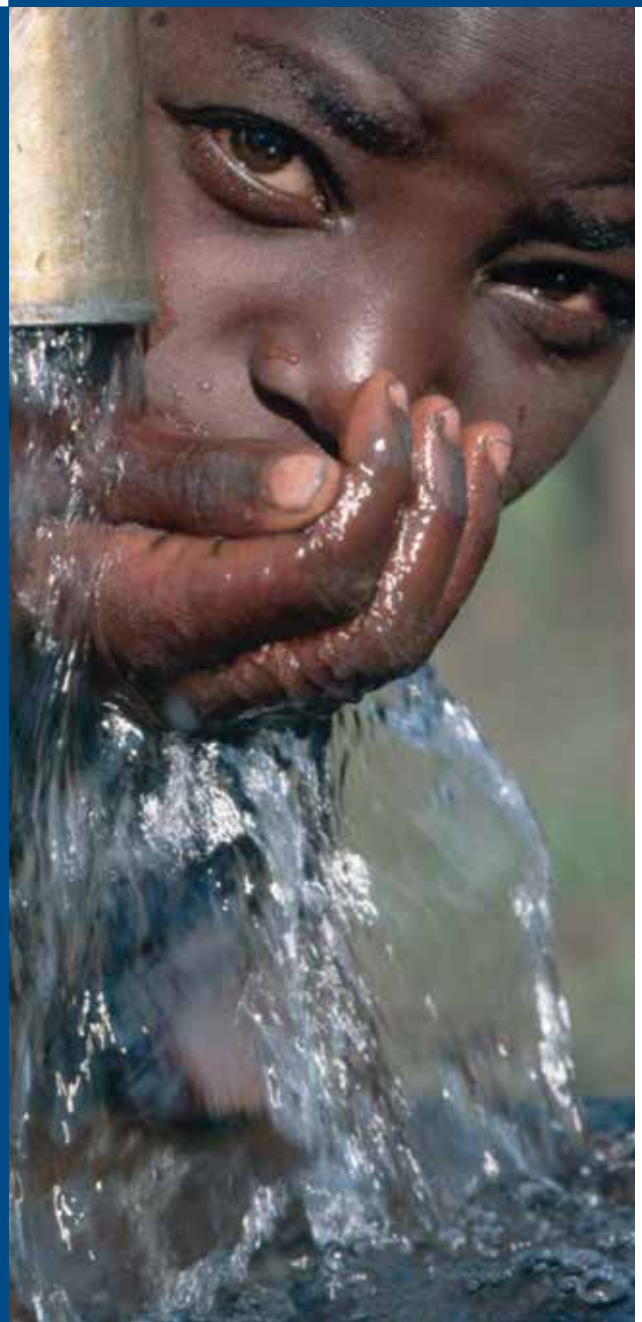

Home Hygiene in Developing Countries
Prevention of infection in the home and the peri-domestic setting

A training resource on hygiene for teachers, community nurses, community workers and health professionals in developing countries

Sally F. Bloomfield and Kumar J. Nath

WATER SUPPLY & SANITATION COLLABORATIVE COUNCIL

IFH INTERNATIONAL SCIENTIFIC FORUM ON HOME HYGIENE

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A training resource on hygiene for teachers, community nurses, community workers and other health professionals in developing countries

Sally F. Bloomfield* and Professor KJ Nath**

*Chairman & Board member of the International Scientific Forum on Home Hygiene; Honorary Professor, London School of Hygiene and Tropical Medicine, UK

**South East Asia Regional co-ordinator of the International Scientific Forum on Home Hygiene; President, Institution of Public Health Engineers, India

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Foreword

For decades, universal access to water and sanitation has been seen as the essential step in reducing the preventable disease burden. It is estimated that up to 1.1 billion people still do not have access to improved or safe water sources, and 2.5 billion people lack adequate sanitation. But it is also now clear that the health impact cannot be achieved by policies focusing only on water and sanitation hardware. There is a general belief that a key mistake in the past has been to undertake water and sanitation programmes in isolation. In order to achieve the primary objective of improving the health status of the community, organisations such as IFH, WSSCC, WHO, IRC, UNICEF and LSHTM are now working to improve attitudes, both with respect to hygiene and general health, and to develop hygiene promotion initiatives and integrate hygiene promotion into programmes related to water and sanitation.

Whereas most people recognise that hygiene means “handwashing”, there is some confusion as to what else is involved. Although there are tools available which give guidance on planning and executing hygiene promotion programmes, these give limited guidance on understanding the routes of infectious disease transmission, identifying “risk practices” and advising on effective hygiene practices. This unique resource is intended to fill a need for such guidance. The resource brings together all aspects of hygiene and looks at it from the point of view of the family and what they need to understand and know in order to protect themselves from infection. The emphasis is on “what to do” in situations where there is a risk of infectious disease transmission.

IFH recognises that, a significant barrier to change is that, in most countries, the separate aspects of hygiene (faeces disposal, food and water hygiene, handwashing, care of the sick, childcare etc) are dealt with by separate agencies. Public health usually focuses on municipal services, hospitals, etc. and there is reluctance to acknowledge the home as a setting of equal importance in the chain of disease transmission. If hygiene promotion is to be effective, ideally there should be a lead agency in each country, and proper infrastructure at national, district and local level for actioning hygiene promotion.

This training resource is intended to give practical support to community workers and teachers at local level who have responsibility for developing school and community hygiene promotion programmes, but can be used by anyone who needs to obtain an overview of hygiene and hygiene practice in developing country situations.

Sally Bloomfield, KJ Nath

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Contents

INTRODUCTION

PART 1- BREAKING THE CHAIN OF INFECTION USING TARGETED HYGIENE

PART 2 - PUTTING HYGIENE INTO PRACTICE
Module 1 - Handwashing
Module 2 - Food & Water hygiene
Module 3 - Peri-domestic hygiene: disposal of human excreta, refuse and waste-water
Module 4 - Personal hygiene
Module 5 - General hygiene: breaking the spread of germs link
Module 6 - Domestic animals and pets, rodents and insects
Module 7 - Where there is more risk: healthcare at home

PART 3 - DEVELOPING A HYGIENE PROMOTION PROGRAMME - ADAPTING TO LOCAL CONDITIONS

Appendices
Appendix 1 - Infectious diseases related to water, sanitation and hygiene
Appendix 2 - Transmission routes for infectious diseases
Appendix 3 - Understanding your community environment - what infections are you aiming to control?
Appendix 4 - Chemical disinfectants explained

Introduction

Introduction

This resource has been developed with the objective of providing practical support for the development of community hygiene promotion programmes aimed at reducing the ID burden across the social spectrum in developing countries.

Building an integrated approach to hygiene

Although the major burden of ID and the greatest needs are in the poorest communities, the need for hygiene education and promotion is high even in the most prosperous communities. IFH recognises that, for hygiene promotion to be effective, we need to look at it from the point of view of the family and the range of actions which they need to undertake in order to protect themselves from infectious disease (ID). Starting from the assumption that hygiene promotion programmes should always include an assessment of the knowledge base of the family, and build on what they know, understand and want to know, the IFH developed this resource covering all aspects of hygiene in the home and the peri- domestic environment.

Building capacity for hygiene promotion

Organisations such as UNICEF and IFH have jointly identified that, if programmes to promote hygiene practice are to be successful, there must be sufficient trained field workers who are responsible for, and committed to, hygiene education and motivation at the community and family level. It is only by combining their knowledge of local conditions, local needs and constraints, with an understanding of the means to prevent infection through hygiene practice, that hygiene behaviour can be improved.

Hygiene for all

Promoting good hygiene practice to families right across the social spectrum is key to reducing the ID burden in developing countries. With this resource, the IFH intends to provide practical support to community workers and teachers (ranging from school teachers to public health educators to community nurses etc.) who have responsibility for developing and implementing community-based programmes to improve home hygiene standards in the household. The resource is written in simple practical language and is based on the IFH guidelines and recommendations and IFH/ICNA Home Hygiene training resource, together with the “Hygiene” section of the UNICEF Facts for Life document (see References and Further Reading).

What does this resource contain?

This resource contains all the necessary material to enable you to build your own knowledge and use it to develop a hygiene education or promotion programme. The contents apply to the whole range of social situations, from relatively prosperous communities where water and sanitation is adequate, to rural unserved communities where they are not.

Remember that for hygiene education and/or hygiene promotion to be successful there are 3 key needs. The contents of this resource have been structured to help you fully address these needs:

- **Understanding your community.** As a community worker or teacher you are the person best placed to understand your community or school and its needs and constraints

- **Understanding hygiene practice.** You are also best placed to develop the appropriate hygiene education or promotion programmes for your school or community. To do this it is essential to understand how infectious diseases are transmitted, and how hygiene practices can prevent spread of infectious disease.

- **Understanding hygiene promotion.** Developing the means to communicate with the target audience in a way that will motivate behaviour change is key to the success of hygiene promotion programmes.

The resource has been produced as a series of modules so that it can be adapted as necessary to meet these 3 key needs in different social and environmental situations. Within each module there is a separate page for each topic. The “key messages’ are the messages which need to be communicated to the community worker, the community, the family or the school children. The ‘Community worker/teachers notes” provide background information for the community worker and/or his/her teacher.

How to use this resource

Part 1 will enable you to understand how infectious diseases are transmitted in the home and community
Since the source and routes of spread of infection can differ across communities, it is important to be able to adapt this resource appropriately to meet the needs of your community or school class. You can only do this if you have a basic understanding of how diseases occur, and how they are spread. Read this short module in order to understand the basics on how infectious diseases are spread in the home and community.

Part 2 will enable you to understand how to put hygiene into practice in order to prevent the spread of infectious disease
It is important that hygiene education and promotion is focussed on those practices in your community which are most risky i.e practices which carry the greatest risk of transmitting disease. To be able to identify what are “risky practices”, you first need to know what is good practice. Having selected which hygiene practices you wish to target, these modules can be used to develop practical guidance on how to prevent the spread of infection through good hygiene.

Part 3 shows you how to develop a hygiene education or promotion programme which meets the needs of your community
Key to hygiene promotion is communicating with your target audience in a way that will motivate behaviour change. Part 3 shows you how to assess your community and how to develop a hygiene promotion and/or education programme which meets their needs. In general this means focusing on a small number of key hygiene practices, and limiting the complexity and number of messages. It also means avoiding “top down” approaches, which “lecture” and build on fear of disease. Participatory approaches that mobilise the community and engender ownership of the programme are also needed to ensure that behaviour change is sustained.

Part 1
Breaking the chain of infection by using targeted hygiene

1. What is home hygiene

Key messages

- Approximately 3.1% of deaths and 3.7% of disability-adjusted-life years world-wide are attributable to unsafe water, sanitation and hygiene
- A significant proportion of these infections could be prevented through integrated programmes involving provision of **sanitation, and water, and promotion of hygiene practice**
- All 3 components must be present for a programme to be fully effective in reducing the burden of infectious disease.

Home hygiene practice

- Is the sum total of all the things we do to break the chain of infection in the home:
- The main home hygiene practices are:
  - **Food hygiene** - safe cooking and storage of food, safe disposal of food waste
  - **Personal hygiene (including handwashing)**
  - **General hygiene (surface cleaning, laundry etc)**
  - **Home health care**
  - **Control of wastewater and rainwater**
  - **Care of domestic animals and pets**
  - **Control of insects.**

For communities without access to safe sanitation and water supply it also means:

- **Safe disposal of human faeces**
- **Household water** including safe storage, handling & point-of-use treatment.

1. WHAT IS HOME HYGIENE

Community workers/teachers notes

Why is home hygiene promotion important?
WHO data suggests that approximately 3.1% of deaths (1.7 million) and 3.7% of disability-adjusted-life years (DALYs) (54.2 million) world-wide are attributable to unsafe water, sanitation, and hygiene (WHO 2002 World Health Report). Of these, over 99.8% occur in developing countries, and 90% are of children.

For decades, universal access to water and sanitation has been seen as the essential step in reducing the preventable disease burden. It is estimated that up to 1.1 billion people still do not have access to improved or safe water sources and 2.5 billion people lack adequate sanitation. But it is also now clear that the health impact cannot be achieved by policies focusing only on water and sanitation hardware. There is a general belief that one of the key mistakes in the past has been to undertake programmes on water and sanitation in isolation. In order to achieve the primary objective of improving the health status of the community there is a need to improve attitudes, both with respect to hygiene in home and general health education, develop hygiene promotion initiatives and integrate hygiene promotion into programmes related to water and sanitation. Most waterborne diseases are spread through exposure of food and drinking water to human faeces. Hence, the rate of infection may be reduced by improving practices for disposal of human waste, as well as improving hygiene in the home, water quality and food hygiene. Thus, e.g. supply of safe water is of little benefit if it becomes contaminated because of unhygienic practices in the home. Only carefully designed programmes that integrate water quality improvements with improvement in water availability sanitation and hygiene promotion will achieve substantial reductions in hygiene-related infectious diseases (ID).

In implementing community-based programmes aiming at controlling water, sanitation and hygiene-related infections, the home is rarely considered as a setting of equal importance in the spread of infection. A careful look at Appendix 3 however shows that home hygiene practice is key to controlling a significant proportion of these infections. In fact, of all the alternative measures, personal and domestic hygiene scores the maximum points. One of the barriers to change is the fact that, in most countries, the separate aspects of home hygiene (food and water hygiene, sanitation, care of the sick, etc.) are dealt with by separate agencies. In order to educate and motivate hygiene behaviour change, hygiene must be considered from the point of view of the family – and the range of problems which they face in order to protect themselves from infectious disease. In reality all hygiene practices are based on the same relatively simple underlying principles e.g. the principles of preventing spread of germs whilst changing a baby's nappy are the same as those used to prevent spread of germs whilst handling and preparing a chicken! Treating them as separate issues tends to make it appear more complicated.

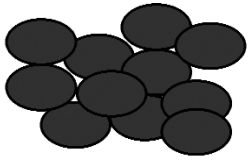
What is Home Hygiene?
In practice the essential components of infectious disease prevention are:
- **Sanitation**: facilities for safe disposal of human waste are vital
- **Water**: in every home there is a requirement for
- safe water for drinking
- adequate water for performing hygiene practice
- **Good hygiene practice.**

The home is an environment where all human activities occur. Home hygiene practice is the sum total of the practices which are undertaken to protect the family from hygiene-related diseases, including:
- **Food hygiene** - safe cooking and storage of food, safe disposal of food waste
- **Personal hygiene (including handwashing)**
- **General hygiene** (care of toilets, baths basins etc, laundry general cleaning of surfaces)
- **Home health care care of those at extra risk**
- Care of the very young and elderly
- Care of those who have reduced immunity to infection (through drug treatments, disease etc)
- Care of those who are infected
- **Control of wastewater and rainwater**
- **Care of domestic animals and pets**
- **Control of insects.**

For communities without access to safe sanitation and water supply it must also include:
- **Safe disposal of human faeces**
- **Household water treatment and safe storage.**

2. Germs, helminths and disease

Key messages



Spherical (coccus)
e.g. *Staphylococcus aureus*

Rod (bacilli)
e.g. *Escherichia coli*

Spiral/helical
e.g. *Treponema*

- The majority of hygiene-related infectious diseases are caused by micro-organisms
- This includes bacteria, viruses, fungi and protozoa
- Microbes are found everywhere - in our bodies, in our domestic animals, on raw food or in water, and everywhere in and around our homes
- We come into contact with microbes all the time, but most of them do us no harm
- Some types of microbes can make us ill if they enter our body
- In this training resource we will use the term “germs” to mean “bacteria, viruses etc which are harmful”
- Other diseases related to safe water, sanitation and hygiene include those caused by various worms (helminths), and scabies which is caused by a species of mite.

2. GERMS, HELMINTHS AND DISEASE

Community workers/teachers notes

What are germs?

Many of the hygiene-related infectious diseases which occur in developing countries are caused by germs. Germs are micro-organisms that cause infectious disease and may be bacterial, viral, fungal or protozoal. The term, germ, is frequently used by the community to refer to all microbes. Strictly speaking it applies only to those microbes that cause disease - and will be used in this way in this teaching resource.

	Commonly-occurring hygiene-related diseases caused by germs
Bacteria	**Diarrhoeal diseases:** *Cholera (Vibrio cholera), typhoid (Salmonella typhii) , dysentery (Shigella spp), Salmonella, Campylobacter, E. coli,* **Others:** *Staphylococcus aureus (food poisoning), Legionella pneumophila (respiratory), Chlamydia trachomatis (trachoma).*
Fungi	*Candida albicans* (thrush)*, Aspergillus*
Viruses	**Diarrhoea & vomiting:** norovirus & rotavirus **Colds and influenza:** rhinovirus, influenza virus etc Hepatitis and poliovirus
Protozoa	*Cryptosporidia, Giardia. Entamoeba*
Vector-borne diseases	Malaria (protozoa), dengue (virus), shistosomiasis (helminth), filariasis (helminth), trypanosomiasis (protozoa), yellow fever (virus) etc

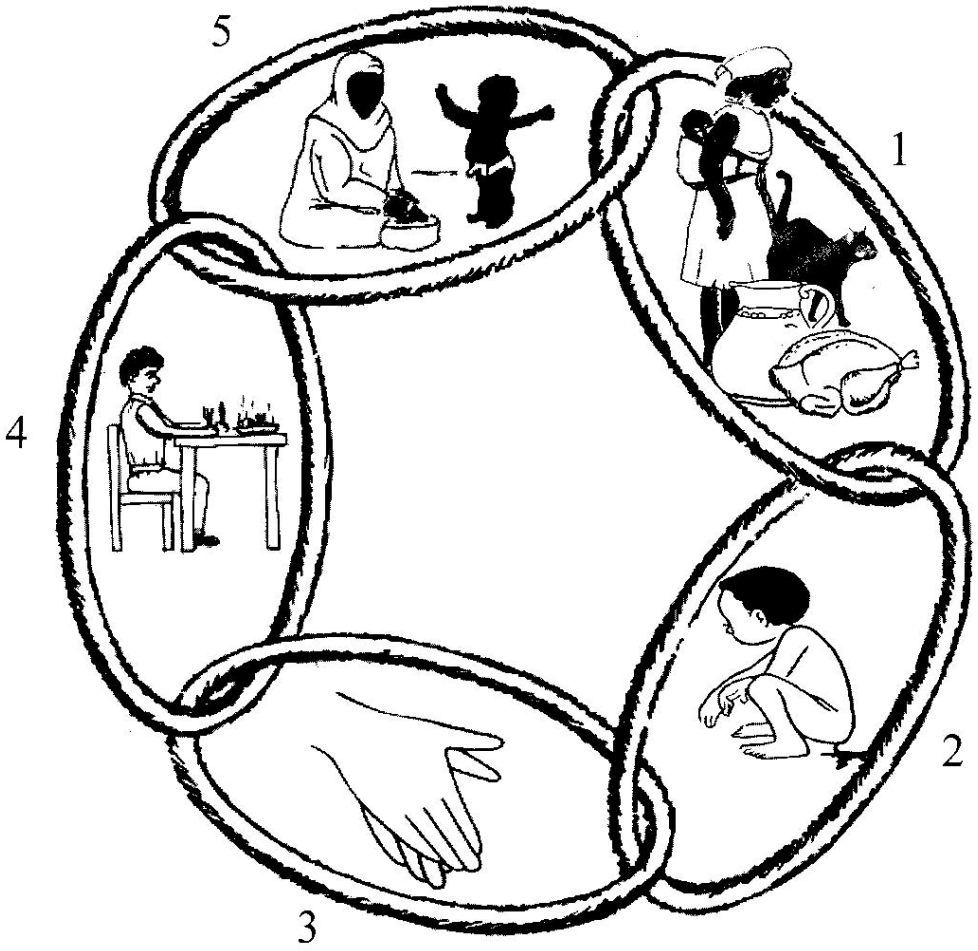
- Microbes are found everywhere - in our bodies or our domestic animals, on the surface of (or in) raw food, or in water - and everywhere in and around our homes (the peridomestic environment). Bacteria, viruses and protozoa are invisible to the naked eye
- Different species have different needs. Some types of bacteria can only "live and breed" in the human or animal body, whilst others are adapted to live in our environment, where different species have a preference for different places. Some bacteria can live both in the human/animal body and the environment
- Viruses can only live and breed inside living cells
- “Mould” is the term commonly used to describe fungal growth. Moulds frequently grow on damp surfaces and can be seen with the naked eye
- Microbes will only breed in situations where there is adequate moisture and nutrients, but many can survive for significant periods of time on e.g. hands or dry surfaces
- We come into contact with microbes all the time. Most of them do us no harm but some types of microbes can make us ill if they enter our body and overcome our body defences. Some types of microbes are used to make foods such as cheeses or yoghurts. Others help us to digest our foods.

Other diseases related to safe water, sanitation and hygiene which are prevalent in developing countries include those caused by various by worms (helminths) including *Ascariasis, trichuriasis,* hookworms guinea worms, whipworms and tapeworms. Scabies, which is caused by a species of mite, is also a common hygiene-related disease.

Micro-organisms, helminths, etc., and their routes of spread, are described in more detail in Appendix 1

3. The chain of infection in the home

Key messages



Spread of infection always involves a chain of events. **All of the links in the chain of infection have to be in place** for germs to pass from an infected source to healthy family members:

1. Source of germs – There must be someone or something in the home or its environs carrying germs that can cause illness. The main sources of germs in the home are infected humans and animals, and contaminated food and water.

2. Way out for the germs – The germs must find a way out of the infected person (e.g. via faeces, vomit, coughing) or from the food (during handling).

3. Spread of germs – There needs to be a way for germs to be passed on. Infection can pass directly e.g. from person to person (or to food or water) or indirectly via e.g. surfaces, unwashed hands, dirty cloths, dirty clothes, insects etc.

4. Way in for germs – There needs to be a way that germs can get into the body, e.g. eating contaminated food

5. Person at risk – We are all at risk of infection. Some people are at extra risk because they have less resistance to infection. This includes the very young, the elderly and those who have an illness which affects their ability to resist infection.

If you break one link in the chain,
an infection cannot spread.

