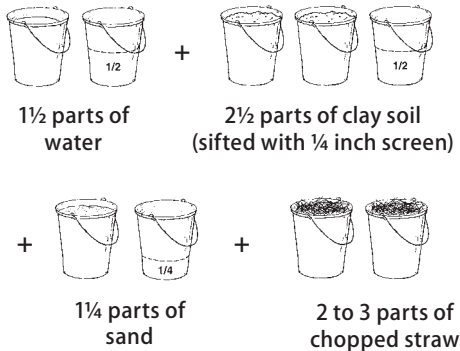
When planning to build a home, consider the good and bad qualities of different materials that may be available. Just because others build their homes in a certain way does not mean it is the best way for everyone.



How to make natural earth plaster

Covering an earth, straw bale, or mud and stick house with plaster protects it from rain and prevents insects from living in the cracks in the walls. Plaster also makes a house more attractive.

You will need:



- 1 Add sand and clay soil to water. Let it sit until clay and sand absorb the water.
- 2 Mix by hand until there are no lumps.
- 3 Add chopped straw and mix again until there are no lumps.

If you are plastering a mud wall, wet the wall. For adobe, straw bale, or other surfaces you may need to apply a layer of clay before applying the plaster. Apply plaster to a small section of wall with your hands and then smooth it with a trowel. When it dries, test it. Does it crack easily or crumble when you press it with your thumb? Does it break away from the wall easily when you pull it, or break down easily when you sprinkle water on it? If it cracks, add more straw. If it crumbles, try adding a paste made from wheat flour and water. If it breaks down easily in water, add longer straw. Once you have plaster that does not crumble, crack, or break down easily, apply it to your walls.

To plaster a floor, add more sand to this mix. Press down the surface to make it smooth and level before you start the new floor. Then apply plaster, smooth it, and let it dry for several weeks to prevent cracking later. If possible, seal the floor with linseed oil after it dries.

Earthquake resistant building

Many lives are lost every year because people live in houses that do not withstand earthquakes. Houses of unreinforced concrete block, or unreinforced brick or earth, and houses without solid foundations, are most vulnerable to earthquakes. Houses made of traditional and flexible materials, such as mud and sticks, wood, or piled earth mixed with straw (called “cob”), or straw bales stacked and tied together and covered with plaster (see Resources) are better able to withstand damage from earthquakes.

Combining traditional materials with improved building methods, such as foundations, cross-braces, and waterproof plaster, can make houses safer, more comfortable, and affordable. To reduce the risk of earthquake damage to earthen houses:

- Build low, single story, small buildings.
- Make walls curved if possible, especially at the corners.
- If you build in a square shape, reinforce corners with wooden cross-braces. If wood is not available, you can use wire.
- Build a foundation on solid ground using lime mortar or concrete with broken brick or large stones. Anchor the foundation materials together by including sticks, bamboo, iron wire or metal rods in the mix.
- Secure the wall to the foundation using rush matting, sticks, nails, metal, or iron wire cemented into the foundation.
- Use light materials for the roof (thatch or corrugated metal).
- To make brick or block houses safer, fasten the layers of brick or blocks together. Attach crossbeams from one wall to the other, and set horizontal braces between the beams to prevent the building from moving side-to-side. Attach the roof to the crossbeams.

