

**CHAPTER 6**

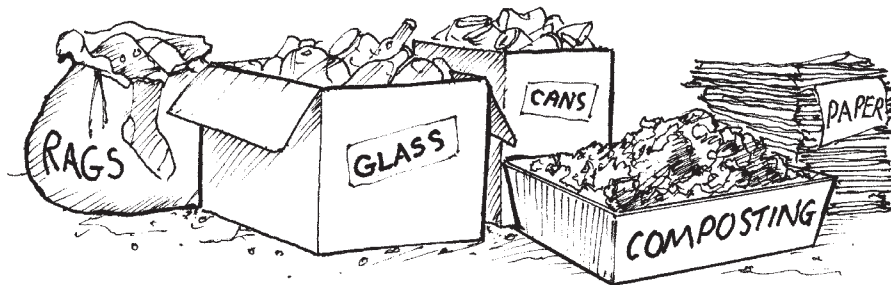
# Solid waste management and chemical safety

To keep the household and village environment clean and to reduce health risks, solid waste (refuse) should be disposed of properly. Untreated refuse is unsightly and smelly and degrades both the quality of the environment and the quality of life in the community. It also provides a breeding ground for disease vectors, such as mosquitoes, flies and rats. If waste is not properly disposed of, animals can bring it close to the home and children can come into contact with disease vectors and pathogens. To be effective, solid waste disposal programmes require action at both household and community levels—if only a few households dispose of waste properly, the village environment may remain dirty and contaminated. Community members should decide how important solid waste management is and determine the best ways to achieve waste-management goals.

## **6.1 Strategies for solid waste management: minimizing waste and recycling**

Key strategies for improving solid waste management and disposal are to minimize the waste generated by households, and to recycle waste whenever possible. To minimize waste, it is important that both the households and the community at large make a conscious decision to reduce the amount of waste they produce and actively participate in recycling. This may involve carrying food and other purchases in reusable bags, such as cloth bags, rather than using plastic bags. Minimizing waste may also entail sorting and recycling waste, which is discussed in more detail below and illustrated in Figure 6.1.

Solid wastes should be sorted for recycling, and for burying or burning. Recycling includes composting organic wastes, and reusing plastic and glass products as well as construction debris. It can offer both cost-saving and economic opportunities for communities. One way a community could generate additional revenue, for example, would be to sell paper waste to industries that use old paper in their manufacturing processes. Paper wastes can also be compacted into dense fuel briquettes and used for cooking to

Figure 6.1 *Separated wastes*

supplement firewood. This would also help reduce deforestation, which itself can adversely affect soil fertility and the quality of water sources. If used tyres are not recycled the best option may be to bury them, since burning produces toxic fumes. They should not be left as waste, because they can fill with rainwater and become breeding sites for insects that carry serious diseases.

## 6.2 Managing solid waste in households

Some low-cost methods for managing household solid waste are summarized below. More information may be available from local government staff, or from agencies such as NGOs and donor organizations.

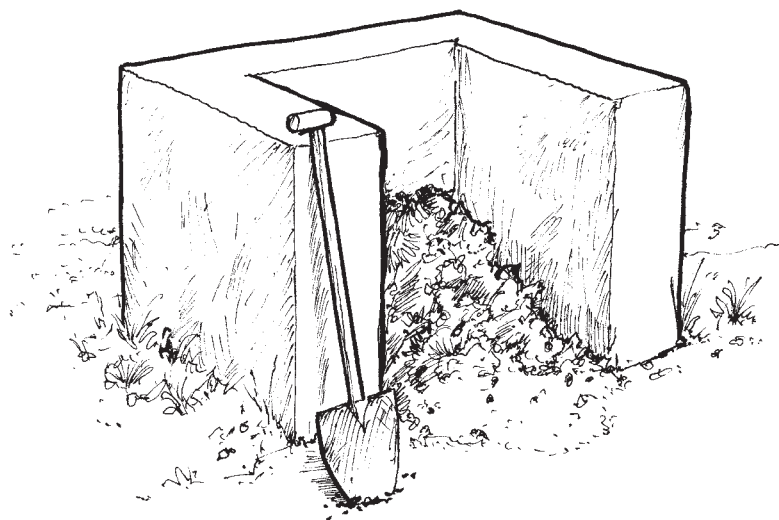
### 6.2.1 Composting

Fruit and vegetable waste, animal dung and even leaves from trees can break down to form a valuable soil conditioner and fertilizer (compost). Household vegetable waste, for example, can be composted in a suitable container. After a few months the contents can be removed and used as fertilizer. An example of a household composting container is shown in Figure 6.2. A more sophisticated option is to use timber and chicken wire to construct a ventilated container that promotes composting. Again, vegetable waste is disposed of in the container until it is full, or until the compost is required.