3. THE CHAIN OF INFECTION IN THE HOME

Community workers/teachers notes

Family members will only become infected as the result of a specific chain of events. All links in the chain of infection must be present for an infection to be transmitted:

Source of germs in the home. Germs etc enter the home (and its environs) in a number of ways. You cannot get infected unless germs are present. This may seem obvious – but people often do not realise this. The source of infections acquired in the home may be a person or a domestic animal that is carrying an infection, or it may originate from contaminated food or water brought into the home. Fungi/mould spores can enter via the air and grow on damp surfaces. Some germs which enter via humans, animals, food etc can set up a permanent home in damp places inside the home such as toilets, sink u-tubes and wet cloths or outside the home in wastewater, rainwater or damp soil etc.

Way out for germs. Bacteria, viruses etc are shed in large numbers from an infected or carrier person or animal. The most important way out for those germs that cause diarrhoeal disease is via faeces. If contaminated food is placed on a surface, the surface and the hands will be contaminated. If contaminated water is used to wash a surface or the hands, these surfaces will become contaminated. Germs cannot “live” on dry surfaces, but they can “survive” long enough to allow them to find a new “human host”.

Method of spread of germs. Germs from an infected (or carrier) person or animal or from food can reach another person in a number of ways. Sometime it occurs by direct contact between the infected and healthy person (e.g. by kissing or touching). Sometimes it occurs by indirect transfer e.g. via surfaces, insects, water etc. The most important surfaces for transfer of germs are the hands, cleaning cloths and mops, hand contact surfaces, and surfaces which come into contact with food or water. Clothing and linens can also transfer germs. Some microbes such as fungal spores, or bacteria attached to skin scales, are carried in the air. Some viruses are carried in aerosol droplets produced by coughing, sneezing or vomiting.

Way in for germs. Microbes must enter the body for an infection to occur (e.g. breathed in, swallowed, through cuts, wounds and abrasions of the skin, through mucous membranes (e.g. the surface of the eye); via tubes entering body openings and blood vessels (e.g. catheters). Diarrhoeal disease mostly results from consuming contaminated food or water, but can also be caused by direct hand to mouth transfer. Respiratory diseases are caused by inhaling air containing germ laden droplets, but can be spread by rubbing the nose or eyes with contaminated fingers. Microbes can infect the skin leading to infections such as impetigo, whilst others can infect the eye.

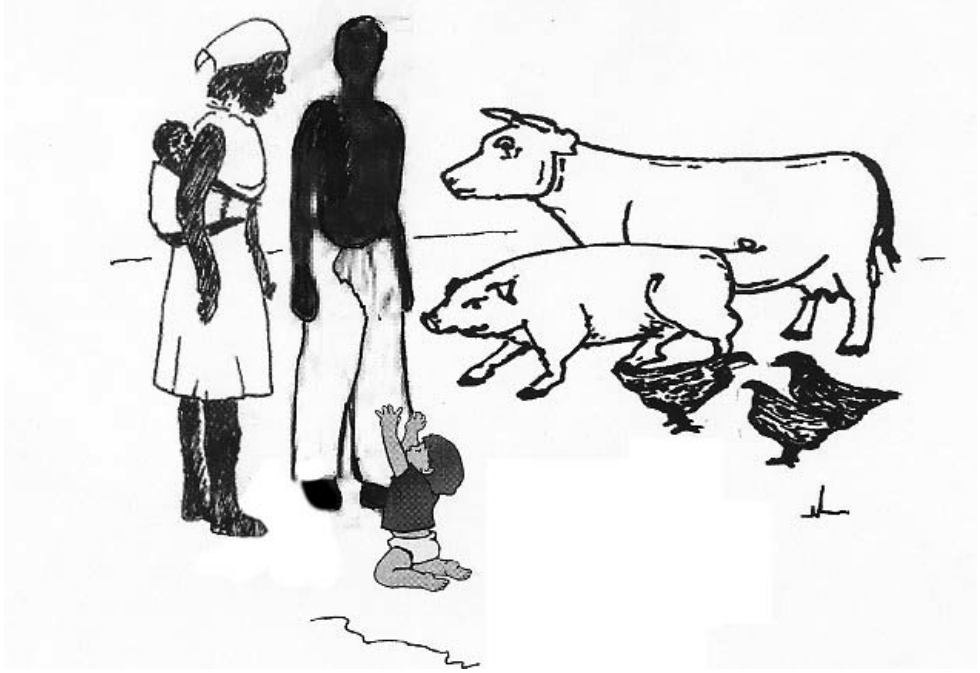
Person at risk. Everyone is susceptible to infection but certain factors can make a person more likely to succumb to infection. The higher the numbers of a particular germ we are exposed to, the higher the risk of infection. People are “at extra risk” of infection if e.g.

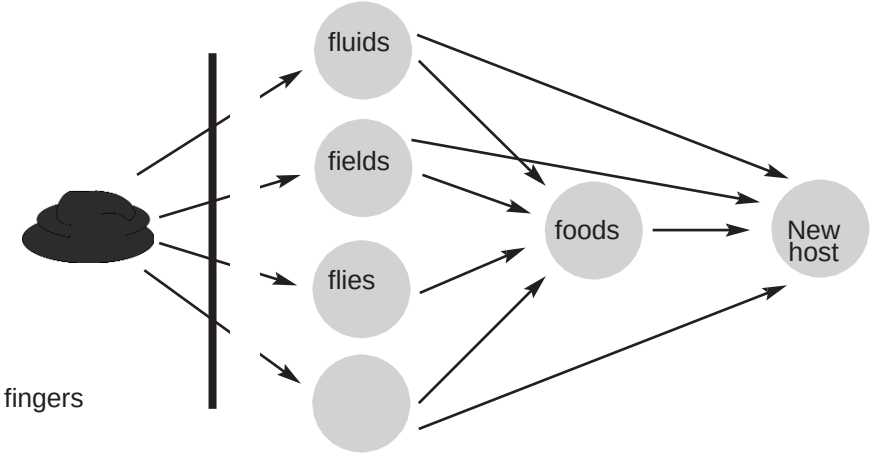
- They are elderly (our immune system becomes “weaker”)
- They are very young (our immune system takes time to develop)
- They are undergoing a specific drug treatment or have a disease (e.g. HIV/AIDS) which weakens the immune system.

The routes spread of hygiene-related diseases is discussed in more detail in Appendix 1-3.

4. Germs in the home: people and animals

Key messages





Faecal:oral transmission of germs - the F-diagram

As a source of germs etc:

- The gut, skin and respiratory tract of humans and animals contain many different types of bacteria, viruses, fungi and worms
- Sometimes it is obvious that a person or animal is infected, but people and animals often carry germs, without showing any signs of disease. These are known as carriers
- Germs are shed in large numbers in faeces (including babies faeces) vomit, by sneezing and coughing, on skin scales, exudates from wounds etc.

As a spreader of germs:

- Hands are one of the most important “germ spreaders” in the home e.g. hands can easily spread germs etc. from faeces to food or water
- Where sanitation is poor or absent: faecal: oral transfer (i.e transfer via infected faeces) is thought to be the main route of transfer. The model which shows how faecal: oral transfer occurs is the F- diagram.

4. GERMS IN THE HOME: PEOPLE AND ANIMALS

Community workers/teachers notes

People and animals as a source of germs in the home

The gut, skin and respiratory tract and other areas of the human or animal body contain many types of microbes which includes both harmless species of bacteria, viruses, fungi and worms, and also harmful species of these organisms. Sometimes it is obvious that a family member is a potential source of infection, but people and animals can often be carrying germs, without showing any signs of disease. These are known as “carriers”.

Germs (and worms) which cause diarrhoeal diseases are shed in very large numbers in the faeces and vomit from an infected person. Droplets from the mouth and nose produced by coughing and sneezing, together with skin scales, hairs and the exudate from wounds etc can all contain germs which are carried in the air or via hands to e.g. surfaces, food or water.

Note: Some infections are transmitted by direct contact from person-to-person e.g. measles, HIV etc, which means that hygiene practice can do little to prevent transmission of infection.

People and animals as spreaders of germs in the home

People continually pick up germs e.g. from contact with infected people, from handling contaminated food or a dirty cloth during their daily activities. These germs can then be passed on to other people, or to other foods or water. Hands are one of the most important “germ spreaders” in the home e.g. hands can easily spread germs from faeces to food or water.

In communities where rates of Infectious Intestinal Desease (IID) are very high and/or where sanitation is poor or absent: faecal:oral transfer (i.e transfer from the infected faeces of an infected person to an uninfected person in the family or community) is thought to be the main route of transfer of diarrhoeal disease from an infected human or animal. The model which shows how faecal:oral transfer can occur via water, food, hands and the environment is the F-diagram. Safe disposal of stools and handwashing are recognised as the key methods of preventing faecal:oral transmission.

The **F-diagram shows** the different routes which germs etc. can take from infected faeces to a new person e.g. microbes in faeces on the ground may get into water (fluids) and be drunk. Hands contaminated during defecation can carry microbes onto foods which are then eaten.

5. Germs in the home: water

Key messages

As a source of germs etc:

- In rural & peri-urban areas of developing countries people often depend on local sources of water
  - Deep tube wells and springs generally, provide microbially safe water,
  - Shallow dug wells, unless protected adequately and disinfected regularly, are microbially unsafe
  - Pond water, and water from rivers, open tanks and step wells must also be considered as unsafe
- Even for homes connected to an adequate and safe municipal water supply, the quality is often not maintained at the point-of- use/collection due to deficiencies in the distribution system
- It is important that people are informed about the quality of the water source which they are using in their home.

As a spreader of germs etc:

- Safe water can become re-contaminated with human, animal and food germs at home due to poor handling and unsafe storage practices
- Infection can occur if the contaminated water is drunk or e.g. used to wash vegetables to be eaten raw or to wash eating utensils
- Water, particularly wastewater can act as the breeding ground for insect vectors.

5. GERMS IN THE HOME: WATER

Community workers/teachers notes

Contaminated water is one of the most significant factors which contributes to the high morbidity and mortality in developing countries. The non-availability of specific treatment for viral diseases such as viral hepatitis E, and the increasing problem of antibiotic resistance which makes bacterial diseases such as typhoid fever and bacillary dysentery more difficult to treat, underlines the importance of prevention through effective hygiene. Unfortunately, epidemiological data does not allow us to determine the extent to which diarrhoeal diseases are the result of faecal:oral transmission within the home and immediate community (as depicted in the F-diagram) compared with the extent to which it results from water which is contaminated at source i.e before it enters the home.

Water as a source of germs in the home

In the rural & peri-urban areas of the developing countries, people often have to depend on bore-wells (tube wells), shallow dug wells, springs and ponds for domestic water supply. While deep tube wells and springs generally provide microbially safe water, shallow dug wells, unless protected adequately and disinfected regularly, are microbially unsafe. Pond water, and water from rivers, open tanks and step wells must also be considered as unsafe.

Although programmes aimed at supplying potable water to urban as well as rural areas have been implemented by governments in developing countries, morbidity and mortality due to water-borne diseases have not declined to an extent commensurate with the increase in availability of potable water supply. Water supply departments may introduce safe water into the supply system, but often the quality is not maintained at the point-of-use or during collection by the consumer due to deficiencies in the distribution system.

It is thus important that people are informed about the source and the quality of water source which they are using in their own home since this may vary considerably from one local community to another.

Water as a spreader of germs in the home

In addition, safe water can become re-contaminated in the home e.g. due to hand contact or storage in dirty or uncovered vessels. It is now well accepted that increased availability of potable water will only produce a significant decline in water-borne diseases if the quality of the water is also ensured at home. To achieve this there is an urgent need to teach people about hygienic practices for handling and storage of water at home and for cleaning and disinfection of reservoirs and surfaces in contact with drinking water. This is important even in areas where the water is known to be of good quality at the point of collection.

Infection can occur not only if the water is drunk, but also if it is, for example, used to wash fresh vegetables to be eaten raw, or to wash eating utensils.

Household water hygiene is discussed in more detail in module 2.

6. Germs in the home: food

Key messages

As a source of germs

- Most food, whether we buy it from a shop or produce it locally, is contaminated with microbes, some of which may be harmful
- Some foods, e.g. raw meat, poultry, vegetables, are more likely to be contaminated with germs than others
- Food may have been contaminated e.g.
  - from the animal from which it is taken,
  - from contaminated water used to irrigate vegetables
- Cooking makes food safe to eat by killing microbes, but does not necessarily “sterilise” it. If cooked food is incorrectly stored a new germ population will grow and cause infection when the food is eaten.

As a spreader of germs

- Food can become contaminated in the home e.g.
  - if prepared by someone with contaminated hands
  - if washed with contaminated water
  - if it comes in contact with other foods which are contaminated.

6. GERMS IN THE HOME: FOOD

Community workers/teachers notes

Diarrhoeal diseases can occur in the home as a result of consuming contaminated food. Unfortunately, as with water, epidemiological data does not allow us to determine the extent to which diarrhoeal disease is the result of faecal:oral transmission within the home and the immediate community, as depicted in the F- diagram, compared with the extent to which it results from food which is contaminated before it enters the community or home. Whatever the case, preventing germ transfer from contaminated raw food via hands and other surfaces, ensuring that food is adequately cooked and stored correctly, and preventing germ transfer to ready-to-eat food, is key to preventing infectious intestinal disease.

Food as a source of germs in the home

Most food purchased from a supermarket, market or anywhere for consumption in the home is contaminated with bacteria, viruses or protozoa, some of which may be harmful. Some foods, e.g. raw meat, poultry, vegetables, dairy products are more likely to be contaminated with germs than others e.g. dry products such as flour, biscuits etc. Meat and poultry can become contaminated with germs or worms from the animal from which it is taken, or it can become contaminated during processing, by cross contamination in the processing plant, or from infected food handlers. Vegetables can become contaminated if the crop has been irrigated with contaminated water.

Because food is safe to eat once it has been thoroughly cooked, people often do not realise the extent of the germ risk from bringing raw food in the home. Survey data suggests e.g. that up to 80% of chickens brought from retail premises are contaminated with *Salmonella* or *Campylobacter*. Alerting people to this important fact is difficult because it could deter them from eating e.g. poultry which is a very economic and healthy source of protein. Although safe to eat and handle after cooking, good hygiene is vital to prevent the transfer of germs from raw foods to other foods during preparation for cooking. The germs are likely to be present in large numbers on the outside surface as well as the inside of food and if e.g. meat or poultry etc is placed on a food preparation surface the germs will be transferred to that surface. Cooking will make contaminated food safe to eat by killing the germs, but does not necessarily “sterilise” it. This means that if the cooked food is incorrectly stored a new germ population will grow and cause infection when the food is eaten. Refrigeration slows down, but will not prevent this from happening.

Food as a spreader of germs in the home

Foods can also become contaminated with germs in the home. This can occur if they are not stored safely, or it can be due to poor hygiene whilst food is handled and prepared for eating. This can happen particularly if family members do not wash their hands before handling cooked foods, or foods which are to be eaten raw, or use contaminated water to wash ready-to-eat foods or prepare infant feeds.

Food hygiene is described in more detail in module 2.

7. Germs in the home: the home environment

Key messages

As a source of germs

- Some of the germs (but not all e.g. *Salmonella* can, but *Campylobacter* cannot) which come into our home e.g. in food or water can become established as a permanent source in the home environment
- These germs only form a permanent source where they find suitable conditions of water, nutrients temperature, etc. e.g. toilets, sinks drains, damp cleaning cloths etc.

As a spreader of germs

- Most germs can survive for some time on dry surfaces and are spread from one surface to another during our normal daily activities
- The main surfaces which spread germs are hands, hand contact surfaces, food contact surfaces and cleaning cloths, mops etc.
- Germs can also be spread via insects, and via dust and aerosol particles.

7. GERMS IN THE HOME: THE HOME ENVIRONMENT

Community workers/teachers notes

The home environment as a source of germs

Although contaminated food and water, together with infected people and pets are the primary sources of germs in our homes, some germs can also become established as a permanent source in the home environment. These germs only form a permanent source in the home where they find suitable conditions of water, temperature, nutrients etc in toilets, sinks drains, damp cleaning cloths, wastewater, rainwater etc. All germs need water to grow, although fungi prefer damp, rather than wet conditions. Not all germs have the ability to grow in the environment e.g. *Salmonella* can grow in toilets and probably also in damp dirty cloths. Legionella can grow in wastewater, rainwater, air conditioning units etc. By contrast, *Campylobacter* cannot grow in any of these places. Viruses in particular can only live inside living animal or plant cells.

The home environment as a spreader of germs

Most germs can survive for some time on dry surfaces. The ability to survive on dry surfaces varies significantly. For some species e.g. *Salmonella* and *Campylobacter*, survival is limited to 1-4hrs, whilst for others e.g. fungal spores, *Cryptosporidia*, survival can be for several weeks or months. Germ survival is greater if the germs are protected by dirt or other soil e.g. food material. Surface drying and exposure to sunlight will kill germs on a surface.

Germs can be spread from one site or surface to another during our normal daily activities. The main surfaces which spread germs are the hands, hand contact surfaces, food contact surfaces and cleaning cloths, mops etc. Germs can also be spread from one surface to another via insects. Germs can also be spread through the air on the surface of dust particles or in aerosol particles generates by coughing sneezing, toilet flushing.

Hygiene related to the home environment is described in more detail in module 5.

8. Germs and the peri-domestic environment

Key messages

- The peri-domestic environment is the interface between home and the environment
- Home hygiene must also include care of the immediate surroundings of the home if disease is to be prevented
- Peri-domestic hygiene must be a shared responsibility between the community and public services
- Hygiene related to the peri-domestic setting must take account of:
  - **Disposal of human faeces:** All faeces (including those of children) should be disposed of safely. Using a toilet or latrine is the best way (module 3)
  - **Safe disposal of refuse** (module 3)
  - **Disposal of wastewater** & prevention of vector breeding (modules 3 and 6)
  - **Sanitation of animal sheds & disposal of animal waste** (module 6).

8. THE PERI-DOMESTIC ENVIRONMENT

Community workers/teachers notes

In all communities, the home extends beyond the four walls of the living area. Peri-domestic hygiene is the interface between home hygiene and environmental hygiene, between community and public services. Particularly in rural areas, the residential environment may be substantial and may include courtyards, animal sheds, grain storage facilities etc. Cleanliness and hygiene of the domestic and peri-domestic areas, of the urban and rural poor in the developing countries, often becomes a complex issue because of poor housing, lack of sanitation and drainage facilities, unpaved surfaces and poor floors. It is obvious that transmission of infectious diseases cannot be totally prevented without improvement of housing and general living conditions. However within these limitations, the broad and basic norms of cleanliness and hygiene must be practiced to minimize the risk of disease transmission.

A whole range of activities and events take place in this environment which have the potential to increase the risk of spread of infection. These can include:

- Housing of domestic animals and pets
- Accumulation of animal and human faeces
- Accumulation of rain water, sullage and waste water
- Disposal of household refuse
- Storage of fodder and e.g. grain
- Children's play area.

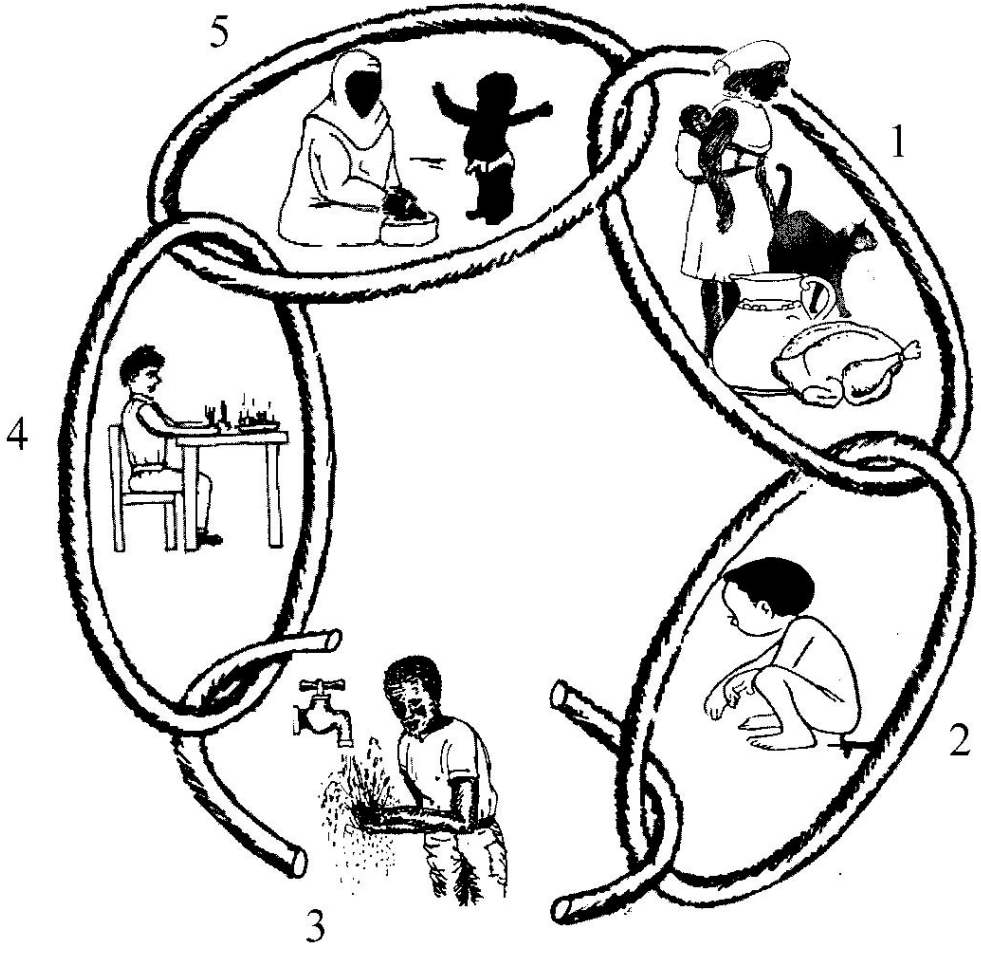
All of these activities offer frequent opportunities for transmission of germs, either directly (e.g. by children coming into direct contact with faeces or contaminated refuse whilst playing), or by indirect transfer (e.g. by germs from faeces or refuse being brought back into the home via flies, cockroaches or rodents – or via the hands). In addition, the accumulation of water encourages the breeding of mosquitoes etc thereby increasing the risks of transmission of vector-borne diseases such as malaria.