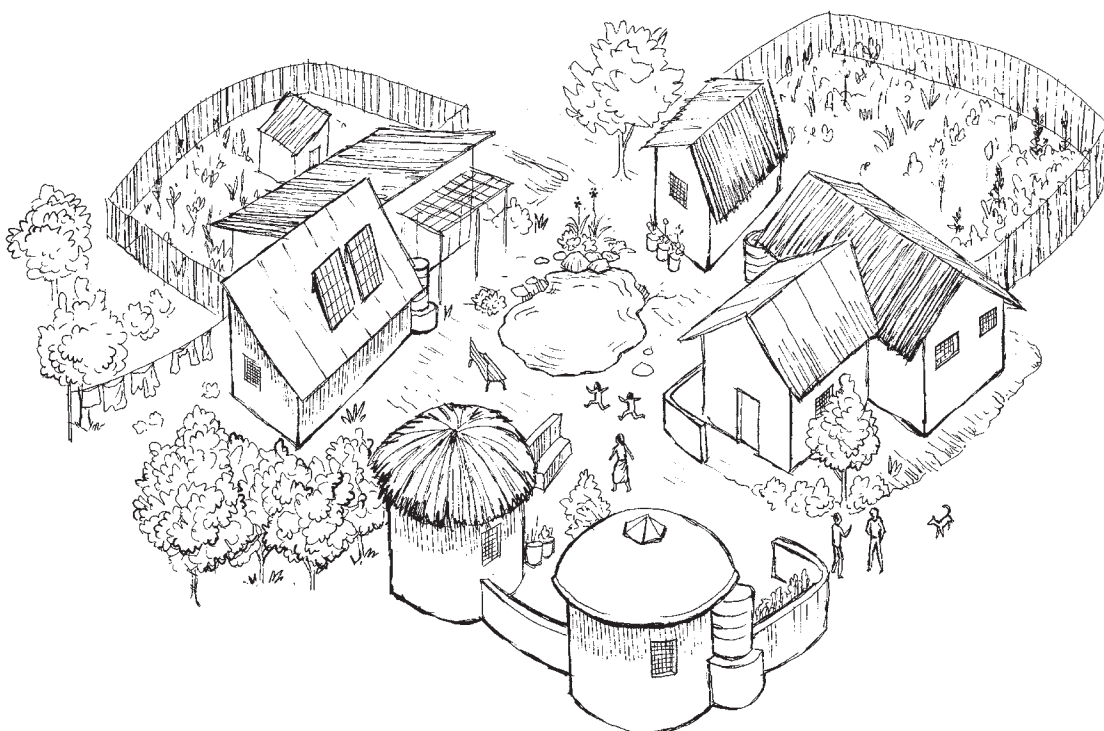


Light materials, like straw bales, make walls that are safer in earthquakes, and help keep inside temperatures mild.

Planning with Communities

When people plan and build their own homes and communities together, they have more control over their lives and can develop a plan that fulfills their needs, hopes, and desires. As much as possible, governments and community development agencies should involve people in planning and maintaining their own housing projects. Remember, at its best, a community is more than a group of houses. In a vibrant community, each home is connected by shared public spaces, such as gardens, water and washing facilities, markets, schools, and other places where people interact.

Building housing requires people to work together. If planners, builders, development agencies, and housing providers encourage people to work together in ways that promote education, skill-sharing, and full participation, they will not only build housing, they will build healthy communities.



Building homes and community

For many years, poor people in South Africa have lived with a housing crisis that makes their poverty and health problems worse. The government tried to solve this by building housing for poor people. But the new houses were small, dark, too close together, and built in such a way that they were either too hot or too cold. They were far from schools, health centers, and shops, and had poor access to water, poor sanitation, did not keep the bad weather out, and needed to be repaired often. They just kept poor people poor.

In response to these problems, a group called Tlholego came together to build a new kind of village. They designed homes using locally available materials like earth, bricks, and straw. Using mud bricks on stone foundations, they designed and built houses that were healthy and attractive for the lowest possible cost (a little more than US \$1000 for each house).

Besides being comfortable, the houses were designed to make the best use of local conditions. They had electricity, tanks to collect rainwater, gardens that reused water from the kitchen and bath, composting toilets, water heated by the sun, and window screens to keep insects out. With windows facing the sun, shade trees all around, and solid mud brick walls, the houses were protected from extreme heat and cold. Tlholego taught people how to build the houses. This saved on construction costs, and made sure each family had a house they were proud to live in.

The houses were planned and built around common spaces, such as roads, gardens, and public buildings. This way, each family's home was a part of the larger community. Tlholego organized an education and training program for adults, and a school where children could learn reading and math, and also about farming, health, and the environment.

Tlholego is an “eco-village,” a village built in harmony with the environment and the needs of its people. Rather than building cheap homes for poor people, Tlholego built a community. Through their success, Tlholego showed it was possible for people who were once forced to live in poverty to use their own resources to build homes and a community rich in dignity.