### 6.2.2 Turning organic waste into fuel

Vegetable waste, including vegetable peelings and dried weeds, can be chopped up and compressed into small bricks and dried in the sun. Animal dung, too, can be spread thinly on the ground and dried in the sun. Once dried, the waste can be stored and used to replace charcoal or wood as a cooking fuel.

Figure 6.2 *Household composting container*



### 6.3 Managing solid waste in the community

Certain wastes are preferably managed at a community level. Some household items do not decompose and can cause injury if not properly disposed of. For example, neither glass nor plastics can be used in composting, and plastic gives off poisonous fumes when burned. Bones and metal items do decompose, but the process is very slow; batteries contain toxic chemicals. Bones, metal objects and broken glass can also be thrown into a latrine pit, but only if the pit is not going to be reused.

#### 6.3.1 Communal refuse pit

A communal refuse pit is simply a pit dug near the community compound and filled with general refuse. The pit should not be located close to a water source, because toxic chemicals could leach into the water.

The disposal site itself should be fenced off to prevent access by scavenging animals. At the end of the day, new waste should be covered with a layer of clean soil 0.1 metre deep. When the pit is full, the waste should be covered with a final layer of soil to prevent flies from breeding.

#### 6.3.2 Communal collection

Householders may transport their solid waste to the disposal site or communal collection may be organized. Communities themselves can organize waste collection, for example by purchasing a suitable vehicle and charging households for the service. If this is done, however, it is essential that the com-

munity members who perform the service are provided with protective equipment and are trained to handle waste safely. This type of approach provides employment and income to community households, improves the environment and reduces health risks.

Communal collection points are particularly important at places such as markets and bus stations, where large numbers of people congregate and food is prepared, sold and eaten. Communal containers, such as empty oil drums, skips or concrete bunkers, can be located strategically, so that solid waste is collected at a single site. If communal concrete bunkers are constructed, they should have holes at the base to encourage drainage away from the bunkers, but care must be taken not to cause contamination of either groundwater or surface water sources. Ideally, water from the waste bunkers should flow into the drainage system and be treated before it enters a river or stream.

It is preferable that vegetable waste is not disposed of in communal collection points unless these are emptied on a daily basis. Vegetable matter decomposes rapidly, is often very smelly and may cause significant contamination of groundwater sources.

All waste from communal collection points should be collected several times a week and taken to a designated disposal site. It can be transported in boxes, or by handcarts, animal carts, bicycles with box containers, tractors with trailers and skip-trucks. The waste should preferably be collected by staff wearing protective clothing and masks, who are trained in safe disposal methods.

## 6.4 Managing special solid wastes

Some solid wastes require special handling and their disposal should be carried out only by trained staff with proper clothing and equipment. Such wastes represent a special health risk and their proper disposal is essential for protecting health in the community. These wastes and their management are discussed in sections 6.4.1–6.4.3.

### 6.4.1 Health care solid wastes

Health care wastes can be generated both by medical facilities and by activities at home, such as changing bandages. Often, these wastes contain infectious pathogens; ideally they should be incinerated or safely buried immediately. Incineration can be carried out at a health centre or clinic, and it is preferable to use purpose-built incinerators with chimneys. However, simple home or community incinerators can be made from oil drums. If incineration is not an option, an alternative is to put bandages or other waste

into a strong disinfectant. The person who does this must wear gloves. They should also wash their hands immediately after handling the waste, even though gloves were used. When bandages are to be reused, they should be thoroughly disinfected in strong bleach. If health care wastes are buried, they should be disposed of in a pit that restricts the access of people and animals. The pit should be built in the medical facility compound and should be surrounded by a fence; each layer of waste should be immediately covered with a layer of dirt. The pit should also be properly lined to prevent contamination of groundwater.