Home hygiene must also include the immediate surroundings of the home and the activities which take place in this setting, if transmission of diarrhoeal and other faecal:oral diseases and vector-borne infections is to be prevented. Improvement of peri-domestic hygiene is a shared responsibility between the community and public. People are often reluctant to take responsibility for hygiene outside their immediate home area. Hygiene promotion programmes should aim to educate communities about the importance of the peridomestic area, and empower communities to collectively take responsibility for this important aspect of hygiene.

Hygiene related to the peridomestic environment is described in more detail in module 3.

9. Breaking the chain of infection

Key messages



If you remove one link from the chain,
an infection cannot take hold.

How do you remove a link?

1. **Source of germs** – Keep an infected person away from other family members. Cook raw food thoroughly (module 2). Treat contaminated water (module 2). Look after domestic animals and pets (module 6)

2. **Way out for germs** – Dispose of faeces (including soiled nappies) safely (module 3). Follow hygiene rules when handling raw food. Store raw food in closed containers (module 2)

3. **Spread of germs** – Removing the spread of germs link is a key way to prevent spread of infection. This is achieved by good hygiene practices such as handwashing, laundry, cleaning of bathrooms, toilet etc. surface (modules 1 & 5). Insect control (module 6)

4. **Way in for germs** – Ensure that what you eat has been cooked properly and that the water you drink is clean. (module 2) Cover cuts and wounds. Practice good personal hygiene (module 4)

5. **Person at risk** – Protect everyone by immunisations. Keep people at extra risk away from people who are infectious, Take extra care with those at extra risk.

9. BREAKING THE CHAIN OF INFECTION

Community workers/teachers notes

There will always be sources of germs around the home and its environs, and there will often be someone in the family who is more susceptible to infection. We have to learn to live with this idea, but at the same time practise good hygiene in order to limit the spread of germs such that family members do not become infected. A family member will only become infected as the result of a specific chain of events – **the chain of infection. All** links in the chain of infection must be present for an infection to be transmitted. If you remove **one link** from the **chain of infection**, then an infection cannot be transmitted from its original source to healthy family members.

Safe disposal of faeces is one of the most important ways of breaking the chain of infection, as is the safe handling and treatment of food and water (the F-diagram shows that breaking the faecal:oral route of spread means safe stool disposal, and handwashing after stool contact). The other link in the chain of infection that we have most control over is the "spread of germs" link.

How to break the chain of infection:

Eliminating the source of germs

- As far as possible isolate infected family members to one room in the home, and exclude them from school, social gatherings etc.
- Cook food and treat water to kill the germs, or at least reduce them to a very low level so that there are no longer enough "live" germs to make us ill
- Good ventilation in the home will reduce humidity and prevent surface mould growth
- Take care of domestic animals and pets.

Way out for germs

- **Always dispose of animal and human faeces safely.** This applies equally to babies. Mothers are often unwilling to accept that a baby's faeces may be a source of germs which can lead to infection in other family members
- Use nappies/incontinence pads etc where necessary. Cover wounds with a clean dressing
- Cover your mouth when coughing and sneezing
- Store raw food in covered containers to prevent contact with "ready to eat" food
- Place contaminated items (nappies, pads, dressings) and raw food waste, straight into a bin or plastic bag.

Preventing the spread of germs

- Use the targeted hygiene approach to home hygiene to prevent the spread of germs. Modules 1-7 show you how to put targeted hygiene into practice.

Way in for germs

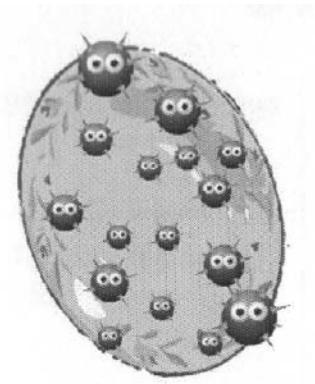
- Reduce the risk of germs entering the body through the skin by regular body washing and by covering cuts
- Ensure what you eat has been cooked properly, and the water you drink is clean.

Susceptible person (person at risk)

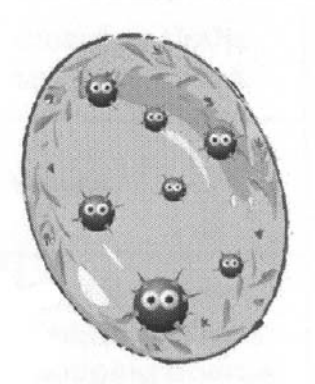
For all family members (including those at extra risk), resistance to infection can be increased by living a healthy lifestyle, good diet etc. Resistance to specific infections can be achieved by giving appropriate immunisations. Resistance to infection is low at birth but develops rapidly in a healthy child; the immune system is normally fully developed by the age of 5 years. Resistance to infection declines in elderly people.

10. Breaking the spread of germs link

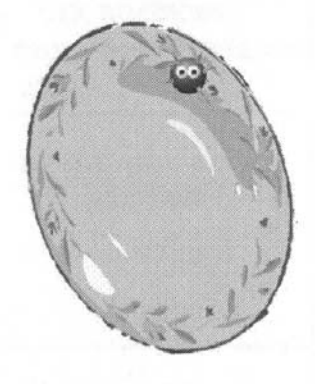
Key messages



Dirty surface



Surface after cleaning



Surface after hygienic cleaning

When e.g. washing hands, or cleaning surfaces to break the spread of infection link, we need to distinguish between “cleaning” and “hygienic cleaning”:

- **Cleaning** means removing visible dirt by sweeping, vacuum cleaning, damp dusting, or washing with water and soap or detergent. Cleaning removes dirt and some germs but does not necessarily reduce them to a ‘safe’ level
- For surfaces where the risk of spread of germs is low (e.g. floors) cleaning is usually sufficient
- Where the risk of spread of germs is high (e.g. hands, raw food preparation) **hygienic cleaning** is vital
- **Hygieneil cleaning** means removing dirt **and** getting rid of as many germs as possible, either by **removing** them, or **killing** them by **disinfecting**
  - **Removing** germs can be by thorough cleaning with hot water and soap or detergent and then **rinsing** to remove the germs
  - **Disinfecting** can be by heating or by using a product that states that it ‘**kills germs***’
  - Or a combination of removal and germ killing
- After hygienic cleaning, surfaces should be dried: by air drying, or using clean towels, cloths or paper towels.

*Chemical disinfectants and their properties are summarised in Appendix 4

10. BREAKING THE SPREAD OF GERMS LINK

Community workers/teachers notes

IFH has introduced the term “hygienic cleaning” to describe the cleaning which is needed when there is a risk of spread of germs i.e to break the spread of germs link.

Hygienic cleaning means reducing the number of germs, on a surface to a ‘safe’ level, i.e. one that is not harmful to health. Although we know that the risk of infection increases as the number of germs we are exposed to increases, we also know that the minimum “dose” of germs required to cause an infection varies significantly. For example, the infectious dose for *Salmonella* can be as much as 1 million cells , but it can also, particularly for someone who has reduced immunity to infection, be as little as 100 - 1000 cells. A major concern about *E. coli* O157 is that it has a very low infectious dose (10 - 100 cells). The infectious dose for many viruses, particularly rotavirus and norovirus, is also known to be very small (1 - 100 virus particles).

In the absence of any precise data about what is a ‘safe’ level of germs, it seems reasonable that in situations where there is significant risk of germs spreading (e.g. during food preparation) the aim should be to get rid of as many germs as possible from the sites and surfaces involved.

A hygienically clean surface can be achieved either by physical removal of the microbes from the surface or they can be killed in situ by a disinfection process. In some cases, a combination of the two approaches is used. Hygienic cleaning methods used in the home are described later in module 5. Handwashing is used to make the surfaces of the hands hygienically clean (module 1).

Note
Cleaning, i.e. removing visible dirt and soil, can remove many of the germs, but does not necessarily reduce them to a ‘safe’ level.
Hygieneil cleaning is **not** necessary for surfaces that we do not usually come into intimate contact with, e.g. floors, walls, furnishings, unless this is for specific reasons, e.g. if the floor is contaminated with vomit, excreta, etc.
Cleaning to remove soil/dirt, food material, etc., is however, a recognised component of hygiene since the presence of soil/dirt and damp provides germs with an ideal breeding ground. So keeping the home clean can help reduce the risks.

Part 2
Putting hygiene into practice

Module 1
Handwashing

Key messages

Handwashing - 1. When?

Hand washing is one of the most important ways of preventing the spread of infection.

Hands can move germs to anything hands touch, e.g. food, water. Sources of hand contamination include raw food, pets and surfaces such as toilets, soiled nappies and food preparation surfaces.

When to wash hands

Most importantly:

- ✓ after using the toilet or disposing of faeces
- ✓ after changing babies' nappies and disposing of their faeces
- ✓ before preparing food
- ✓ before eating food or feeding children.

But also:

- ✓ Immediately after handling raw food (e.g. chicken, raw meat)
- ✓ after contact with contaminated surfaces (e.g. rubbish bins, cleaning cloths)
- ✓ after handling pets and domestic animals
- ✓ after contact with blood or body fluids (e.g. faeces, vomit, etc)
- ✓ before and after dressing wounds or giving care to a sick person
- ✓ after wiping or blowing your nose.

1. HAND WASHING – WHEN?

Community workers/teachers notes

What are the risks?

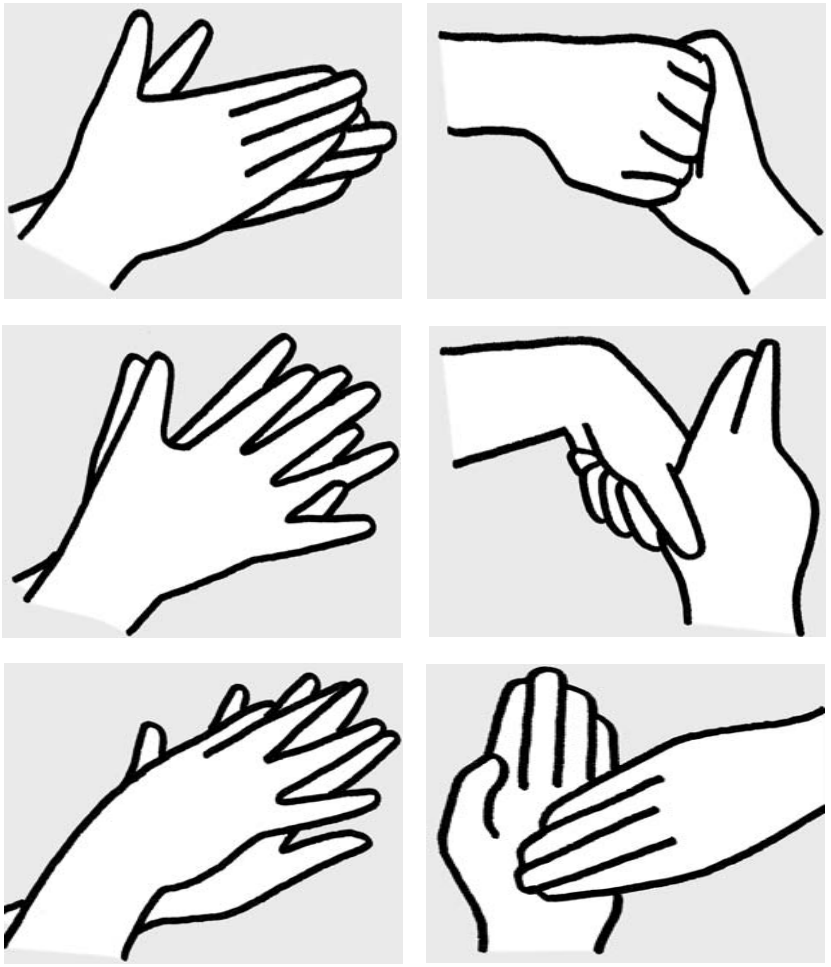
One of the most important routes for transmission of infection is via the hands. A recent systematic review concluded that interventions to promote handwashing could reduce the risk of diarrhoeal disease by as much as 45% (Curtis and Cairncross 2003). Recent studies also suggest that unclean hands are among the factors contributing to spread of respiratory infections. It is vital to raise and maintain awareness of the fact that ANY item, surface or object (including human skin) touched by the hands after contact with a contaminated source will be contaminated with micro-organisms from that source. The major contamination sources may include raw food, pets, soiled nappies, contaminated surfaces and reservoir sites such as toilets, sneezing, coughing and transfer of nasal secretions to the hands.

Microbes can be transferred from unwashed hands to other people, surfaces and food. These include bacteria such as *Salmonella, Shigella, E. coli* and *Staphylococcus aureus*, and viruses such as rotavirus and norovirus. For example, a person with gastroenteritis is likely to excrete the pathogen in their faeces. These germs are easily transferred to the hands during visits to the toilet or by touching faeces. If the person does not wash their hands effectively, the microbes can be transferred to food during meal preparation. Ingestion of these microbes by another person could then cause illness. Microbes can also be transferred directly from hand to mouth. This is known as ‘faecal:oral transmission’.

Although airborne transmission is considered the main route for transmission of respiratory viruses such as cold viruses and flu viruses, research now shows that infection may occur by rubbing the eyes or the internal surface of the nose with hands contaminated with the virus.

In general the level of personal hygiene in rural areas and in the peri-urban and urban under-served areas is extremely poor although it is relatively better among the urban middle class and richer populations. In a sample survey in India it was found that 24% of the rural population wash their hands (after defecation) with water only. 61% use water/ash/mud and only 14% use water with soap. Among the urban population with higher economic status the picture is somewhat better. Here almost 100% use water with soap for washing their hands after defecation but only 75% wash their hands with soap and water before having a meal. Hand washing before eating or after handling pets is often not practiced diligently even in urban educated communities.

Handwashing - 2. How?



How to wash hands correctly

- ✓ Always wash hands under warm running water
- ✓ Apply soap (ash or soil)
- ✓ Rub hands together for 15 to 30 seconds, paying particular attention to fingertips, thumbs and between the fingers
- ✓ Rinse well under running water and dry thoroughly using a clean towel.

Don’t make it hard

People are much more likely to wash their hands if soap and water are conveniently located e.g. next to the latrine or toilet, and in the kitchen.

If there are inadequate facilities for washing hands or if there is a high risk of spread of infection, alcohol hand gels/rubs can be used. These should contain over 60% alcohol.

2. HAND WASHING – HOW?

Community workers/teachers notes

Transient microbial contamination picked up onto the hands by contact with a contaminated source can be effectively removed by thorough handwashing with soap and running water. Alternatively they can be killed in situ by the application of alcohol-based handrubs.

Handwashing with soap and water

For most activities, hand washing with soap and water is sufficient to make the hands hygienically clean, but only if it is carried out correctly. Soap and clean warm running water should be used. Rubbing with soap (or ash) and water loosens the germs (bacteria and viruses) from the skin. Rinsing the hands then removes the germs. Hand drying is important since germs are more easily transferred from wet hands.

People often do not realise that rubbing the hands with soap is not enough on its own to make the hands hygienic; it is the rinsing process, which takes the germs off the hands. It is also important to understand that compromising any aspect of hand washing (e.g. time spent rubbing hands, thorough rinsing) will significantly reduce hand washing effectiveness.

In the developing countries use of soap for hand washing is widely practiced among the urban served people. But in the rural & periurban areas, soil or ash is still being used for cleaning hands after defecation.

Using antimicrobial products

Alcohol-based handrubs are a practical way of making the hands hygienically clean in situations where hand-washing is not possible, but it is not effective on dirty hands because alcohol does not penetrate soil very well. The concentration of alcohol should be at least 62% v/v. It must be borne in mind that alcohol handrubs are not a feasible solution at all socioeconomic levels and must not be regarded as a substitute for handwashing in situations where there is access to soap and water.

Using a soap-based product containing an antimicrobial (e.g. antibacterial soap bar) that kills germs, for hand washing, or applying an alcohol-based handrub after hand washing may be recommended in situations of extra risk, such as when caring for people who are immune-compromised and therefore more vulnerable to infection, or for people who are infected. Where feasible, particularly in high risk situations, the use of disposable paper towels rather than shared towels is preferred, since contaminated towels can be a cause of infection transmission.

Alcohol-based handrubs (also called hygienic handrubs) make the hands hygienically clean by killing germs, whilst soap-based products (usually called hygienic handwashes) rely on a combination of germ kill and germ removal. To be confident that the product will produce a risk reduction greater than that achieved by hand washing with plain soap, the product should comply with standard European test methods EN 1499 and EN 1500, or an equivalent approved method.

Module 2
Food and water hygiene

Key messages

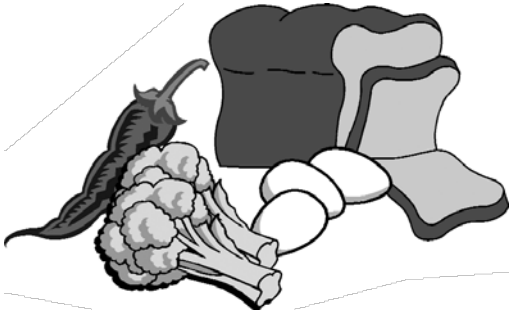
What is food poisoning?

Food poisoning is a major cause of morbidity and mortality in developing countries.

- Food poisoning is disease caused by the consumption of food
- It can be caused by bacteria, viruses, fungi or protozoa
- It can also be caused by chemicals or pesticides
- WHO estimates that around 40% of all foodborne infections originate in the home.

Any food can contain germs

- Most foods contain some microbes, which may include germs
- You cannot tell if food contains germs by its look, smell or taste
- Germs can be on the surface and/or inside the food.



How does food get contaminated?

- Food can be contaminated when you bring it home. This is true both for foods which you grow or rear at home, and foods which you buy from a market or shop
- During handling, storage, preparation etc at home germs can get into ‘clean’ food from people, pets, pests, surfaces, contaminated food or water.

Not all intestinal diseases are foodborne. They can also be transmitted by drinking contaminated water, or by direct person-to-person transfer.

WHAT IS FOOD POISONING?

Community workers/teachers notes

Food poisoning is defined as ‘Any disease of an infectious or toxic nature caused by, or thought to be caused by, the consumption of food or water’ (WHO definition). Food poisoning can be caused by bacteria, viruses, fungi or protozoa, but also by chemicals or pesticides. There is a tendency to assume that most foodborne infections come from eating outside the home e.g. a restaurant or food stall. WHO estimates that around 40% of all foodborne infections originate in the home. Although the term "germs" is not routinely used in relation to food poisoning, in order to be consistent with the rest of the training resource, we will continue to use this term in this section to refer to those bacteria, viruses etc which are harmful.

Bacterial food poisoning

- Bacteria e.g. *Campylobacter* or *Salmonella* eaten via food, grow in and irritate the intestines causing diarrhoea or vomiting
- Some bacteria produce a chemical (toxin) within the food. Cooking may kill the bacteria but doesn’t remove the toxin and if the food is eaten, the toxin can cause illness, e.g. *Staphylococcus aureus, E. coli O157, Bacillus cereus* and *Clostridium perfringens*
- Other bacteria may be in food when eaten and then produce harmful toxins once they have reached the intestines and multiply, e.g. *Shigella, Listeria.*

Viral food poisoning

Viruses cannot grow in food, but can survive. Food may be infected via contaminated water or an infected food handler. Examples include;

- rotavirus, the most important viral cause of diarrhoea in children under five years;
- norovirus (commonly known as ‘winter vomiting disease’); and
- hepatitis A.

Symptoms of food poisoning

Symptoms usually start 1 - 36 hours after eating contaminated food and can last for up to seven days. Symptoms may include all or some of the following: abdominal pain, diarrhoea, vomiting, nausea (feeling sick, dizzy and faint) and fever.

How does food get contaminated?

All food can contain germs regardless of whether we grow, or rear, it at home, or buy it from a market or shop. Food can also become contaminated whilst being handled or stored at home. In developing country situations, the question is “how much food-borne disease is “faecal:oral” and preventable by improved sanitation and handwashing, and how much requires other interventions”. Since the faecal:oral route is seen as the major underlying contributor to the spread of infectious intestinal disease (IID) in developing countries, food hygiene messages currently focus on handwashing before handling food and before eating. By contrast hygiene messages related to food contaminated at the point of sale e.g. washing hands and surfaces after handling and preparing e.g. raw poultry, is largely overlooked. As far as global investment in food safety is concerned, the emphasis remains on controlling food quality during production through improved food processing and packaging, and on better standards and regulations. There is an unwillingness to alarm consumers by making them more aware of this problem, and a fear that encouraging consumers to take more responsibility for preventing food-borne disease could be seen as releasing food producers from the responsibility of producing better quality food. In reality all food-borne disease could be prevented through good food hygiene practice during handling and preparing food for eating.

Not all gut infections are foodborne

In some cultures there is a tendency to assume that all gut infections are foodborne i.e "it must have been something I ate". This is far from correct e.g. a UK study suggests that as little as 20% of the estimated 10 million gut infections per year are food borne.

Not all foodborne organisms cause infectious diseases

Some micro-organisms which are found in foods are useful or beneficial. Some types of microbes are used to make foods such as cheeses or yoghurts. Others help us to digest our foods. Other microbes present in foods may do us no harm but cause spoilage of our food i.e they cause it to smell bad, taste horrible or look disgusting.

Food hygiene: basic principles

All food borne disease could be prevented through good hygiene practice during handling and preparing food for eating. There are **five key actions** needed to prevent food poisoning:

- Keep Clean - prevent cross contamination
- Separate raw and cooked food
- Cook food thoroughly
- Store food properly
- Use safe water and raw materials.

Always remember that babies and infants are more vulnerable to food poisoning so special care is needed for these groups.

FOOD HYGIENE – BASIC PRINCIPLES

Community workers/teachers notes

The WHO has devised a system of *5 keys* that can be used as a framework to produce food safety training materials for a variety of audiences aimed at preventing food borne disease in the home and other settings.

The 5 key messages are:

1. Keep clean – prevent cross contamination

- Preventing cross-contamination means stopping germs from spreading from people, pets, pests and contaminated food or water, into food which is being prepared for eating
- Germs cannot move on their own, they are moved via hands, or hand and food contact surfaces (e.g. knives, chopping boards, cloths)
- A person may be infected with food poisoning germs, but not show any symptoms of illness. This means that everyone must practice good hygiene when preparing food.

2. Separate raw and cooked foods

- Germs can also move by direct contact between contaminated food and 'clean' food.

3. Cook food thoroughly

- Food can be made safe to eat by heating at a particular temperature for a sufficient time.

4. Store food properly

- Foods must be kept at the right temperature, e.g. hot foods kept hot, chilled foods kept cold. If not, bacteria can grow in food to an unsafe level.

5. Use safe water and raw materials

These are the core messages and should be applicable to all audiences. However, depending on basic needs, the order of the messages may need to be changed. For example, in developing countries, it may be necessary to address the use of safe water and raw materials first.

Further Reading

WHO has produced a practical manual which gives detailed guidance on designing and actioning food hygiene promotion programmes: "Bringing food safety home. How to use the "WHO 5 keys to safer food" to create effective food safety training for specific target audiences". 2006 Food Safety department, World Health Organisation, Geneva. **http://www.who.int/foodsafety/consumer/en**

Key messages

1. Prevent cross contamination

Do:

- ✓ Make food preparation surfaces hygienically clean* before preparing food
- ✓ Wash and dry hands after handling high risk raw foods, and before handling ready-to-eat food
- ✓ Immediately hygienically clean* surfaces contaminated by contact with hands, food or cloths. Do not leave it until later
- ✓ Wash utensils (including cutting boards) immediately after preparing raw food, in hot soapy water, rinse in clean water and leave to dry
- ✓ Wash and dry cloths after every use. Don't use a dirty cloth on a clean surface
- ✓ Avoid preparing food if you are infectious
- ✓ Protect kitchen areas and food from insects, domestic animals and pests.

Don't:

- ✘ Wash the 'meat' chopping board in the same bowl as crockery, etc.
- ✘ Use fingers to taste food during preparation. Use a clean spoon
- ✘ Use a utensil to stir or serve cooked food if previously used with raw food
- ✘ Wash your hands in the washing up water, always use clean running water.

***Since these surfaces cannot be rinsed effectively, it is advisable to clean and then disinfect them.**

1. KEEP CLEAN - PREVENT CROSS CONTAMINATION

Community workers/teachers notes

High risk foods

Certain raw foods or ingredients have a high risk of carrying germs, e.g.

- poultry and red meat (*Campylobacter, Salmonella, E. coli 0157*)
- cooked rice (*Bacillus cereus*)
- dairy products (*Listeria, Salmonella, Staphylococcus aureus, Shigella*)
- raw and undercooked eggs (*Salmonella*)
- soft cheeses (Listeria)
- salads, fruit and vegetables (*Salmonella, Norovirus, Shigella*)
- shellfish/seafood (*Vibrio*, Hepatitis A virus, cholera).

- Germs can be on the surface of food as well as inside the food. The packaging can also be contaminated
- Whenever you handle food, or put it on a surface, cut it up, etc., germs will be transferred to these surfaces and your hands
- If you then use the cloth to clean other surfaces, you will spread the germs to these surfaces
- If you open the kitchen cupboards, answer the telephone or turn on the taps to wash your hands, these surfaces will also be contaminated
- In the washing-up bowl, germs can spread from a contaminated chopping board, knife or cloth to plates, cups and eating utensils.

Reducing cross-contamination

- Hygienically clean food preparation surfaces and hands immediately after preparing high risk foods and before you start other tasks. Germs can survive for up to 24 hours even on dry surfaces
  - Crockery, eating and cooking utensils can be hygienically cleaned in detergent and hot water followed by rinsing.
  - For surfaces which cannot be properly rinsed (e.g. fixed kitchen surfaces, taps, door handles, cooker knobs) or surfaces such as cleaning cloths where germs become too firmly attached, the appropriate way to achieve a hygienically clean surface is by cleaning followed by disinfection or using a disinfectant/cleaner
- Hygienically clean surfaces, hands etc before handling ready to eat foods. Never put ready to eat foods on dirty plates
- If possible, keep a separate chopping board for high risk foods. This can be a problem if you have helpers in the kitchen who do not know the routine. Recent studies have shown that *Salmonella* can be very difficult to remove from surfaces. It is advisable to clean and disinfect the chopping board after cutting raw meat and poultry
- Drying surfaces and keeping them dry is an important part of hygiene
- Domestic kitchens are rarely designed with hygiene in mind. Planning your kitchen properly can help to reduce cross-contamination risks. Designate one kitchen surface area (preferably close to the sink and waste disposal) for preparing raw foods, and reserve another area for handling cooked foods, cutting bread, making sandwiches, etc.

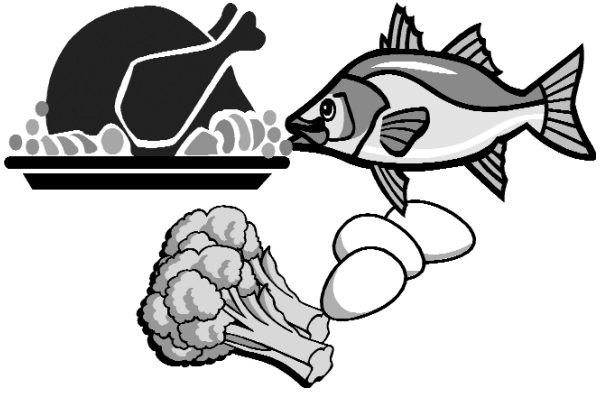
Take care with people and pets – and insects

- Food poisoning is sometimes caused by infected people who contaminate food whilst handling or preparing it
- Kitchen surfaces can also be the culprit, e.g. if a person vomits in the kitchen sink, if the nappy bucket contents are poured down the kitchen sink, or if pets walk on food preparation surfaces
- Because you never know what has been happening in your kitchen, it is important to make food preparation surfaces and your hands hygienically clean just before you start preparing food
- Store food in covered containers to keep out flies and other insects. Flies can transfer germs to food in exactly the same way as hands.

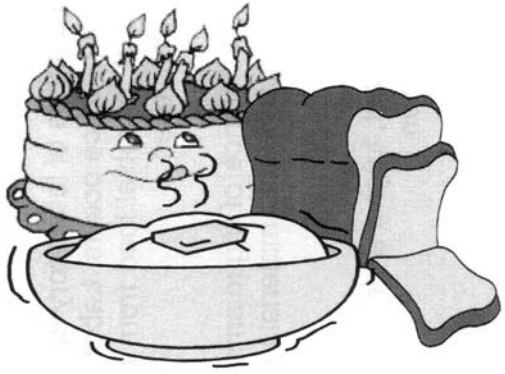
2. Separate raw and cooked food

Do:

- ✓ Separate raw meat, poultry and seafood from other foods during storage and during preparation - also during shopping
- ✓ Use separate equipment and utensils such as knives and cutting boards for handling raw foods. If this is not feasible then ensure that all raw food utensils (including cutting boards) are hygienically cleaned and dried before use with ready-to-eat food (e.g. salads, fruits, bread)
- ✓ Store food in containers to avoid contact between raw and prepared foods
- ✓ In the refrigerator, store prepared food above raw meat and chicken to avoid juices dripping onto prepared food



- ✓ Make sure cloths that have been used for raw food do not touch other food.



2. SEPARATE RAW AND COOKED FOOD

Community workers/teachers notes

Raw food, especially meat, poultry and seafood and their juices, may contain germs that can be transferred onto other foods during food preparation and storage. Prevent the transfer of germs by keeping raw and prepared food, and old and new food, separate. “Ready to eat” food can become contaminated through even the slightest contact with raw food or surfaces where raw food has been kept. Cloths used to wipe raw foods, or hands and surfaces contaminated from contact with raw food, can also transfer germs to “ready to eat” foods if they come into contact. It is VERY important to wash hands IMMEDIATELY AFTER handling raw food.

Old food may contain micro-organisms that could be transferred to the new food if they are mixed together. Either use up the old food first (if it is safe), or throw it away.

Raw foods should be stored in containers away from cooked or ready to eat foods.

The refrigerator is a place where, because space is limited, there is a high risk of cross-contamination. The risk can be reduced by:

- storing raw and cooked foods in separate areas or shelves
- securely enclosing raw meat or poultry in a bag or container before freezing
- placing raw meat in a dish or sealed container at the bottom of the fridge so that any juices do not drip onto other foods
- ensuring cooked foods, or raw foods not to be cooked before eating, are covered when stored in the fridge.

Keeping raw food separate is important not only when during food preparation, but also during slaughtering processes, etc.

3. Cook food thoroughly

Do:

- ✓ Cook food thoroughly to kill germs. This does not kill all the germs, but reduces them to a safe level.

Make sure:

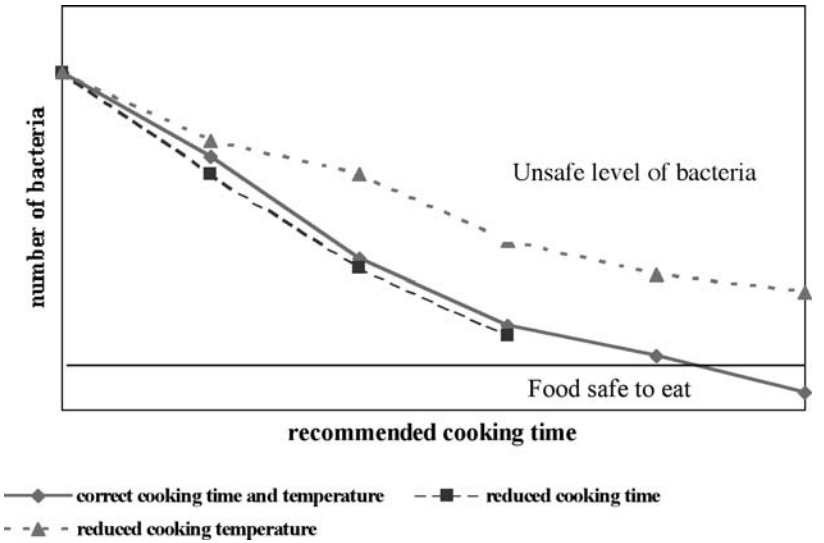
- ✓ Food, especially meat, poultry eggs and seafood is cooked all the way through. If properly cooked, juices from meat or poultry will run clear when pricked with a knife
- ✓ Keep food cold or stored in the refrigerator, but be aware that it will take longer to cook through
- ✓ Frozen food should be defrosted (preferably in a refrigerator) prior to cooking
- ✓ Cooked food should be eaten without delay, or thoroughly reheated
- ✓ Hot food should be kept hot (for a maximum of two hours) if not to be eaten immediately
- ✓ Do not reheat food more than once.

3. COOK FOOD THOROUGHLY

Community workers/teachers notes

Cooking food

Cooking will not kill all bacteria in food, but will reduce numbers to a ‘safe’ level. To cook meat or poultry safely, the centre of the meat must reach a temperature of at least 70°C and be ‘held’ at that temperature for at least two minutes. If available, use a meat thermometer (placed in the thickest part of the meat) to check the internal temperature of poultry or meat. Food hygienists often use the term “piping hot” to “describe” the right temperature for cooking. Other indicators which can be used to check whether meat and poultry is properly cooked is to make sure that the meat juices "run clear" when pricked with a knife and/or the meat is not pink in the middle.



Always check and follow cooking instructions on food packaging. Cooking times in recipe books are, unless stated, the sum of the time needed to raise the food from room temperature to cooking temperature plus the “holding time”. Frozen food must be thoroughly thawed before cooking, or if suitable to cook from frozen additional heating time must be added to allow extra time for the food to reach the ‘holding temperature’.

Microwave cooking

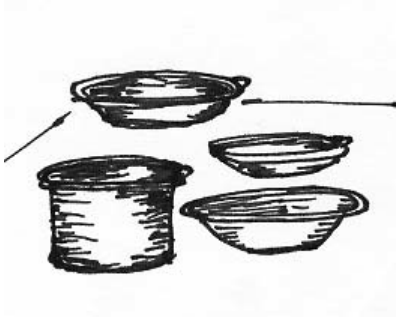
Refer to manufacturers’ instructions on appropriate times or power settings for cooking or defrosting food. Microwaves have hot and cold spots, so foods must be turned or stirred to prevent uneven heating.

Meal preparation

- Once food is ready for eating, care must be taken to ensure it stays ‘safe’
- Hands must always be washed before handling cooked or prepared foods
- Ensure that all preparation/serving surfaces are hygienically clean
- Cooked food should not come into contact with raw meat, unwashed vegetables or salad, or with utensils, cloths or surfaces contaminated by contact with raw food
- Do not place cooked food onto plates that previously held raw food. This is often forgotten when barbecuing.

4. Store food properly

Germs grow quickly in warm food, or food at room temperature, to an unsafe level. Refrigeration slows down growth but does not stop germs growing. Freezing stops germs growing but does not kill them.

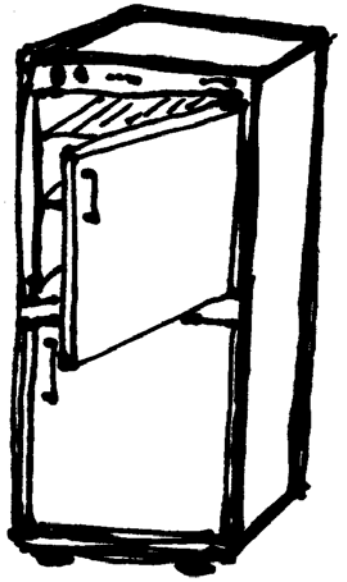


Do:

- ✓ Food should be eaten as soon as possible after cooking
- ✓ If food has to be kept for more than 2 hours it must be kept steaming hot or very cool.

Using a refrigerator or freezer:

- ✓ A domestic fridge should be between 1 and 5˚C and a freezer should be at -18˚C. If possible, use a thermometer to check the temperature
- ✓ Pay attention to expiry dates and discard food when the date has passed
- ✓ Cooked food should be cooled quickly to prevent regrowth of germs
- ✓ Hygienically clean internal surfaces and the door handle of the fridge regularly.



Don’t:

- × Put hot food into the fridge as this causes the temperature to rise
- × Refreeze food once it has been defrosted (unless you have cooked it first)
- × Store leftover food in the fridge for more than 2-3 days.

4. STORE FOOD PROPERLY

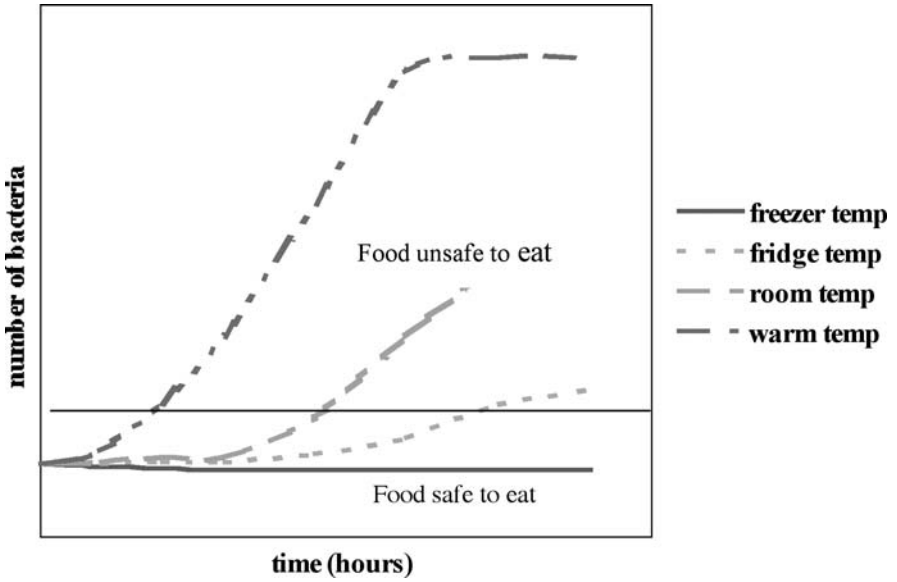
Community workers/teachers notes

Cooking food thoroughly will reduce the number of germs to a level which is safe to eat, but a small number of live germs may remain. Likewise “ready to eat” food which is purchased from the shop or market may contain small numbers of germs. Unless food is “frozen”, the germs will multiply back to an unsafe level: the warmer the temperature at which the food is stored, the faster this growth will be.

A **fridge** maintained between 1 - 5˚C will reduce the growth rate of microbes. It does not prevent them growing. Food should only be stored in the fridge for a limited period and the ‘use-by’ or ‘best before’ dates on product packaging adhered to.

A **freezer** maintained at -18°C will prevent bacterial growth in foods for an indefinite period. Food that is safe for consumption can be maintained in that state by freezing.

Refrigerators and freezers must be cleaned and defrosted regularly. Avoid leaving the door open for too long to prevent temperature fluctuations. Never overload the refrigerator, as it is harder for cold air to circulate.



If not being eaten immediately, cooked food should be cooled as quickly as possible and then stored in a fridge or freezer. This ensures any remaining germs do not have time to grow during the time when the temperature of the food is optimum for growth.

Avoid mould growth on food or in food storage areas. Mould spores easily become airborne and spread to other foods. Throw mouldy food away.

Frozen food that has thawed should not be refrozen, unless it has been cooked.

Storage practices vary greatly between different communities and many people do not have access to a refrigerator let alone a freezer. In such communities other methods can be used to keep food cool (digging a hole, or immersing in cold water). Buying or slaughtering food on a daily basis is another way to avoid storage problems!

5. Use safe water and raw materials

Do:

- ✓ Use safe water for preparing foods. If necessary treat water to make it safe
- ✓ Select fresh and wholesome foods
- ✓ Choose foods processed for safety, such as pasteurised milk
- ✓ Food and vegetables to be eaten raw should be peeled, washed and rinsed using clean water
- ✓ Do not use food beyond its expiry date.

5. USE SAFE WATER AND RAW MATERIALS

Community workers/teachers notes

Raw materials, including water and ice, may be contaminated with microorganisms and dangerous chemicals. Toxic chemicals may be formed in damaged and mouldy foods.

Care in selection of raw materials and simple measures such as washing and peeling of foods which are to be eaten raw may reduce risk. Although food which is “spoiled” (i.e smells nasty, or has a disgusting taste or appearance) is not necessarily dangerous to eat, it serves as a good indicator that the food is not fresh).

Suggested methods for ensuring safe water are described in the following section. During food handling and preparation safe water is needed to:

- wash fruits and vegetables
- add to food
- make up drinks
- make ice
- clean cooking and eating utensils
- wash hands.

6. Feeds for infants and babies

- **Infants and babies are much more likely than adults to become ill from eating contaminated food or drinking contaminated water. Special care should be taken when preparing food for infants and small children**
- **Breastmilk is the safest for infants and young children**
- **Powdered infant formula is not a sterile product and should be prepared and stored with care to prevent growth of germs.**

Hygiene practices for preparing infant feeds are the same as for all foods - but make sure:

- ✓ Your hands are washed before preparing foods and feeding children
- ✓ Feeds are always prepared using “safe” water
- ✓ Feeding bottles, teats, cups, spoons etc are hygienically clean. Clean them thoroughly after each use with soap/detergent and hot water and then disinfect by immersing in boiling water or Milton solution
- ✓ Wherever possible feeds are prepared and given immediately
- × Don’t store prepared feeds at room temperature
- × Don’t store prepared feeds in a fridge for more than 8 hours.

6. FEEDS FOR INFANTS AND BABIES

Community workers/teachers notes

Infants and babies are much more likely than adults to become ill from eating contaminated food or drinking contaminated water. Because their immune system is not fully developed, even very small "doses" of germs can cause illness.

- Breastmilk is the safest for babies. Expressed breastmilk can be stored for up to 8 hrs in a clean covered container
- Animal milk should be freshly boiled or pasteurised
- Powdered infant formula is not a sterile product and should therefore be prepared and used with care to prevent growth of harmful organisms
- Use only safe water to prepare infant feeds
- Hygiene practices for preparing infant feeds are the same as for all foods, but special care should be taken when preparing food for infants and small children
- Feeding bottles and teats should not be used unless they have been cleaned, and then disinfected with boiling water or Milton solution
- Infants should be fed from a clean cup.

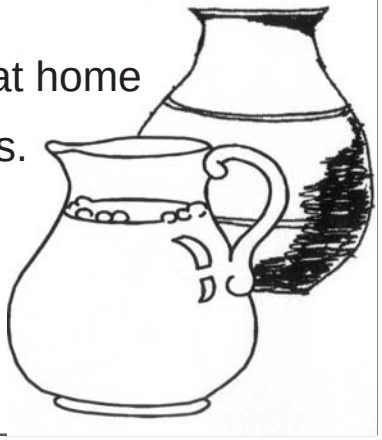
How water can make you ill

Contaminated water is one of the most significant factors which contributes to the high morbidity and mortality from infectious diseases in developing countries.

- It can be caused by bacteria, viruses, fungi, protozoa or worms
- It can also be caused by chemicals (e.g. arsenic, fluoride, nitrate) or pesticides.

How does water get contaminated?

- Water supply departments usually introduce safe water into the supply system, but the quality is often not maintained at the point of use or collection by consumers due to deficiencies in the distribution system and intermittent water pressure
- In communities where there is no piped water supply, clean water sources include tube wells, protected dug wells and springs. These sources may however be contaminated if not properly constructed and maintained
- Water from ponds, rivers, open tanks and step wells must be considered as unsafe
- Clean water can become contaminated due to poor handling and storage practices at home
- Water may be contaminated with faeces etc during floods and other natural disasters.



An adequate and safe water supply is needed for:

- Drinking
- Hygiene practices e.g. handwashing, dishwashing etc.

HOW WATER CAN MAKE YOU ILL

Community workers/teachers notes

Universal access to safe water is seen as an essential step in reducing the burden of infectious disease.
At present, it is estimated that up to 1.1 billion people still do not have access to microbiologically safe sources of water for drinking.