If needles must be used at home, for example because a person is a diabetic, they should be disinfected and disposed of properly. Used plastic syringes or their needles should never be reused, as this can cause serious illness. The needles should be blunted before disposal, to prevent them from becoming a hazard to others, and then burned or buried.

#### **6.4.2 Slaughterhouse solid wastes**

Slaughterhouse wastes contain decaying animal carcasses, blood and faecal matter, and they are a significant source of pathogens and bad odours. These wastes may also pollute water supplies. As slaughterhouse wastes represent a particular hazard, their collection and disposal should be carried out by trained staff and the wastes disposed of in properly maintained sites. If there are slaughterhouses in a community, community members should ensure that the local health authorities inspect the premises to ensure that proper procedures are followed.

#### **6.4.3 Industrial solid wastes**

Industrial wastes contain toxic chemicals that pose health risks and pollute the environment. While most industries will be located in towns, some small-scale industries, such as tanneries and mining operations, may be located in rural areas.

Tannery wastes, in particular, contain highly toxic metal compounds that cause both short- and long-term health problems. If water sources are polluted with tannery wastes, they may be unusable for many years, resulting in higher costs for drinking-water and adversely impacting health. If small-scale tanneries are located in a village, environmental protection agencies should be consulted about ways of reducing the risk of pollution.

Small-scale mining operations also use and produce toxic chemicals, such as mercury, and arsenic. These chemicals represent a serious health risk to the population, and if mining is carried out in a community, community members

should seek advice on how to dispose of toxic chemicals properly. While it may not be possible for the community itself to set up disposal and treatment areas for industrial wastes, it is important that community members recognize the hazards of these wastes and request support to ensure that they are properly disposed of.

## 6.5 Chemical safety

Toxic chemicals are frequently used within a village and within homes. Pesticides, dips and inorganic fertilizers, for example, are used in agriculture, and toxic chemicals are commonly used in the repair of vehicles. In the home, chemicals are used as cleaning agents. Many of these chemicals are highly toxic and care should be taken to store, use and dispose of them safely. In particular, the manufacturers' instructions on use, storage and disposal should be carefully followed; these are usually marked on the packaging. If they are not, or if they are in a foreign language, advice on disposal should be sought from the suppliers, or the product should be avoided. If chemicals are past their "sell-by" date they should be avoided.

### 6.5.1 Storage of toxic chemicals

All chemicals should be kept in a safe place and out of the reach of children, for example by storing them in a locked cupboard. When chemicals are stored in houses, workshops or stores, individuals should be aware of the dangers posed by the chemicals, and poisonous chemicals should be clearly marked with a danger symbol recognizable by all community members. Chemical stores should remain locked when not in use and keys given only to individuals who must use the chemicals. Chemical stores should also be well ventilated, as many chemicals give off toxic fumes. With chlorine products, for example, there must be ventilation at the bottom of the building because chlorine is heavier than air and chlorine gas will accumulate at floor level. Local health and environment staff can be consulted about the safe storage and ventilation of chemicals.

For safety reasons, chemical stores should have a shower or washing system so that users can wash themselves immediately in the event of a toxic chemical spill. One option is to keep a full barrel of water close to the store for this purpose. When chemicals give off toxic fumes, breathing apparatus may also be required for people entering the store. Chemical stores should be located away from water sources to avoid the possibility of toxic chemicals infiltrating the soil and contaminating drinking-water supplies. Poorly stored agricultural chemicals in particular, such as fertilizers and pesticides, can get into the groundwater.