Waterborne pathogens include:

Bacterial	Viral	Protozoa	Helminths
Cholera (*Vibrio cholera*) Typhoid (*Salmonella typhii*) Bacillary dysentery (*Shigella* spp) *Campylobacter* spp *Salmonella* spp.	Hepatitis A Poliovirus Norovirus	Cryptosporidiosis (Cryptosporidium parvum) Giardiasis (Giardia lamblia)	Roundworms Guinea worm Flatworms

Contaminated water supplies have the potential to cause large and explosive epidemics (e.g., cholera). The non-availability of specific treatment for viral diseases such as hepatitis and the increasing problem of antibiotic resistance, which makes bacterial diseases such as typhoid and dysentery more difficult to treat, underlines the importance of preventing water-borne disease through effective hygiene. It is estimated that residents of developing nations may experience between 5 and 20 episodes of diarrhoea per year.

Although significant advances have been made globally in the provision of community water supplies, there are increasing concerns that the health gains from investment in water supply are being significantly compromised by the fact that:

- Many communities have access to water that is microbiologically safe when collected or when it leaves a treatment plant. However, substandard water distribution pipes, functioning under intermittent supply (i.e a lack of continuous positive water pressure in the pipes) often lead to the introduction of faecal contamination resulting in microbiologically contaminated water at the consumer's tap or collection point
- Water can become contaminated by unsafe consumer storage and handling practices at the household level.

Increasingly it is recognised that key to reducing the burden of water-borne ID is by promoting point-of-use water treatment and safe storage in the home. A key argument for promoting household water treatment and safe storage is that it can provide safe water to underserved populations much more quickly and affordably than it takes to design, install and deliver piped community supplies. Promotion of “point of use” water treatment has the potential to provide immediate benefit to at risk populations until the long- term goal of providing community water supplies can be achieved. It is important however that point-of-use water treatment is not seen as an alternative to the provision of safe community water supplies, and an argument for decreased investment in such programmes. Two recent meta-analysis assessments using data derived from community intervention studies, suggest that promotion of household water treatment and safe storage could reduce the risk of diarrhoeal diseases by up to 35 to 42% (Clasen and Cairncross
2004, Fewtrell et al 2005).

An adequate and safe water supply is needed for:

- Drinking
- Hygiene practices e.g. handwashing, dishwashing etc. In the rural areas, unsafe sources of water such as pond or river water are often used for domestic purposes, including cleaning of utensils, cooking and washing of clothes. Communities should be made aware of the potential risks and encouraged to use safe sources of water for these purposes as well as for drinking.

Key messages

Water hygiene: basic principles

To reduce the risks from water borne disease people must be:

- Informed and aware about the source and the quality of their water, since this can vary significantly between different communities
- Educated on how to handle, store, test quality periodically and, if necessary, treat water in their own homes.

There are three key actions needed to prevent waterborne disease:

- Families and communities need to protect their water supply against contamination
- Families need to keep water clean in the home
- Families may need to treat water to make it safe for drinking and other uses.

Key messages

1. Protecting the water supply

- In communities where there is no piped water supply, people have to rely on other sources of water such as bore wells and springs
- Communities should be made aware of the importance of protecting their water supply, encouraged to take responsibility for the supply, and instructed on how to do this.

Families and communities can protect their water supply by:

✓Keeping wells covered and installing a hand-pump

✓Disposing of faeces and waste water well away from any water source used for cooking, drinking and washing

✓Building latrines at least 15 metres away and downhill from a water source

✓Keeping buckets, ropes and jars used to collect and store water as clean as possible by storing them in a clean place rather than on the ground

✓Keeping animals away from drinking water sources and family living areas

✓Avoiding the use of pesticides or chemicals anywhere near a water source

✓Sanitary Inspection of water sources & water quality testing should be undertaken periodically.

1. PROTECTING THE WATER SUPPLY

Community workers/teachers notes

In communities where there is no piped water supply, but where a “clean” source of water is available, the communities should be made aware of the importance of protecting the supply, encouraged to take responsibility for the supply, and instructed on how to do this.

In the rural & peri-urban areas of the developing countries of Asia & Africa, people often have to depend on bore-wells (tube wells), shallow dug wells, springs and ponds for domestic water supply. While deep tube wells and springs generally, provide microbially safe water, shallow dug wells, unless protected adequately and disinfected regularly, are microbially unsafe. Pond water is likely to be grossly contaminated with faecal pollution, and should not be used for drinking or cooking. Water from rivers, open tanks and step wells must also be considered as unsafe. Even bathing and washing utensils in pond water, which is very common, can cause skin infections or faecal:oral infections, and should be avoided as far as possible.

Properly designed tube-wells drawing water from adequate depths, are generally safe microbially, but may contain toxic chemicals such as arsenic, fluoride, nitrate etc. Microbial contamination is also possible due to faulty construction or operation and periodic testing is advisable. If found contaminated they should be thoroughly disinfected.

In emergency situations such as flooding or other natural disasters where normally safe facilities like bore wells can get grossly contaminated with faecal matter, water-borne infections like diarrhoea, dysentery, typhoid, infectious hepatitis etc are likely to occur unless the water supply is thoroughly decontaminated (super chlorination).

Super chlorination of contaminated sources can be achieved by adding chlorine to the water (in the form of bleaching powder (calcium hypochlorite) or bleach solution) and ensuring a contact period of 24 hours. The final concentration of chlorine in the water should be 25-50mgm/l available chlorine. For further details on how to prepare and dilute chlorine solutions consult the WHO website:
http://www.who.int/household_water/resources/en/emergencies.pdf

2. Keeping water clean in the home

For those in rural and peri-urban areas, who do not have piped water in the home, water has to be collected and stored in vessels such as jars or buckets in the home.

For those in urban situations where the water supply is intermittent, water has to be stored in the home in tanks or other reservoirs.

The following should be applied:

- ✓Water vessels and tanks must be clean and kept covered
- ✓During collection and storage, do not allow anyone to put their hands into the water or drink directly from the storage vessel or tank
- ✓If possible water storage vessels should have a narrow neck and a tap at the bottom so that hand contact is not possible
- ✓Otherwise take water out of the vessel with a clean ladle or cup
- ✓Do not continually top up the water in storage vessels. After each use vessels must be thoroughly rinsed with potable or treated water
- ✓Storage tanks should be regularly cleaned and disinfected
- ✓Keep animals away from stored water
- ✓Water in storage vessels should be stored in the home for the shortest possible time.

2. KEEPING WATER CLEAN IN THE HOME

Community workers/teachers notes

Even in communities where an adequate supply of microbiologically safe water is available, this water can become contaminated by unsafe consumer storage and handling practices at the household level:

- For those in rural and peri-urban areas, who do not have piped water in the home, water has to be collected from the community supply and stored in jars, buckets or other vessels in the home. Many people continue to obtain their water on a daily or other frequent basis from any available source and either carry it or otherwise have it delivered to the home for personal use
- For communities where the municipal water supply is intermittent, water has to be stored for significant periods in the home in a container or tank of sufficient size. The municipal water distribution system, is often faecally contaminated during non-supply hours, due to leaky pipelines and sewerage system. In such homes the water may be stored in a tank which is specifically reserved for the purpose of water storage, or e.g. in the family bath.

Collection, storage and handling of drinking water in the home, is one of the major risk areas in respect of domestic hygiene in most developing countries.

Water storage vessels and water handling in the home

Repeated hand contact with drinking water, during its collection and storage is a major health concern. The low-income group people in the rural and peri-urban areas, who do not have house taps, collect water in vessels such as open jars / buckets and store them in the home, often without proper covers. Water is taken from these containers by dipping hands and fingers into the water which may be contaminated with faecal pathogens. If the container is not kept covered, the water may become contaminated from flies, cockroaches or domestic animals.

It is suggested that all domestic vessels for storing drinking water made of stainless steel/porcelain/glass/burnt clay and should be designed with a narrow neck and provided with a tap at the bottom so that hand contact is not required. Vessels should always be emptied and rinsed before refilling.

Cleaning & disinfection of drinking water storage tanks in the home

For water storage tanks in the home, it is particularly important that these are kept clean because pathogens can sometimes become established and form a permanent reservoir. Water storage tanks must be emptied and cleaned, preferably once a month, and at least every 2-3 months. This should be done by cleaning and descaling to remove any biological growth from the water contact surface followed by disinfection by super-chlorination. For disinfection of drinking water contact surfaces, the container should be filled with a solution containing 20-50 mg/l available chlorine for a contact period of 10-24 hrs followed by thorough rinsing with fresh water.

Key messages

3. Treating water to make it safe

Only safe water should be used for drinking. Turbid water should be pre-treated before disinfection. It can then be made safe by:

Treatment	Availability and practicality	Cost	Microbial efficacy
Boiling	high*	varies	high
Chemical treatment (chlorine or iodine)	high to moderate	moderate	high**
Solar disinfection	high***	low	moderate
UV lamp treatment	varies****	moderate-high	high
Coagulation/Flocculation Sedimentation/Filtration	varies	varies	varies

A multi-barrier approach which uses combinations of these technologies is appropriate in many situations.

The “best” option should be selected according to what is most applicable and acceptable to the community in question.

*provided fuel source is available; **Cryptosporidium (and to a lesser extent Giardia) are resistant; ***difficult to treat large volumes, requires 6h exposure time; ****requires power.

3. TREATING WATER IN THE HOME TO MAKE IT SAFE FOR DRINKING

Community workers/teachers notes

Water from ponds/dug-wells, etc. and from municipal supply systems which are deemed to be of doubtful quality should be disinfected in the home. If the water is turbid it must be pre-treated before disinfection. Water can be treated by a number of methods. The "best" option should be selected according to what is most applicable to the community in question.

Pretreatment of turbid water

Turbid water should be filtered through a cotton cloth to remove any solid materials, treated with alum and bleaching powder, stored for at least 2h and then decanted or filtered through a clean cloth. For pre-treatment add 10g alum & 5g lime per 100l of turbid water.

Treatment to eliminate pathogens

1. Chemical disinfection

Where chlorine or iodine tablets are available, they should be used as directed by the manufacturer. Alternatively water should be disinfected with hypochlorite in the form of bleaching powder or hypochlorite solution for 30 mins. The final concentration of chlorine should be 0.5-1mgm/l available chlorine after 30 mins. The amount of chlorine needed depends mainly on the concentration of organic matter in the water and should ideally be determined for each situation using a test kit. If not available, a slight smell of chlorine is a crude indicator. For details on preparing chlorine solutions consult the WHO website: **http://www.who.int/household_water/resources/en/emergencies.pdf** For iodine, 3.7 mg/l, contact time 10 mins, is required (6.3 mg/l if virucidal contamination is suspected). Iodine is not recommended for long term use.

2. Boiling

Bringing water to a rolling boil and holding at this temperature for a specified time will kill pathogens effectively except at high altitudes. A holding period of 3-5 mins will ensure that water is safe, except in situations where contamination with spore-forming bacteria, fungal or protozoal cysts or hepatitis virus is suspected, in which case 10 mins is advised.

3. Filtration

Ceramic filters with small pores, often coated with silver, can be effective at removing microbes and suspended solids, but efficacy varies. Up-front costs are high, but acceptable on per litre output basis. Filters need to be cleaned regularly to avoid them becoming reservoirs of micro-organisms. Monthly maintenance involves scrubbing the filter to unclog pores and washing the receptacle tank and spigot. If properly maintained, they have a long life. For further information, see **www.potpaz.org/ or www.purifier.com.np**

4. Solar disinfection

Solar disinfection is an effective method, especially when no chemical disinfectants are available. Ultra-violet rays from the sun inactivate pathogens present in water. Water should be filled to three quarters full in clear plastic bottles and shaken thoroughly 20 times, before being filled completely. Bottles are then exposed to sunlight (e.g. on the roof of a house) for 6 hours (or for 2 days if the days are cloudy). The water should be consumed directly from the bottle or transferred to a clean glass for drinking. To be effective, solar disinfection must be applied to relatively clear water. For further information, see **www.sodis.ch & www.who.int/water_sanitation_health/dwq/wsh0207/en/**

5. UV irradiation

UV light has received renewed interest following the realisation that Cryptosporidium or Giardia cysts are relatively resistant to chlorination but sensitive to quite low (<10mJ/cm2) doses of UV. Most small scale (community or household) UV systems use low pressure Mercury lamps which provide UV at 254nm wavelength. UV systems may be batch or flow-though and the lamps can be suspended above the water channel or submerged in the water flow.

6. Combined floculation/disinfection systems

Commercially produced sachets of powder which act by coagulating and flocculating sediments in water followed by a timed release of chlorine are available. These typically treat 10l of water. The water is normally stirred for few minutes, strained, and allowed to stand for a half hour.

7. Multibarrier methods

Systems which use of two or more of the above treatment in combination or in succession as a means of optimising water quality are now available.

Further information

1. Promoting hygiene practices related to household water treatment and water storage. International Scientific Forum on Home Hygiene. **http://www.ifh-homehygiene.org/2003/2library/low_res_water_paper.pdf**
2. Managing water in the home: accelerated gains from improved water supply. 2002 World Health Organization, Geneva: WHO/SDE/WSH/02.07
3. Preventing travellers diarrhoea: how to make drinking water safe. WHO Geneva 2005. **http://www.who.int/water_sanitation_health/hygiene/envsan/sdwtravel.pdf p7.**

Module 3
Peri-domestic hygiene: disposal of human excreta, refuse & waste water

1. Disposal of faeces

The most important barrier to transmission of faecal pathogens is the safe disposal of human stools so that they are isolated from human contact.

To reduce infection risks from faeces:

- ✓ Always use a toilet or latrine if possible
- ✓ Keep toilets/latrines clean and covered (see module 5)
- ✓ Keep the toilet/latrine area clean, particularly surfaces touched by hands (see module 5)
- ✓ For safe disposal of excreta, toilets should be connected to sewerage system or an onsite sanitation system (e.g. septic tank or seepage pit)
- ✓ In rural & peri-urban areas and urban unserved areas, low cost pit latrines are the most appropriate option.

For communities where there are no toilets or latrines:

- ✗ Do not defecate in the vicinity of the house
- ✓ Bury faeces immediately - do not leave them lying around.

Personal toilet hygiene:

- ✓ Using an appropriate and safe method for anal cleansing is as important as safe disposal of faeces
- ✓ Dispose of toilet paper or other materials used for anal cleansing into the toilet or latrine, or bury in soil
- ✓ **ALWAYS** wash hands with soap and water after defecation.

1. DISPOSAL OF FAECES

Community workers/teachers notes

Many illnesses, especially diarrhoea, come from germs found in human faeces. One gram of faeces can contain up to 1 million bacteria and 10 million viruses. If the germs get into water or into food, or get onto the hands, utensils or surfaces, particularly those which come into contact with food or which are regularly touched (e.g. door handles, tap handles or toilet flush handles), they can be swallowed and cause illness. When someone has been infected they may continue to shed the germs in their faeces for days or weeks after they have recovered. Some people carry germs without any visible signs of being ill. It is necessary to assume that ALL faeces are dangerous. This applies to domestic animals and pets as well as humans (domestic animals are dealt with in module 6).

The most important barrier to transmission of faecal pathogens in the domestic and peri-domestic environment is the safe disposal of human stools so that they are isolated from contact with humans, animals or flies. Studies in developing countries indicate that indiscriminate defecation near the home, or children defecating in living areas is associated with increased incidence of diarrhoea. A recent meta-analysis assessment using data derived from community intervention studies, suggest that provision of improved facilities for disposal of faeces could reduce the risk of diarrhoeal diseases by up to 32 % (Fewtrell et al 2005).

Use a toilet or latrine (also see module 5)
Wherever possible faeces should be put down a toilet or latrine. The toilet/latrine should be flushed with water after each use. Flushing removes most of the faecal material, but scale and biofilms which can harbour germs quickly build up on the inner surfaces of the toilet. Since these are not removed by flushing alone, the toilet should be regularly scrubbed using soap or detergent solution applied with a brush, followed by flushing. The toilet should also be treated regularly with a descaler. The toilet/latrine should be kept covered to prevent transfer of germs by flies etc.

The surfaces of the toilet or latrine, and surroundings, particularly surfaces which are touched by hands such as the toilet rim, seat, lid and flush handles, should be cleaned regularly using a soap or detergent solution applied with a cloth. If possible these surfaces should also be disinfected, since cleaning with a cloth may leave some residual germs behind. A separate cloth should be reserved for cleaning the toilet and toilet area. After cleaning the toilet, the toilet brush and cloth should be cleaned with soap or detergent and then rinsed and thoroughly dried.

On-site disposal of human excreta
Ideally toilets should be connected to sewerage systems. In rural & peri-urban areas, and even in small & medium towns, in developing countries, disposal and treatment of human excreta is frequently done onsite (septic tank, pit latrines etc). It is important that the soil-seepage component of such systems is appropriately located and adequately maintained, otherwise it will cause contamination of soil/water sources and encourage vector breeding. For design of onsite sanitation system, local/state Govt./WHO/UNICEF guidance documents should be consulted.

Communities without sanitary human excreta disposal
Still there are 2.4 million people in the world without access to toilets or latrines in their homes. Strictly speaking, good hygiene practice is not possible without facilities for safe disposal of faeces. Communities without toilets or latrines must ensure that faeces are buried immediately and not left lying around. These communities should be encouraged to seek support from local government and NGOs on design and construction of low cost latrines.

Anal cleansing
Using an appropriate and safe method for anal cleansing is as important as safe disposal of faeces. Even small amounts of residual faecal material can contain thousands of germs. Anal cleansing is best done using toilet paper or tissue which can be disposed of in the toilet or latrine, or buried. In most developing countries many people don’t use toilet paper for anal cleaning, they use leaves, sticks, stones etc. It is important that these materials are disposed of safely (e.g. with the refuse or buried). If anal cleansing is done using running water, it is important to rinse thoroughly and ensure that the rinsings are flushed away with water, and not left e.g. on the floor of the toilet of bathroom area.

ALWAYS wash hands following defecation.

Key messages

2. Disposal of faeces - children

- ✓ Train children to use a potty
- ✓ Dispose of children's stools in the toilet or latrine, or bury in soil
- ✓ Clean the childs bottom with toilet paper or other materials, or with with adequate running water.
- ✓ Collect the rinsings in the potty
- ✓ Dispose of toilet paper etc in the toilet or latrine or bury
- ✓ Clean the potty under running water, dispose of rinsings into the toilet/latrine. Dry the potty
- ✓ Remove any stool from the floor or any other surface, wash it clean and if possible disinfect
- ✓ ALWAYS wash hands with soap and water after cleaning up stools or cleaning up a child.

2. DISPOSAL OF FAECES - CHILDREN

Community workers/teachers notes

Small children should be encouraged to use a potty. Anal cleansing after defecation is important to get rid of residual faecal material which will can also contain thousands of germs. Use toilet paper to clean the child's bottom, or in rural areas where this is not available, wash the child's bottom under running water, or water from a bucket, and collect the rinsings in the potty. This latter is important because the rinsings will also contain germs.

The contents of the potty, toilet tissue etc should be disposed of into a toilet or latrine and the potty then rinsed and the rinsing disposed of in the same way. The potty should be dried and kept covered to avoid attracting flies.

If children defecate without using the toilet or potty, the faeces should be cleaned up immediately (not left lying around the environment of the home) and put down the toilet or latrine, or buried. If this occurs inside the home, the floor area should be cleaned and if possible disinfected.

ALWAYS wash your hands after cleaning a child following defecation.

3. Disposal of faeces - babies

In higher income communities, either disposable or reusable towelling nappies are used:

- ✓ Disposable nappies should be sealed in a plastic bag and placed in the waste bin
- ✓ For reusable nappies
  - Transfer faecal material to the toilet
  - Place nappies in a nappy bucket and soak in bleach disinfectant. Nappy bucket contents should be flushed down the toilet - NOT poured down the kitchen sink
- ✓ Clean the baby's bottom with toilet paper and place paper in the toilet
- ✓ Nappies & soiled clothing should be laundered
- ✓ Surfaces contaminated with faecal material (e.g. changing mats) should be cleaned & disinfected.

In low income communities, clothing materials etc are used as nappies:

- ✓ Place faeces in the toilet/latrine or bury immediately
- ✓ Clean the baby's bottom with tissue, cloth or other material and/or under running water
- ✓ Collect rinsings in a potty
- ✓ Remove any stool from the floor or other surface and wash it clean - do not leave faeces lying around
- ✓ Wash, rinse and dry nappies and anal cleaning cloths
- ✓ Dispose of toilet paper etc in the toilet or latrine or bury.

Mothers are often reluctant to believe that their babies faeces can be just as dangerous a source of germs as any other member of the family.

ALWAYS wash hands with soap and water after cleaning up stools or cleaning up baby.

3. DISPOSAL OF FAECES - BABIES

Community workers/teachers notes

There is potentially a greater risk of spread of germs from babies because they have no control over their bowels and rely on others to meet their hygiene needs. Mothers are often reluctant to believe that their babies' faeces can be just as dangerous a source of germs as any other member of the family. This belief has led to their being somewhat careless in handling and disposal of their babies' faeces.

For low income communities nappies and toilet paper are not available and mothers have to use cloths or other materials as available. The bulk of the faeces from a nappy can be disposed of safely into the toilet or latrine or, for communities which lack such facilities, by burying. In these communities babies' faeces are often not disposed of straight away, but kept for a time within the home. This may not only contaminate the floors of the living rooms and the domestic environment, but also contributes to transfer of germs via insects (flies) from the stool to food, stored water or on to other objects. Babies' faeces are often disposed of with general refuse or by throwing them indiscriminately in the courtyard or in the immediate environment of the house, which can also result in disease transmission.

Even small amounts of faeces can carry very large numbers of germs, so it is just as important to use a safe method for anal cleansing of babies after defecation, and for cleaning of nappies to get rid of residual faecal material. If anal cleansing is done by washing with water, it is important that the rinsing are collected in a potty (not on the ground) and disposed of safely. If anal cleansing is done with toilet paper or tissue, the tissue should be disposed of in a toilet or latrine, or buried. If anal cleaning is done with a cloth, this should be cleaned in the same way as the nappy.

For cleaning of nappies, they should, wherever possible, be placed in a nappy bucket (after removal of faeces) containing a bleach disinfectant and allowed to soak for 30mins. They should then be laundered or washed, rinsed and dried (see module 5). It is important that the contents of the nappy bucket are disposed of down the toilet, not into the kitchen sink. It is difficult to recommend a safe method for laundering of nappies and anal cleansing cloths in communities which lack access to adequate water- but for example:

- Ensure that nappies are washed separately from other laundry items, particularly cloths etc which are used in the kitchen
- If access to running water is limited, it may be better to wash nappies in the local stream or river, which means that any residual germs will be flushed away. Since the river water may itself be polluted, nappies should then be rinsed in clean water
- Drying nappies thoroughly, preferably in direct sunlight will kill any residual germs.

Mothers are often not very particular about washing their hands after cleaning their babies, before undertaking other household activities, including cooking and serving food. This is also responsible for faecal: oral disease transmission.

Key messages

4. Safe disposal of refuse

Germs can be spread by flies, cockroaches, rats etc. which thrive in refuse.

- ✓ Refuse should never be discarded onto the ground, but always put into refuse containers (bags or bins).

In urban areas

- ✓ Refuse should be handed over to the municipal collectors or put into municipal bins at regular intervals
- ✓ Waste bins should be kept clean and dry. Outside bins should have tightly fitting lids. Bags should be tied
- ✓ Ensure proper arrangements for regular collections of waste by municipal authorities
- ✓ Infectious waste should be stored in separate, secure containers and disposed of as soon as possible with the general refuse.

In rural areas, where municipal collection is not available

- ✓ Individual homes or groups of homes should have on-site treatment of refuse, along with animal dung by way of vermi- composting, garbage pits or bio-gas generation
- ✓ Infectious waste should be buried in a pit, or disinfected before disposing of with the general refuse.

Always wash hands after handling waste, waste bins, or bags.

4. SAFE DISPOSAL OF REFUSE

Community workers/teachers notes

Germs can be spread by flies, cockroaches, rats and mice which thrive in refuse such as food scraps and peelings from fruit and vegetables. Indiscriminate disposal of household solid waste in the vicinity of the home, apart from fouling the general environment, adds to fly breeding and rat/insect harbouring. Accumulation of solid waste blocks drains and creates water logging in the peri-domestic environment. Municipal authorities in developing countries often fail to provide satisfactory services for collection, storage and disposal of domestic solid waste. There is often no system of house-to-house collection, or for segregation of bio- medical/infectious waste from general garbage. People add to the problem by throwing garbage including kitchen waste as well as the infectious waste indiscriminately onto the roads etc. People are reluctant to take responsibility for their community environment. In most cases, there is no co-ordination between private and public responsibilities. Inadequate solid waste disposal in the urban areas particularly in the small & medium towns and peri-urban areas is a cause of transmission of diarrhoeal and other faecal:oral communicable diseases.

In urban areas

Refuse should never be discarded onto the ground, but always put into containers and handed over to the municipal collectors or put directly into the municipal bins regularly. Indoor waste bins should be kept clean and dry. Foot-operated pedal bins are preferred, if possible. This prevents hands picking up germs by touching the bin lid. Outside bins should have tightly fitting lids such that rats, rodents, flies and other insects do not have access to the waste.

The municipal authorities should make proper arrangements for regular and separate house to house collections of infectious and non-infectious wastes, and for their safe and sanitary transportation and disposal. Wherever house to house collection is not possible, community bins (one bin for 10-20 houses) should be provided. The bins should be designed such that rats, rodents, flies and other insects do not have access to the waste. Infectious waste should be stored in separate, secure containers and disposed of as soon as possible.

In rural areas

In the absence of any municipal collection and disposal system, refuse should never be discarded onto the ground, but always put into containers. Individual homes or a group of homes should have on-site treatment of garbage, along with animal dung, by way of vermi-composting, garbage pits or bio-gas generation. Infectious waste should be buried in a pit, or disinfected before disposing of with the general refuse.

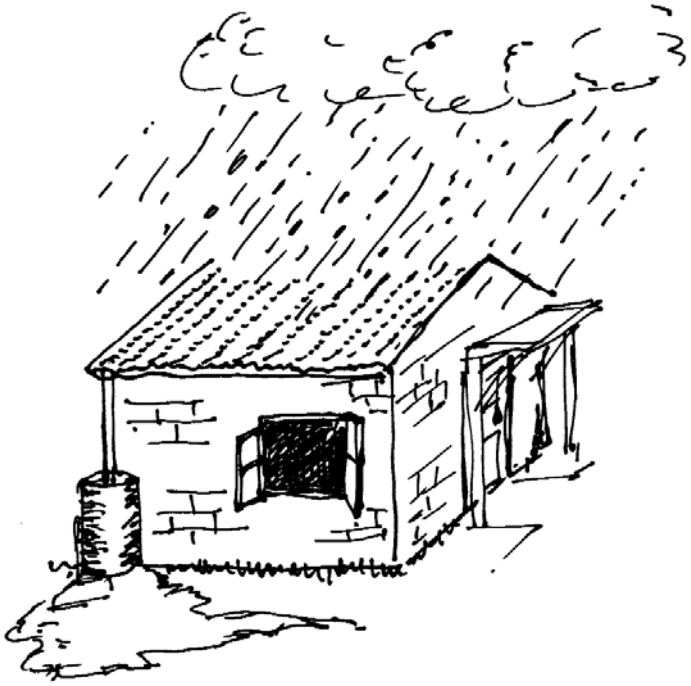
In some countries where official garbage collection does not occur, regular “Village Cleanup Campaigns” are organized by the local health or development committee.

Chemicals

Chemicals used as pesticides and herbicides can be very dangerous if even small quantities get into water or food, or onto hands or feet. Chemical containers and clothes worn when handling chemicals should not be washed near a household water source. Pesticides and other chemicals should not be used around the household or near a water source. Chemicals should not be stored in or near drinking water containers or near food. Never store water in pesticide or fertilizer containers.

5. Disposal of wastewater and rainwater

Accumulation of water in the vicinity of the home is a cause of vector breeding (mosquito) and transmission of vector-borne diseases.



Clean water

Clean water must be protected by storage in covered vessels, tanks etc.

Dirty water

Preventing the accumulation of **wastewater** and **rainwater** in the peri-domestic environment means:

In municipal areas:

- ✓ Providing drainage channels around tap-stand/ bore-wells to flush away wastewater to the municipal drain
- ✓ Providing drainage channels to channel wastewater and rainwater from the home to the municipal drain/sewerage
- ✓ Periodic cleaning and de-sludging of drains.

In rural areas with no proper drainage system:

- ✓ Household wastewater and rainwater can be disposed of by making a soak pit, or digging a channel to the kitchen garden or to the field.

5. DISPOSAL OF WASTEWATER AND RAINWATER

Community workers/teachers notes

Preventing accumulation of wastewater and rainwater in the peri-domestic environment, and protecting clean water sources from contamination by insects is vital. Inadequate drainage and consequent accumulation of water in the vicinity of the home is a root cause of vector breeding (mosquito) and transmission of vector- borne diseases. While accumulation of dirty water in the sewage and sullage drains is responsible for diseases like filaria, dengue, etc, accumulation of clean water in unused containers left in the courtyards or around bore-wells/tap-stands used to supply household water, helps vector breeding and spreads malaria. Today malaria is a major public health problem in many developing countries. Use of insecticides during the 1950s controlled the transmission of malaria to a great extent, but with increased vector resistance to insecticides, the disease has made a serious comeback in urban areas, primarily due to proliferation of mosquitoes in breeding sites in the vicinity of the home. In high income homes accumulation of water in air conditioners and access of mosquitoes to household drinking water tanks is also a problem.

The principal measure for preventing vector breeding should be to protect clean water sources from contamination, and prevent accumulation of waste-water and rainwater in the peri-domestic environment:

Clean water

- There should be no open storage of clean water in buckets or other vessels in the home. All water containers should be kept covered
- Drinking water storage tanks should also be adequately covered
- Mosquito proof wire netting should be used in air conditioners and water storage tanks
- Open water storage tanks outside the house must be emptied at least once in 3 days.

Dirty water

Effluents from septic tanks, pit latrines and sullage water from kitchen and bathroom, should not be allowed to stagnate around the area of the home and provide a breeding ground for mosquitos.

- In urban areas this means:
  - providing drainage channels around tap-stand/ bore-wells to flush away waste water to the municipal drain
  - providing drainage channels to channel wastewater and rainwater from the home to the municipal drain/sewerage
- In rural areas where there is no municipal drainage system:
  - where there is no municipal sewerage or drainage system, household wastewater and rainwater can be disposed of making a soak pit, or digging a channel to the kitchen garden or to the field
- Make sure that empty or discarded cans, wheel-tyres etc are not left lying in the courtyard or in the immediate surroundings of the home, which could accumulate water and act as a breeding place for mosquitoes.

Note – Dirty water associated with the home and peri-domestic setting includes:

Wastewater – This includes sullage, wastewater from toilets and effluents from septic tanks, pit latrines, aquaprivies etc. It also includes rainwater which comes from the roof of the house or which collects around the house.

Sullage – Sullage is the wastewater from kitchen, bathroom etc. and is often mixed with rainwater.

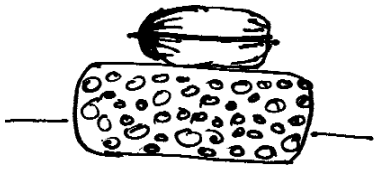
Module 4
Personal hygiene

Key messages

1. Personal hygiene

- All areas of the skin, the mouth and the nose contain:
  - a **“resident flora”** - microbes which colonise the body surface
  - a **“transient flora”** - microbes which are picked up onto the skin during our day to day activities.
- Some of these microbes can produce infection if transferred to other areas of the body e.g. the urinary tract, or if they enter a cut or abrasion. This is known as “self infection”.

Regular bathing/showering, handwashing and good general personal hygiene can reduce the risks of self infection



In particular

✓ Washing the face with soap and water every day helps to prevent eye infections such as conjunctivitis or trachoma.

Don’t forget cloths, towels and toothbrushes

✓ Bath sponges, nail brushes, tooth brushes and towels can become contaminated and can transmit germs. Therefore:

  ✓ Face cloths, bath sponges, nail brushes and toothbrushes should be thoroughly rinsed under running water after use and then dried as rapidly as possible

  ✓ Face cloths and towels should be regularly laundered.

1. PERSONAL HYGIENE

Community workers/teachers notes

Microbes are found in all areas of the skin and mucous membranes such as the mouth and nose. Microbes found on the body surface may either be transient or resident flora.

- **Resident flora** (normal flora) are those microbes that colonise or live on, and are thus normally found on, the skin. They are not generally pathogenic (disease causing) except if transferred to other areas of the body e.g. the urinary tract, or if they enter a cut or abrasion
- **Transient flora** are those microbes that are picked up onto the skin (mainly the hands) by touching surfaces, food, infected people and pets during our day to day activities. If the surface which is touched is contaminated with germs, then these are likely to be transferred to the hands etc. Transient microbes do not usually colonise the skin surface, but can remain viable and infectious for significant periods on the skin surface and can, if they gain entry to the body through the mouth, through cuts and abrasions, through the membranes of the nose or eyes, cause infections.

If we get infected from germs on our skin surface this is usually referred to as “self-infection”. It is impossible and undesirable to eradicate the normal resident microbial flora from the body but regular bathing/showering and good general personal hygiene can reduce the risks of self infection. The reduction in the resident skin flora can increased by the use of antibacterial soaps or by the application of alcohol-based hand rubs. Transient microbes are usually only loosely attached to the skin and can be removed by handwashing and bathing.

Note: Germs on the skin surface, particularly the hands, can be transferred on to another person, either by direct contact or via surfaces, and can cause infection in that person. Handwashing is key to preventing spread of infection (usually called cross infection) from a source to another person, or to food or water. Handwashing is key to preventing spread of germs and is described in module 1.

Conjunctivitis and Trachoma

Washing the face with soap and water every day helps to prevent eye infections such as conjunctivitis and trachoma. In some parts of the world, eye infections lead to trachoma which can cause blindness. Trachoma is the world’s leading cause of preventable blindness that threatens to blind nearly 10 percent of the world’s population. Currently, more than eight million people are visually impaired or irreversibly blind as a result of trachoma, and over 84 million people have active disease. The disease is particularly widespread in Africa, where 36 countries are trachoma endemic. It is a highly infectious disease of the eye caused by the bacterium *Chlamydia trachomatis*. The bacteria can spread easily on an infected person’s clothing or hands, or may be carried by flies that have come into contact with the discharge from the eyes or nose of someone who is infected. Trachoma affects rural populations with limited access to health care and clean water, and it disproportionately affects the most vulnerable members of these underserved populations— women and children. The primary hosts of the trachoma bacteria are children under the age of five. Due to the infectious nature of the disease, those who have the most contact with infected children are most likely to become infected themselves. Since women are traditionally the primary caregivers of children, they are frequently exposed to trachoma and are thus more vulnerable to infection and eventual blindness. Face washing breaks the cycle of infection.

Personal hygiene materials

Materials such as bath sponges, nail brushes, tooth brushes and towels which are used for personal hygiene can become contaminated and can transmit germs. Therefore, the following procedures are advised:

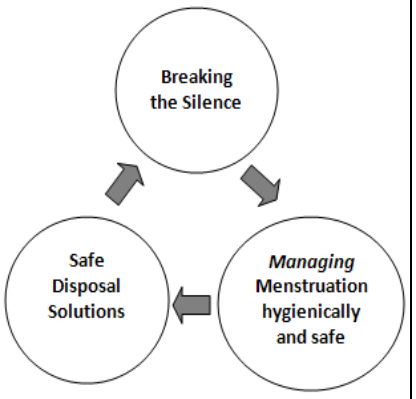
- Face cloths, bath sponges, nail brushes and toothbrushes should be thoroughly rinsed under running water after use and then dried as rapidly as possible. If face cloths or other items are left in a damp condition residual bacteria will rapidly multiply at ambient temperatures
- Face cloths and towels should be regularly laundered.

Note: The AIDS virus cannot be transmitted by person-to-person contact; it is a sexually transmitted disease which is preventable by adopting "safe sex" habits i.e use of a condom.

2. Menstrual Hygiene Management

There are three interrelated dimensions of managing the menstrual cycle safely. These are

i) having the information and knowledge to be prepared psychologically and physiologically for the onset of menstruation and monthly periods thereafter
ii) managing the menstrual flow hygienically and with privacy and dignity
iii) preparing material (cloth) for safe reuse or disposing the sanitary material in an environmentally safe manner.



Do Not

- Use damp sanitary material (cloth or pads).These can cause irritation and create the conditions for bacterial, fungal or yeast growth and related infections.
- Reduce or stop bathing and washing during menstruation periods
- Keep used cloths or pads in the home for a long time, even if it is out of sight (under a mattress, on a high shelf or in a dustbin)
- Dispose used cloth or pads in streams, ponds or rivers, in the bushes or in flush toilets.

Do

- Use clean and dry sanitary material (cotton cloth, pads) to absorb menstrual blood
- Change sanitary material (cloth or pads) two or three times a day depending on the flow
- If using cloth, wash with detergent and dry in the sun before reusing
- Dispose used sanitary materials (cloth or pads) outside the home either by burning, burying in a deep pit or putting in dustbins that are emptied regularly
- Ensure good personal hygiene during menstruation, especially frequent bathing and washing to minimize the risk of infection
- Wash hands with soap after touching private parts and used menstrual materials.

2. MENSTRUAL HYGIENE MANAGEMENT

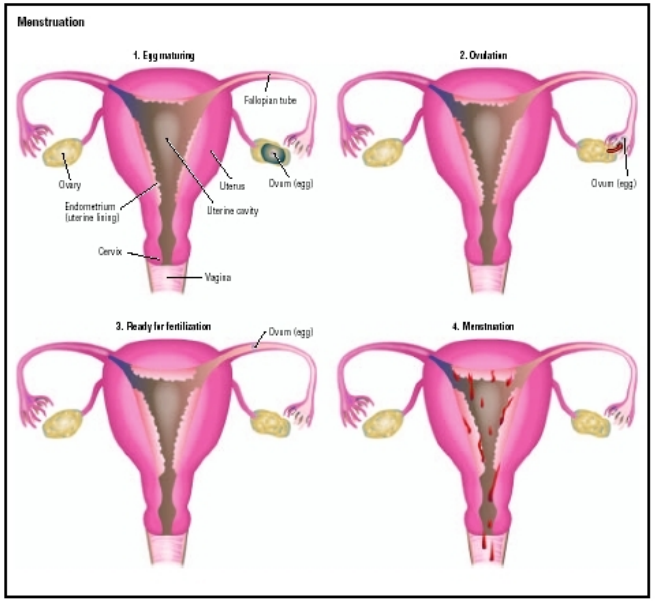
What is menstruation?

Menstruation is the normal, healthy shedding of blood and tissue from the uterus that exits the body through the vagina. The vagina is the small opening that girls have between their legs. Menstruation is also called a girls/woman's "period." It usually lasts between three and seven days. Menstruation happens for most girls about once a month. It is a sign that a girl can now become pregnant. Women stop menstruating during pregnancy but then start again after delivery.

It is a natural process linked to the reproductive cycle of women and girls. It is not a sickness. Menstrual blood is not dirtier than any other blood. However, if not properly managed poor menstrual hygiene can result in health problems. Menstrual hygiene is personal hygiene during menstruation that includes bathing and washing, the use of clean, dry sanitary material to absorb the flow and hygienic and environmentally preparation of material for reuse or safe disposal where relevant.

Menstrual Cycle

Girls start menstruating between the ages of 8 and 12. First, an egg matures inside the ovary (1), which then releases the egg (2), allowing it to travel through the fallopian tube, where it rests awaiting fertilization (3). If the egg is not fertilized, it is flushed out with the menstrual flow (4). http://www.healthofchildren.com/M/Menstruation.html#b#ixzz2EjF8mFee



What happens during a menstrual period, and how long does it last?

During the menstrual cycle, the lining of the uterus thickens to get ready for pregnancy. Then, during the period, the body sheds the uterus lining along with blood. The amount of blood and fluid lost is usually between 4 and 12 teaspoons each cycle. The average menstrual cycle lasts 28 days. For some women and girls, though, cycles can be as short as 21 days. For others, they can be as long as 35 days. A normal period lasts between two and seven days. The average length of time for a menstrual period is three to five days.

General hygiene and health measures for menstruation

- Bathe at least once daily. Taking a warm water bath would ensure that there is some relief to the aches and pains associated with menstruation.
- Ensure that undergarments and sweat drenched clothes are changed regularly.
- Cotton panties are preferable to synthetic ones as synthetic ones do not absorb moisture and heat, making it a breeding ground for bacteria.
- A brisk walk and mild exercise are also helpful.
- Change napkins regularly. Remember to take change of napkins whenever going out.
- Wash the genital area after each use of the toilet, also after urination.
- Keep the area between the legs dry otherwise soreness and chaffing may develop.
- Some amount of body odour is natural but regular bathing, washing and changing of napkins will ensure that it is not noticeable.
- Unhygienic management can result in reproductive tract infections and urinary tract infections.
- A balanced diet with lots of fresh fruits and vegetables.
- Cut down on salt during your period to reduce bloating and fluid retention. Cut down on caffeine to feel less tense and irritable.
- Eat foods that are high in calcium. Calcium has been shown to help alleviate some of the symptoms associated with PMS.
- Keep to a regular sleeping schedule, consistent sleep and wake times can help control excessive fatigue or insomnia.

GENERAL HYGIENE AND HEALTH MEASURES FOR MENSTRUATION

What products should girls use during menstruation?

Clean cloth: These are cut to fit in the panty area by sewing several layers of cotton rags on top of each other. These must be clean. They must be washed thoroughly and hung in a private but sunny place to dry. They should not be shared with others.

Pads or sanitary napkins: These are designed to fit the panty area close to the body. Strips of tape keep them attached to the panties, and the panties help to hold the pads close to the opening of the vagina. Sanitary napkins manufactured by multinational companies like Stayfree, Carefree, Whisper, Kotex are available in the market. In the recent times, SHGs have also started manufacturing sterile, low cost sanitary napkins which can be purchased locally even at the village level. Women SHG members themselves sell these products and so adolescents and rural girls may feel comfortable purchasing them. Pads have a plastic lining to minimize the spill of blood.

How does a girl dispose napkins at her house?

Napkins should not be thrown into the toilets particularly the water closet. It is better to keep a dust bin in the corner of the toilet. Wash the soiled napkins and squeeze dry. Keep old newspapers/waste paper ready to wrap the washed napkin. Drop it in the bin. You can dispose the contents of the bin after your cycle bleed is over or daily.

In the house also, an old drum can be converted into a similar incinerator with a smoke vent and periodically it can be incinerated.

The other method of sanitary napkin disposal is creating a sanitary pit. If you have a large backyard, then this is possible. Dig a pit in the backyard, keep dropping the newspaper wrapped used napkins in the pit. Cover the pit to stop animals from pulling it outside. Keep dropping ash after use. Once the pit is filled up, close the pit completely and use another pit.

Module 5
General hygiene – breaking the spread of germs link

Breaking the “spread of germ” link

- In every home, regardless of how clean it looks, there are millions of microbes all the time, including some germ (i.e micro-organisms which cause disease)
- Good hygiene does not mean trying to get rid of all the germs in the whole house
- Good hygiene means getting rid of as many germs as possible, **where** and **when** there is a risk of them spreading and causing infection. This is called **targeted hygiene**
- Targeted hygiene means:
  identifying the risks, i.e. knowing where and when there is risk of germs spreading
  reducing the risks, i.e. preventing these germs from spreading by hygienic cleaning.

Note:

- Hands are one of the key risk surfaces - hand hygiene is dealt with in module 1.

BREAKING THE SPREAD OF GERMS LINK

Community workers/teachers notes

Good hygiene practice means reducing the risks of germs spreading in the home.