Figure 6.3 *Unhealthy use of agricultural chemicals*



### 6.5.2 Handling toxic chemicals

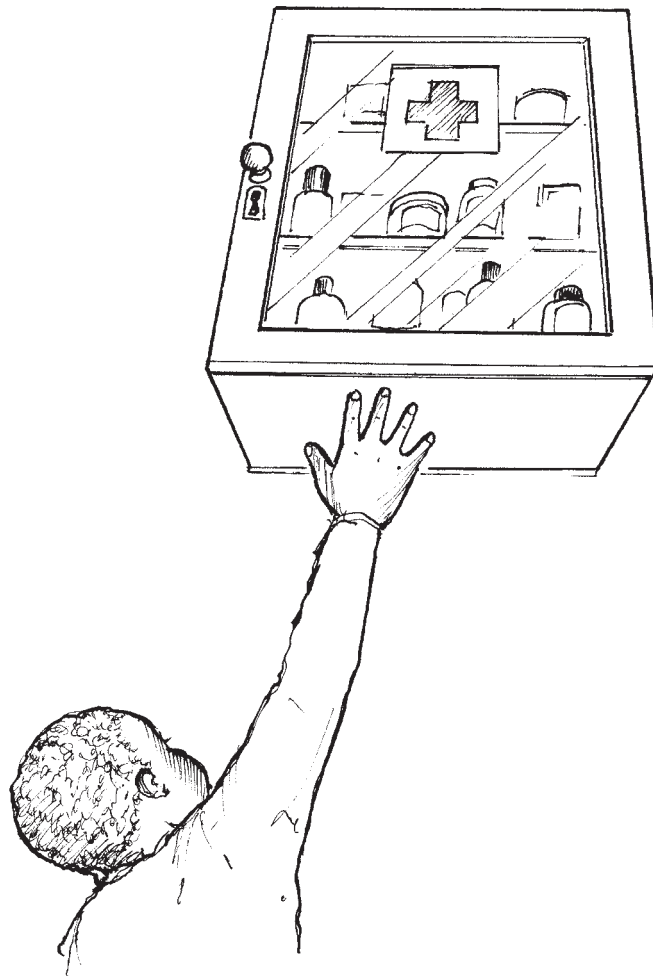
All chemicals should be handled with great care. Most are toxic at some level and even though short-term exposure may not be particularly harmful, long-term exposure can cause serious health problems. For example, organophosphates in sheep dips can lead to heart and breathing problems, and to mental health problems. Consequently, agricultural workers should be trained in the use of chemicals. Training is usually carried out by agricultural extension workers and will normally include such topics as use of protective clothing, gloves and breathing apparatus. An example of bad practice in handling agricultural chemicals is shown in Figure 6.3. If there are any doubts regarding the safe handling and use of agricultural chemicals, workers should seek advice from local agricultural staff, otherwise the community may be exposed to serious health risks. If a toxic spill occurs, it should be contained as far as possible and the appropriate local or national environmental agency contacted.

### 6.5.3 Chemicals in the home

Many households use chemical cleaning products that can be harmful if not handled and stored correctly. Gloves and other protective wear should be worn when chemicals such as bleach are used, even if they are diluted. Fumes should not be inhaled, nor should the chemicals be allowed to enter the eyes or mouth, since many household chemicals are poisonous in sufficient amounts. Children are more likely to suffer accidents than adults, and chemicals should be stored in locked cupboards, out of reach of children as shown in Figure 6.4. If a chemical accident occurs in the home, medical advice should be sought immediately. With some chemicals, if detoxification is not carried out right away, death or permanent injury can result.

When insecticides are used in the home to control mosquitoes, flies and other insects, manufacturers' instructions must be followed and the products kept out of the reach of children. In a Healthy Village approach, however,

Figure 6.4 *Keeping household chemicals secure*



communities should be informed about alternative and more sustainable ways of insect control, such as draining insect breeding sites, screening houses, using impregnated mosquito nets and introducing fish that feed on mosquito larvae.

#### 6.5.4 **Disposal of toxic chemicals**

Proper disposal of toxic chemicals requires responsibility and action at both household and community levels. In households where home chemicals are not safely disposed of, it is not simply the health of family members that is jeopardized; the health of all community members is placed at risk. Old chemicals should not be indiscriminately dumped in the environment, as this can pollute both soil and water, and the chemicals may give off toxic fumes. If it is suspected that toxic chemicals are being illegally dumped in a community, the local agency responsible for waste management or for the environment should be contacted immediately and community members should insist that preventive action be taken.

Chemicals should be disposed of according to manufacturers' guidance and if they have passed their "sell-by" date they should be collected by trained staff and disposed of at special sites. If there is any doubt about how to dispose of chemicals, local health and environment officials should be consulted.