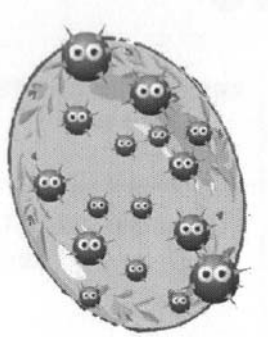
Microbes are found everywhere in the home, often in large numbers at sites where there is sufficient water. The residual water in the u-bend of the sink is likely to contain at least 1 million microbes per millilitre of water. A used dishcloth may contain up to 100 million bacteria per square centimetre. The surface of a chicken may contain over 25,000 *Salmonella* or *Campylobacter*. The human skin is colonised by 100 - 1000 or more bacteria per square centimetre. The floor is likely to contain 100 or more bacteria per 25 square centimetres. In each of these places, there will be different types of microbes present, including several species of bacteria and fungi. Most microbes in the home are not harmful, but harmful microbes (i.e. germs) are always present somewhere.

However rigorously we clean and disinfect we cannot rid the home of germs and other microbes.

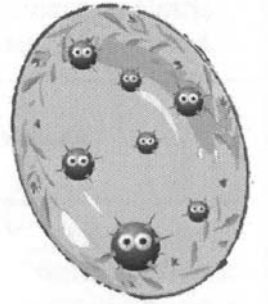
What we can do through good hygiene practice is to reduce the risk of coming into contact with those microbes that are harmful (i.e. germs). We know that most germs originate from a limited range of sources, e.g. food, people and pets. By knowing what these sources are and how and when germs are spread, we can use hygiene to reduce the risk of them spreading. Reducing the risk of spread of germs through hygienic cleaning is not about trying to rid the whole house of germs, it is about getting rid of as many germs as possible from sites and surfaces, where and when there is a risk. This is known as **targeted hygiene**.

But keep in mind that reducing microbial risks through hygiene is similar to wearing a car seat belt. Just as we never know when an accident might happen and wearing the seat belt might save our life, we also never know when germs are present, so we need to practice good hygiene all the time. If we make a mistake, e.g. in the kitchen whilst preparing food, and don’t get ill, it doesn’t mean there’s no risk. Next time we may not be so lucky!

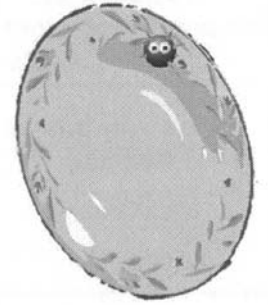
Breaking the spread of germs link by hygienic cleaning



Dirty surface



Surface after cleaning



Surface after hygienic cleaning

When e.g. washing hands, or cleaning surfaces, we need to distinguish between “cleaning” and “hygienic cleaning”:

- **Cleaning** means removing visible dirt by sweeping, vacuum cleaning, damp dusting, or washing with water and soap or detergent. Cleaning removes dirt and some germs but does not necessarily reduce them to a ‘safe’ level
- For surfaces where the risk of spread of germs is low (e.g. floors) cleaning is usually sufficient
- Where the risk of spread of germs is high (e.g. hands, raw food preparation) **hygienic cleaning** is vital
- **Hygieneil cleaning** means removing dirt **and** getting rid of as many germs as possible, either by **removing** them, or **killing** them by **disinfecting**
  - **Removing** germs can be by thorough cleaning with hot water and soap or detergent and then **rinsing** to remove the germs
  - **Disinfecting** can be by heating or by using a product that states that it ‘**kills germs***’
  - Or a combination of removal and germ killing
- After hygienic cleaning, surfaces should be dried: by air drying, or using clean towels, cloths or paper towels.

* Chemical disinfectants and their properties are summarised in Appendix 4

BREAKING THE SPREAD OF GERMS LINK BY HYGIENIC CLEANING

Community workers/teachers notes

IFH has introduced the term “hygienic cleaning” to describe the cleaning which is needed when there is a risk of spread of germs.

Hygienic cleaning means reducing the number of germs, on a surface to a ‘safe’ level, i.e. one that is not harmful to health. Although we know that the risk of infection increases as the number of germs we are exposed to increases, we also know that the minimum “dose” of germs required to cause an infection varies significantly. For example, the infectious dose for *Salmonella* can be as much as 1 million cells , but it can also, particularly for someone who has reduced immunity to infection, be as little as 100 - 1000 cells. A major concern about *E. coli* O157 is that it has a very low infectious dose (10 - 100 cells). The infectious dose for many viruses, particularly rotavirus and norovirus, is also known to be very small (1 - 100 virus particles).

In the absence of any precise data about what is a ‘safe’ level of germs, it seems reasonable that in situations where there is significant risk of germs spreading (e.g. during food preparation) the aim should be to get rid of as many germs as possible from the sites and surfaces involved.

A hygienically clean surface can be achieved either by physical removal of the microbes from the surface or they can be killed *in situ* by a disinfection process. In some cases, a combination of the two approaches is used. Hygienic cleaning methods used in the home are described later in this module.

Note
Cleaning, i.e. removing visible dirt and soil, can remove many of the germs, but does not necessarily reduce them to a ‘safe’ level.
Hygienic cleaning is not necessary for surfaces that we do not usually come into intimate contact with, e.g. floors, walls, furnishings, unless this is for specific reasons, e.g. if the floor is contaminated with vomit, excreta, etc.
Cleaning to remove soil/dirt, food material, etc., is however, a recognised component of hygiene since the presence of soil/dirt and damp provides germs with an ideal breeding ground. So keeping the home clean can help reduce the risks.

Targeted hygiene: identifying the risk of spread of germs

Sites & surfaces in the home	Assessing the risk		What to do
	Chance of germs being present	Risk of spread of germs	
Toilets, u-bends, etc.	High	Relatively low Occasional e.g. if someone has diarrhoea and vomiting	○ ●
Cleaning cloths, sponges, mops, etc.	High	Constant	●
Hands	Sometimes	Constant	●
Hands and food contact surfaces: chopping boards, work surfaces, taps, door handles, etc.	Sometimes	Constant	●
Laundry: Soiled Non-soiled	Sometimes Low	Risk to person handling laundry Low	● ○
Floors, walls, etc.	Occasional	Relatively low Occasional e.g. if spills of bodyfluids	○ ●

○ Cleaning is sufficient

● Hygienic cleaning is necessary

Germs enter the home all the time on food, people, pets, and sometimes in water. They can also set up home where there is moisture and food (e.g. the dishcloth or toilet). Good hygiene means preventing germs from spreading.

To decide **where and when there is a risk of spread of germs**, you need to ask:

- Is this site or surface likely to be contaminated with germs?
- Are germs likely to be spread from this site or surface?

If the answer to **both** questions is **yes**, then there is a need for **hygienic cleaning** to stop the germs from spreading.

Note: Targeted hygiene means hygienic cleaning **at the right time as well as in the right places** e.g. your hands are not a risk all the time, but they are after visiting the toilet, changing a nappy or before handling 'ready to eat' food.

TARGETED HYGIENE - IDENTIFYING THE RISK OF SPREAD OF GERMS

Community workers/teachers notes

Over the last 30 years, risk assessment or HACCP (Hazard Analysis Critical Control Point) has been used successfully to control microbial risks in food processing and other manufacturing environments. This is done by applying the following steps to each component of the setting under consideration:

- **Step 1 - Hazard characterisation**, means deciding if
  - the component (i.e. site, surface) is likely to be contaminated with germs
  - the germs are likely to be present in sufficient numbers to cause infection
- **Step 2 - Exposure assessment**, means assessing the probability that we might be exposed to the hazard
- **Step 3 - Risk assessment**, means using the information from Steps 1 and 2 to decide the extent of the risk, what action to take to reduce it, and when to take it.

Targeted hygiene means applying these three steps in the home (Bloomfield 2002).

Hazard characterisation and exposure assessment in the home

- Contaminated food, infected people and pets, insect carriers, and sometimes contaminated air and water, are the primary sources of germs in our homes. Other primary sources are sites where there is enough water (e.g. sinks, u-bends, toilets, cleaning cloths) to support the growth of bacteria and fungi. (Note: Viruses only grow in animal or plant cells). Germs are continually spread from these primary sources to other sites and surfaces (including our hands) during our daily routine, where they can remain alive for quite long periods of time and thus represent a hazard
- Deciding whether there are enough germs to cause infection is difficult because it varies for different germs and is generally fewer for 'at risk' groups than healthy family members. For viruses, the infectious dose can be as little as 1 - 100 particles. For *Salmonella* it can be up to 1 million cells, but small numbers of *Salmonella* can multiply rapidly to this level, e.g. in contaminated food stored at room temperature
- Germs in our home are only a **risk** if we are exposed to them, e.g. if we touch the toilet or if they are spread from the toilet.

Risk assessment in the home

To carry out a risk assessment and decide where cleaning or hygienic cleaning is necessary in the home, sites and surfaces are categorised into groups:

- For **reservoir sites**, e.g. sinks, u-bends or toilet bowls, although the probability of germs being present is high, the risk of spread (by splashing or aerosol formation) is relatively low unless there is someone who is at risk (e.g. a baby or elderly person) or who poses an extra risk (e.g. someone who is incontinent or has fluid diarrhoea) in the home
- **Reservoir/disseminators**, e.g. wet cleaning cloths, mops and sponges, not only regularly come into contact with germs and can support their growth but also, by the nature of their use, carry a high risk of spreading these germs
- For **hands, hand contact surfaces, food preparation surfaces and laundry**, although the probability of being contaminated is relatively lower, it is still significant, particularly, for example, after preparing contaminated food or visiting the toilet. These surfaces however carry a constant risk of spreading germs
- For **other surfaces** (e.g. floors, walls) the risk of contamination and exposure via these surfaces is usually low, except for example, where there is soiling of floors by pets or crawling babies present.

Since germs are continually circulating in the home, for targeted hygiene to work it must be applied not only in the right places but also **at the right time**, e.g. you should disinfect dishcloths after you have used them, not just once a day or once a week.

Targeted hygiene: reducing the risk of spread of germs

What are the options?	How to choose an option	How do I do it?	What's the result?
Cleaning	When it is **not essential to remove all germs**, e.g. floors, walls, some items of clothing and laundry.	**Wet cleaning** - Clean using warm water and detergent. Use a cloth, mop or scrubbing brush for floors and other surfaces. Use a 40˚C wash cycle for laundry. **Dry cleaning** - Vacuum cleaning, dusting, etc.	
Cleaning, rinsing and drying	For **hygienic cleaning** of surfaces or items that can be **easily rinsed and quickly dried**, e.g. hands, cuttlery, crockery.	Clean thoroughly (either manually or using a dishwasher) with hot water and detergent, rub well, rinse in warm/hotrunning water. Air dry or dry using clean fabric towels or paper towels.	
Disinfection*	For **hygienic cleaning** of surfaces which you **cannot rinse**, e.g. outside surface of toilet, flush handle, seat and taps, kitchen surfaces.	Clean surface to remove 'dirt', and then use a disinfectant product** (diluted as directed if necessary).	
Combined cleaning and disinfection*	For hygienic cleaning of surfaces which you cannot rinse. **Or** For hygienic cleaning of laundry at low temperatures.	Clean thoroughly using a combined disinfectant/cleaner** (dilute product as directed). Use a laundry detergent that contains bleach, on a 40˚C wash cycle.	
Heat	For hygienic cleaning of surfaced and items which can withstand hot temperatures, e.g. cotton fabrics, cutlery, crockery, toughened glass, (feeding bottles), etc.	Use a hot cycle on a washing machine or dishwasher (60˚C or higher). **Or** Clean with detergent and hot water. Immerse in boiling water for 20 minutes.	

 Clean Hygienically Clean

*Dirt, food residues, faeces, etc., will stop the disinfection process from working. If a surface is very dirty or soiled, it should be cleaned before applying the disinfectant. Otherwise, a combined disinfectant/cleaner may be preferred for convenience.

**Make sure you use a product that states it 'kills germs' on the label (see Appendix 4 for information about disinfectants).

TARGETED HYGIENE - REDUCING THE RISK OF SPREAD OF GERMS

Community workers/teachers notes

In situations (times and places) where there is a risk, hygienic cleaning should be used to prevent the spread of germs. A hygienically (as opposed to visibly) clean surface can be achieved either by removing as many germs as possible from the surface, or by killing them *in situ* using a disinfection process. In some cases, a combination of the two approaches is used.

Hygienic cleaning does not always mean “killing” germs. It can be achieved by removing germs using detergent or soap and warm or hot water. The soap or detergent lifts the germs off the surface and the water then rinses them away. This means that detergent/soap-based cleaning will only produce a hygienically clean surface if it is applied in conjunction with a rinsing process under fresh running water. We often assume that wiping a chopping board with a cloth rinsed in soapy water until it is visibly clean produces a surface that is also hygienically clean. In reality, this removes a proportion of the germs but it also spreads the remaining germs around the surface and onto the cloth to be spread to other surfaces. Rinsing alone will not produce a hygienically clean surface; soap or detergent is also necessary to lift the germs off the surface.

This is the reason why, for risk surfaces that cannot be properly rinsed (e.g. fixed kitchen surfaces, taps, toilet flush handles, door handles and nappy changing surfaces) or surfaces such as cleaning and face cloths where the germs become too firmly attached, the appropriate means to achieve hygienic cleaning is by cleaning followed by, or accompanied by, a disinfection process.

Disinfection can be achieved by heating to a specified temperature for a specified time or by using a chemical disinfectant. The accepted definition of a ‘chemical disinfectant’ is ‘a product that kills germs’, but these products are only effective if they are used at the specified concentration for the required contact time (see Appendix 4 for more information on disinfectant products).

For dishwashing and laundry, hygienic cleaning is achieved by a combination of germ removal and germ kill. Disinfection by heat can be achieved at temperatures of 60˚C or above, but if lower temperatures are used it is necessary to also use a bleach-based product to achieve a satisfactory level of germ kill.

Drying surfaces and keeping them dry is an important part of hygiene. Drying alone will not produce a hygienically clean surface, but if surfaces are not dry this helps any residual germs to survive, and if there is sufficient water (e.g. in a wet dishcloth, washing up bowl or sink) then some germs can grow to sufficient numbers to provide an infectious dose.

Further reading

1. Beumer R., Bloomfield S.F., Exner M., Fara G.M, Nath K.J. and Scott E. (2002) Hygiene procedures in the home and their effectiveness: A review of the scientific evidence base. http://www.ifh-homehygiene.org/2public/hygprocevbasefinal2.pdf.

1. Cloths, mops and cleaning equipment

These items have frequent contact with germs and there is a high risk that they may spread the germs around from one surface to another. If they are left damp, any germs on these items will have time to multiply to high numbers.

Cloths and sponges:

- ✓ Always use a cloth which is hygienically clean. Never use a cloth which is dirty
- ✓ Cloths can be hygienically cleaned by:
  - ✓ cleaning with soap or detergent and warm water, and then soaking in a disinfectant for 20 minutes or
  - ✓ cleaning with soap or detergent and water and then immersing in boiling water for 20 mins. or
  - ✓ washing in a washing machine at 60˚C.
- ✓ After hygienic cleaning, dry as rapidly as possible
- ✓ Use disposable cloths or paper towels where possible, especially for removing e.g. raw food residues, faeces, vomit, etc.

Washing-up brushes:

- ✓ After each use, clean using detergent or soap, rinse with hot water and leave head-up to dry
- ✓ Brushes can also be hygienically cleaned in a dishwasher.

Mops and buckets:

- ✓ Clean mops using soap or detergent and warm water and then soak in disinfectant for 20 mins. Wring out until dry as possible and leave head-up to dry
- ✓ Clean buckets with in detergent or soap and warm water, rinse and leave upside-down to dry.

1. CLOTHS, MOPS AND CLEANING EQUIPMENT

Community workers/teachers notes

What are the risks?

Cloths and cleaning equipment are considered to be reservoir-disseminators (i.e. a source and a spreader of germs). They pose a high risk of cross-contamination for a number of reasons:

- They are used to clean items and surfaces that are soiled with dirt and organic matter; therefore, they inevitably become contaminated with microbes and act as reservoirs
- They are touched by hands, which in turn become contaminated
- Even if they are cleaned thoroughly, it is likely that some microbes will survive and multiply to high numbers over a period of hours
- They can contribute to the spread of microbes if not adequately decontaminated between uses or discarded.

Hygiene measures

Cloths and cleaning equipment must always be hygienically cleaned. Microbes tend to stick to fibres of cloths and mops and may not be removed by cleaning with soap or detergent, followed by rinsing. For this reason clothes should be cleaned to remove soil and then disinfected either by boiling or by using a disinfectant product. A good way to make cloths hygienically clean is by using a dishwasher or washing machine. This not only dislodges dirt and microbes, but the hot water also kills the microbes. If the cloth is left wet for several hours, the bacteria will multiply and become even more strongly bound. Growth of any microbes not destroyed by the disinfection process can be prevented if the items are dried between uses and after laundering or disinfection.

To minimise the risk of cross-contamination, it is recommended that disposable cleaning items are used where possible, particularly for high risk cleaning activities such as for cleaning food preparation surfaces and utensils, pet cages and spills of excreta.

Hands must be washed after handling cloths and cleaning equipment.

2. Surfaces commonly touched by hands

Germs can survive for several hours on surfaces. Hands touching the surface can pick up the germs and spread them to other people or other surfaces. Hand contact surfaces include:

- **taps**
- **toilet handles, toilet seat and lid**
- **handles of cupboards, oven, fridge, etc.**
- **toys**
- **surfaces contaminated by used nappies/pads, vomit, faeces, blood, etc.**
- **surfaces and boards used for handling raw meat/poultry, etc.**
- **telephones, computer keyboards and mouse.**

Some surfaces are a risk because they are more likely to be contaminated e.g. work surfaces contaminated by raw food, pets, used nappies/pads, vomit, etc. Other surfaces are a risk because they are frequently touched by contaminated hands e.g. taps and toilet flush handles.

How and when to clean contact surfaces

✓ Hygienically clean and dry surfaces regularly or when visibly soiled by cleaning followed by disinfection or using a disinfectant/cleaner*

✓ The frequency of cleaning depends upon the situation. For example, toys need to be cleaned more often if they are shared or a child has an infection.

In a busy household, it is not possible to keep hand contact surfaces hygienically clean all the time. That is why it is so important to wash your hands before preparing food, eating meals etc.

* See Appendix 4 for advice on disinfectants

2. SURFACES COMMONLY TOUCHED BY HANDS

Community workers/teachers notes

What are the risks?

Microbes continually enter the household in a number of ways, such as via:

- contaminated food or water
- infected people or pets
- shoes and clothing.

These microbes can contaminate surfaces that are frequently touched by hands or food, and can result in the transfer of the microbes to other people or other surfaces. The microbes will gradually die off but can remain viable for some time in sufficient numbers to cause infection if transferred to a susceptible person. Even some respiratory infections (e.g. colds) may be acquired from contact with a contaminated surface. The virus may be picked up on the fingers and rubbed into the lining of the mouth, nose or eyes.

Remember microbes do not multiply in dry conditions, so keep surfaces dry. If microbes are transferred to a more hospitable environment, e.g. unrefrigerated food, the gut, a wound, etc., they may be able to grow. In this situation, even a small number of microbes can multiply to an infectious level over time.

Hygiene measures

It is important to recognise that surfaces commonly touched by hands are more easily contaminated. Because these surfaces are frequently touched by all the family and therefore carry a real risk of spreading infections, they should be hygienically cleaned. It is advisable, if possible, to use a cleaner/disinfectant. Wiping the surface with a cloth will remove visible dirt and some, but not all of the germs. However, it is impossible to keep these surfaces hygienically clean all the time in a busy household. This is why **hand hygiene** is so important.

3. Toilets and latrines

During use, both the toilet or latrine, and the surfaces surrounding the toilet can become heavily contaminated with germs. These can be spread to (and via) other people who have contact with them.

- **If the surfaces of the toilet and latrine (bowl, seat, lid, commode, squatting plate, pan & trap) are not kept clean this will attract flies which can then spread infection if surfaces are not kept clean**

- **Wherever possible keep toilets and latrines covered to keep away flies**

*See Appendix 4 for advice on disinfectants

- ✓ Keep the u-bend and toilet or latrine bowl clean by flushing with water after each use and using a toilet cleaner and brush every day. Remove scale using a descalent product

- ✓ Keep the toilet seat, handle and under the toilet rim hygienically clean by cleaning followed by disinfection, or by using a disinfectant cleaner*

- ✓ If someone in the household has diarrhoea and/or vomiting, add disinfectant to the toilet, close the lid and flush. It is particularly important to then hygienically clean all the surfaces of the toilet, i.e. the toilet bowl, toilet seat, lid, etc. This should ideally be done every time they use the toilet while they are ill

- ✓ If possible wear rubber gloves when cleaning toilets and latrines

ALWAYS wash your hands after cleaning the toilet or handling used nappies or pads.

3. TOILETS AND LATRINES

Community workers/teachers notes

What are the risks?

Toilets act as reservoirs for microbes because they are inevitably wet and contaminated with excreta, thus providing ideal conditions for the growth of microbes. Microbes can be transmitted from toilets and latrines either by direct contact with these items or indirectly via contaminated hands, or via insects. In general, the risk from a toilet bowl is not high if the toilet is functioning correctly and is kept covered by a lid, although some splashing and aerosol formation can occur during flushing. However, if an individual within the household has a gastrointestinal infection, they excrete large numbers of pathogenic microbes during and for some time after their illness. In this situation, there is a considerable increase in the risk of spread arising from splashing and aerosols. In the toilet bowl, pathogenic microbes are most usually found under the flushing rim and in the scale that forms on the porcelain surface.

If someone in the household has diarrhoea or vomiting, it is much more likely that toilets and latrines and their surroundings will become contaminated with pathogenic microbes. Other household members may come into contact with these contaminated surfaces if they are not swiftly dealt with by hygienic cleaning.

There is potentially a greater risk of spread from babies with diarrhoea because they have no control over their bowels and they rely on others to meet their hygiene needs. The same applies to older children and adults who lose their ability to maintain their own hygiene or lose bowel control due to infection, ill health or age.

Hygiene measures

The toilet or latrine needs to be kept clean, including any surfaces which are touched by hands. The toilet/latrine itself should be flushed with water after each use. Flushing will remove most of the faecal material, but scale and biofilms which can harbour germs quickly build up on the inner surfaces of a toilet and are not removed by flushing alone. The toilet or latrine bowl should therefore be regularly scrubbed clean using a soap or detergent solution applied with a brush, followed by flushing or rinsing. The toilet should also be descaled regularly using a descaler. The toilet or latrine should be kept covered to prevent transfer of germs by flies etc.

The surfaces of, and surrounding, a toilet or latrine including the toilet rim, seat, lid and flush handles should also be cleaned regularly using a detergent solution applied with a cloth. If possible these surfaces should also be disinfected, since cleaning with a cloth may leave some residual germs behind. A separate cloth should be reserved for cleaning the toilet and toilet area. After cleaning the toilet, the toilet brush and cloth should be cleaned with a detergent and then rinsed and thoroughly dried.

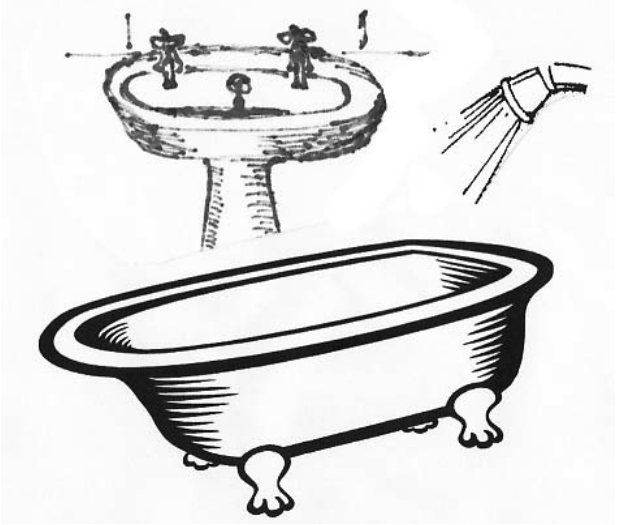
When there is diarrhoea, add disinfectant to the toilet bowl before flushing, with the lid down, to prevent spread of microbes via aerosolised droplets of toilet water. Also, disinfect all surfaces of the toilet seat, lid and bowl, including under the flushing rim where microbes may accumulate.

After cleaning toilets and latrines, the hands may be contaminated and may transmit microbes to other people or other sites. It is important therefore to wash hands thoroughly after cleaning toilets and latrines or to protect hands from soiling by wearing rubber gloves.

Note: In homes where sewage is disposed of “on site” e.g. in septic tanks or pits, take care not to introduce excessive amounts of detergent, soap or disinfectant into the system. These systems rely on biodegradation by environmental microbes to kill faecal germs. The biodegradation can be inhibited by exposure to high levels of soap, detergent or disinfectant.

4. Baths, sinks, showers and tiled surfaces

Germs can survive in the scum or scale left behind after bathing. Water left stagnant in the water pipes of showers can become contaminated with germs that may become airborne when the shower, etc. is turned on. Showerheads can also harbour germs. Moulds can live on or behind wall and floor tiles and on shower curtains.



Baths and sinks

- ✓ Hygienically clean baths and sinks regularly by cleaning followed by thorough rinsing and leave to dry. Alternatively, a disinfectant cleaner may be preferred*. This is very important after use by a person who is infected, or if the surface is contaminated with faeces.

Showers

- ✓ Clean shower trays as for baths and sinks
- ✓ If a shower is not used for a long period, leave it to run at a hot temperature for a few minutes before use.

Tiles and shower curtains

- ✓ Make sure tiles and grout are in good condition and cleaned regularly. An anti-fungal product may be needed
- ✓ Hygienically clean or launder shower curtains regularly.

* See Appendix 4 for advice on disinfectants

4. BATHS, SINKS, SHOWERS, AND TILED SURFACES

Community workers/teachers notes

What are the risks?

These sites can act as a permanent reservoir for potentially harmful microbes such as *Legionella* or *Pseudomonas* that may be present in water. These microbes are more likely to proliferate in stagnant water and where scale or scum (biofilms) has formed. They can be transmitted to others by inhalation of aerosols generated from the water. Microbes such as *Staphylococcus aureus*, which may be present on the skin, or gut microbes such as *Enterococcus faecalis*, can survive in the damp scum or scale left behind after bathing, and may be transmitted to others by contact.

Certain individuals may be at risk of potentially life threatening infection from some of these microbes. However, for a healthy person they would not usually pose a high risk of infection due to protection from an intact skin, normal commensal flora and immune system, although no-one would want to bathe in a dirty bath/shower.

People with wounds, catheters or other invasive devices that break the skin may be at risk from contact with dirty baths, showers and whirlpool baths. People with underlying respiratory conditions, such as cystic fibrosis, and older people are at increased risk of infection caused by aerosolised microbes disseminated by showers.

Hygiene measures

Hygiene in relation to baths, sinks, showerheads and cubicles aims to remove microbes contained on skin scales and in the scum which can contaminate these surfaces. This is best achieved using a combined cleaning/disinfecting product followed by rinsing with fresh water. It is especially important if there has been contamination with body fluids, or if used by a person with a known infection.

Showers also need to be kept clean and regularly treated to avoid the build up of biofilms. If a shower is not used for several days it should be turned on and allowed to run on the hot setting for a few minutes before the next use. This action will flush the system and remove any microbes that may have accumulated.

Tiled surfaces need to be cleaned regularly (a dilute solution of bleach will help mould removal) and an anti-fungal product may be needed. Loose tiles should be reapplied and re-grouted to prevent the growth of mould.

5. Laundry

Soiled clothing and linen can spread germs.

In general:

- Clothing likely to be contaminated, e.g. underwear, personal towels or cloths used in the kitchen or toilet should be hygienically cleaned either by:
  - washing at **40-60°C with a bleach-based** product (check ingredients on the package)
  - **washing at 60°C or above**.

✓Heavily soiled laundry should not be hand sluiced or rinsed. Remove soil and discard directly into the toilet. **Launder at 60˚C** or wash at **40-60°C with a bleach-based** product

✓Low risk clothing e.g. clothing other than underclothing, can be washed at 40˚C or below with a non-bleach based product.

In Rural areas:

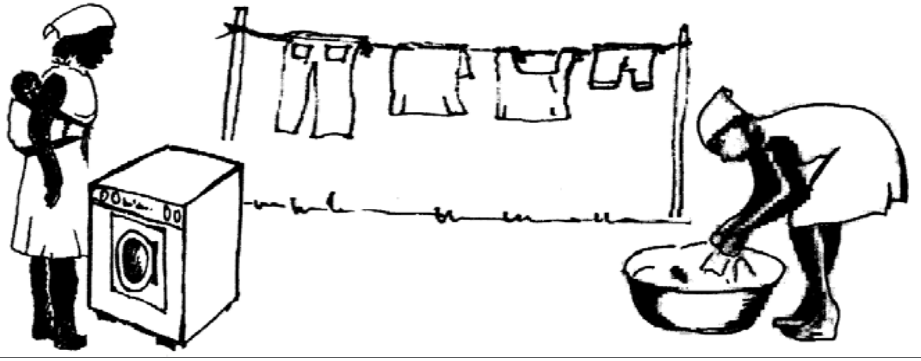
- In rural areas, washing of clothing in polluted water (ponds/canals) is a significant infection risk
- People should be encouraged to use tap water or tubewell/dugwell water wherever feasible
- Use of bleaching powder during laundering is advised.

For all laundry:

✓Wash hands after handling soiled laundry

✓Launder items used around food separately from other items

✓Thorough drying, preferably in direct sunlight, will kill any residual germs.



5. LAUNDRY

Community workers/teachers notes

What are the risks?
Germs and other microbes can be transferred between contaminated and uncontaminated items of clothing and linen during washing, and are only partially removed by subsequent rinse cycles. Thorough drying of laundry however, in most cases, reduces contamination to a level where it no longer represents a significant risk.

Although there is a risk of infection transmission via laundry, and there is documented evidence for transmsission of infection via soiled clothing and linens, under normal daily conditions, the risk is low or infrequent compared with risks from cleaning cloths or hand and food contact surfaces, since the risk is predominately to the person handling the laundry.

There are two points where laundry can transfer infection:
- when it is handled before laundering
- if laundering fails to remove all germs and the laundry remains damp for a period, there is the chance for growth of residual germs, such that clothes can then become a source of germs and can contaminate hands when subsequently handled.

Hygiene measures
- Wear gloves if laundry is visibly soiled
- Remove residual solid material and place it in the toilet
- Sluicing (hand-washing dirty linen before putting it in the washing machine) is not recommended as this can create aerosols that may contain germs.

Two processes are considered suitable for hygienic cleaning of clothing and linen:
- Washing at 60°C or above: This is considered to give consistent hygienic decontamination, removing bacteria, fungi and viruses by a combination of physical removal and heat inactivation
- Washing at 30-40°C using a bleach-based product: This produces bacterial decontamination of fabrics by a combination of physical removal and chemical inactivation. However, some types of fungi and viruses that are harder to inactivate, may not be removed.

Always washing at temperatures of 40˚C or below with a non-bleach product is considered to carry a risk of inadequate decontamination. Regularly washing at or below 40ºC, without using a bleach product may allow biofilms to build up in washing machines. At least once a week, use a high temperature wash or chemical disinfectant on an empty cycle to prevent the build up of germs and other microbes in a washing machine.

Dry laundry as soon as possible after washing. Don’t leave it damp for long periods, e.g. in the washing machine overnight, as any remaining germs may multiply rapidly.

In rural areas of countries with low income populations, washing of clothing in grossly polluted water (ponds/canals/rivers) is a major infection hazard, by way of bacterial and fungal infection. In areas where there is no piped water supply, people should be encouraged to use tubewell/dugwell water as an alternative, although this may not be feasible if the alternative sources are not conveniently situated. In this situation the use of bleaching powder during laundering is advised. Where "clean" water is not available, then the least polluted option should be chosen e.g. rivers or large ponds.

Key messages

6. Floors and soft furnishings

Although floors become dirty and sometimes get contaminated with vomit, faeces, etc., they are not in frequent contact with the hands, etc., so the risk of spread of germs is low. The risks may be higher if:

- **Babies and young children play and crawl on the floor**
- **Domestic animals and pets are kept in the home**
- **Food is prepared on the floor**
- **Dung is used as a floor covering as in some rural areas.**

- ✓ Clean floors regularly to remove visible dirt, with warm water and detergent or soap, using a mop and bucket or a scrubbing brush. If the surface is contaminated with vomit, excreta, etc., it should be hygienically cleaned at once by:
  - removing as much as possible of the soil from the surface using paper or a disposable cloth, cleaning the surface using detergent and warm water, and then applying a disinfectant*
- ✓ Ensure the floor is dry before allowing children and pets on it
- ✓ Keep other surfaces clean by vacuum cleaning, dusting, brushing, etc.
- ✓ Periodically clean carpets and soft furnishings
- ✓ Curtains, etc., can be cleaned by laundering.

* See Appendix 4 for advice on disinfectants

6. FLOORS AND SOFT FURNISHINGS

Community workers/teachers notes

What are the risks?

Microbes continually enter the home and contaminate floors via shoes, the feet of pets, etc. In general, the risk of infection resulting from contaminated floors or soft furnishings is very small. The risks increase if:

- there is a spillage of an infectious substance such as faeces, vomit or blood
- there are young children crawling on the floor
- there are domestic animals or pets such as dogs, cats, etc., in the home
- food is prepared on the floor.

Floor coverings, whether carpet, vinyl, tile, etc., should be in good condition because damaged fabric can be more difficult to clean and may also support the growth of fungi and bacteria. Where possible, floors should be easy to clean. Carpets are not ideal in situations where they may be frequently soiled with body fluids, e.g. in bathrooms.

Hygiene measures

As a general principle, floors simply need to be kept clean. Floors are considered as low risk, because microbes need moisture as well as dirt to grow, but reducing the level of dirt in the home will reduce the opportunities for microbial growth. The frequency of cleaning will depend upon the frequency and degree of contamination. In some households, a weekly clean may be adequate, whereas in other households, e.g. where there are young children, pets or overcrowding, more frequent cleaning may be necessary. Carpets and soft furnishings also need to be clean, mainly for aesthetic purposes, e.g. removal of dust and pet hairs.

Detergent or soap and water is sufficient for cleaning floors, but the hygiene of the mops, buckets and cloths must also be considered. If these are contaminated before use, they may increase the number of microbes on the floor rather than reduce it.

If the floor is contaminated with an infectious substance (infected faeces or vomit), it will need to be hygienically cleaned. Since disinfectants, particularly bleach- based disinfectants, tend to be inactivated by dirt, body fluids, etc., it is important to remove as much of the ‘soil’ as possible before cleaning the surface and then applying a disinfectant. It is also important that the person who deals with the contaminated material protects themselves by wearing disposable gloves and ensures that the contaminated material, cloths, etc., are disposed of safely. If a carpet is affected, any disinfectant will need to be carefully selected to avoid damaging the material. Steam cleaning machines are now available and can avoid this problem. The high temperature of the steam will kill any microbes present.

Hygienic cleaning (i.e cleaning with soap or detergent and water followed by disinfection) or by using a disinfectant/cleaner may be beneficial for routine cleaning of floors in hotter, more humid climates where germs survive better, and where the floor is used by the family for cooking, social gathering etc.

Key messages

7. Airborne contamination

- **In developing countries poor air quality in the home due to poor ventilation is a serious problem**
- **Indoor bio-aerosols generated in the home may carry bacteria, viruses, yeasts, moulds and fungi.**

Airborne contamination can be reduced by:

- Ensuring good ventilation throughout the home, including the bathroom and toilet
- Keeping conditions in the home as “dry” as possible
- Good home maintenance - damaged walls and cracked tiles encourage accumulation of dirt and damp
- Regular cleaning of floors walls and surfaces, preferably using vacuum extraction
- Regular cleaning of surfaces where where mould is likely to grow. A dilute solution of bleach will help mould removal.

7. AIRBORNE CONTAMINATION

Community workers/teachers notes

What are the risks?

The homes of low income and poor communities are often conspicuous by their unhealthy and unhygienic living conditions. Hygiene-related problems include damp floors, overcrowding and lack of adequate ventilation. Women, who spend the most time in the home, are particularly exposed to serious smoke hazards due to lack of proper exhaust arrangements in the kitchen. Many homes do not have a separate kitchen or cooking area, hence indoor air pollution permeates the entire dwelling, contributing to high mortality rates in under 5s, from respiratory infections. Lack of ventilation in bathrooms and toilets increases the risks of transmission of air-borne contamination. In India it is known that overcrowding in poor quality houses, among the poor, has helped spread of tuberculosis infection; there are 17 million tuberculosis cases annually in India, with 500,000 deaths. Indoor bio-aerosols generated in the home may carry bacteria, viruses, yeasts, moulds and fungi. Although mould spores can occur in isolation, bacteria and viruses in the air are usually associated with skin scales, or mucous droplets generated by sneezing. Although most of the airborne micro-organisms which are pathogenic do not survive for long periods under dry conditions, germs such as cold and flu viruses (in mucous droplets), and bacteria such as *Staphylococcus aureus* (attached to skin scales) can survive long enough to allow transfer of infection. By contrast mould spores can survive for very long periods of time.

Allergic reactions from airborne contamination

The relationship between damp housing, mould growth and poor health has been well established; damp and mouldy living conditions have an adverse effect on health, especially among children. Moulds can exacerbate asthma and other respiratory diseases. Allergens from house dust mite faeces are also implicated in respiratory disease such as asthma.

Hygiene measures

While poor standards of housing, exacerbated by poverty, is the ongoing cause of poor air quality in homes, at the root of the problem is the fact that kitchen and bathroom ventilation is often neglected at the time of planning the house. This applies even to middle income groups. In India, government recommendations now specify that kitchen and living room windows should span at least 20% and 10% of the floor area respectively. Use of poor quality coal and all types of biomass (dung, wood, cropstalks etc) in cooking ovens are strongly associated with infant respiratory infections and chronic obstructive lung disease in adults. Except possibly for parts of China, more poor people are reliant on biomass for cooking and heating than on coal. Approximately half the world's population cooks with biomass fuel. These ovens create serious SO_2 and other toxicant hazards in the kitchens, in absence of proper exhaust arrangement. Introduction of bio-gas oven (with human/animal excreta) could improve the situation, but is not applicable in many communities. A minimum number of animals per household is required, and some capital investment, putting biogas systems beyond the reach of most poor and all landless. Group/villages schemes have been successful in places, but this is still not seen as a general solution. The most effective means of overcoming these problems is ensure that these problems are addressed during planning and construction of new housing.

On a day-to-day, basis airborne contamination can be reduced by a number of other measures. Keeping conditions in the home as “dry” as possible can be a problem in humid countries, but good home maintenance e.g. mending damaged walls and cracked tiles which encourage accumulation of dirt and damp, is an important measure. Floors, walls and surfaces should be regularly cleaned, preferably using vacuum extraction. Of particular importance is regular cleaning of surfaces where mould is likely to grow. A solution of bleach (0.5 to 2% w/v available chlorine) in soap or detergent will help mould removal, but an anti-fungal product may also be needed. Severe problems of damp housing and mould growth suggest poor ventilation, and may need to be referred to relevant environmental housing departments.

8. Toys

Toys can become contaminated through handling or by children putting their mouths to them. Germs can remain on toys for some periods of time.

Do:

- Store toys in a clean container or cupboard
- Ideally, children should have their own toys, rather than sharing them
- Clean toys as frequently as possible, but at least whenever soiled
- Clean hard or plastic toys that have become dirty or dusty by washing thoroughly with detergent and storing them clean and dry
- Wash soft toys when they become dirty in a washing machine but check the cleaning instructions first.

Hard toys which are contaminated can be hygienically cleaned by:

- Scrubbing with soapy warm water and a brush, rinsing with clean water & drying and wiping with alcohol wipes.

or by:

- scrubbing with soapy warm water and a brush, immersing in a mild bleach solution for 10 to 20 mins, rinsing with clean water & air drying .

or by:

- putting in the dishwasher or washing machine.

Soft toys can be hygienically cleaned by:

- Some soft toys can be cleaned in the washing machine
- Soft toys that have become heavily contaminated may need to be thrown away.

Also:

- Sandpits (indoor and outdoor) should be covered to avoid contamination (e.g. from pets). The sand should be changed regularly
- Balls from ball pits should be cleaned regularly
- Water play equipment should be emptied at the end of the day and stored clean and dry.

8. TOYS

Community workers/teachers notes

What are the risks?
Evidence has shown that toys can become contaminated quite easily. Toys are passed from child to child and are often put into mouths. Infections caused by bacteria and viruses have been isolated from toys. However, it is important not to get neurotic about toys. Children will inevitably pick up infections, but there are ways in which you can reduce these risks by ensuring that looking after toys is a part of the household hygiene routine. This is particularly important where there is an infected child in the home or a child who needs special protection from infection.

Some viruses such as rotaviruses can easily contaminate surfaces either directly or through droplets from saliva or vomit. These viruses can remain viable on surfaces such as toys for many hours. For example, cytomegalovirus (CMV) was found on toys in a classroom immediately after a child had put their mouth on the toy and was shedding CMV in their saliva. The virus could still be isolated from the toys after 30 minutes.

Contaminated toys including equipment such as play mats, plastic beakers and ball pits can contribute to the spread of infection.

Soft toys
Studies on soft toys in a variety of settings such as intensive care units and day care centres in UK show that soft toys can be contaminated with bacteria, including some potentially pathogenic species.

Hard toys
Bacteria of the upper respiratory tract have been isolated from hard toys taken from a general practitioner's surgery. Toy balls in a day care centre were contaminated with faeces. Several studies have suggested that hard toys can contribute to outbreaks of diarrhoea and vomiting. For example, in two different day care centres in the UK with an outbreak of rotavirus, 39% of toy balls were contaminated with the virus.

Hygiene measures
There should be a regular cleaning rota for most things in the domestic environment, and toys and equipment should be included in the rota to ensure that they are regularly cleaned. Ideally, toys should be washable. Soft toys can be put into a washing machine in the hot water cycle. This is particularly important for children at special risk. Where toys are known to be contaminated, e.g. where they become contaminated with vomit or faeces, or mucous from a child who is ill, they must be hygienically cleaned or may even need to be discarded.

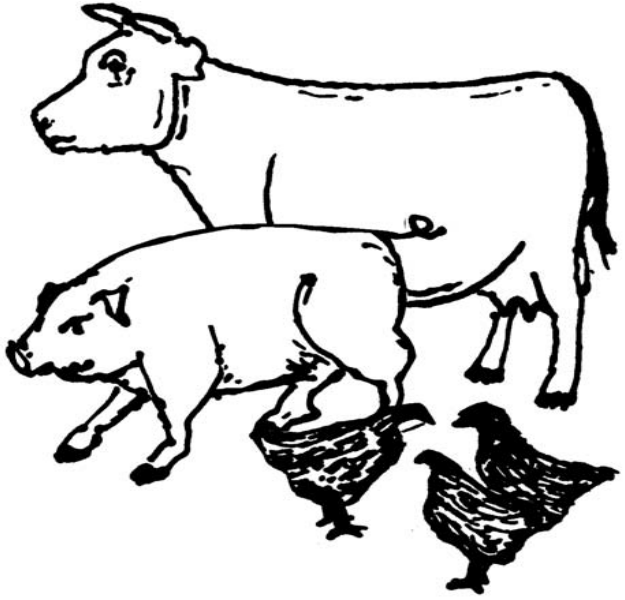
Module 6
Domestic animals and pets, rodents and insects

Key messages

1. Domestic animals, rodents, etc.

In rural areas in many developing countries, people live in close proximity with cows, pigs and chickens. Cowsheds and piggeries are common features in rural homes.

Rodents and birds in the vicinity of the home can also carry and transmit diseases.



- ✓ As far as possible animal sheds should be separate and detached from the home
- ✓ Animal sheds should be kept clean and there should be adequate arrangements for disposal of faecal waste (faeces & urine)
- ✓ Introduction of bio-gas, stoves in rural homes could solve the problem of animal waste/human waste disposal
- ✓ Rodents should be controlled. Proper disposal of refuse is very important for the control of rodents
- ✓ **Always wash hands after handling domestic animals.**

1. DOMESTIC ANIMALS, RODENTS, ETC

Community workers/teachers notes

What are the risks?

In many countries in the Indian subcontinent, Asia, Africa and elsewhere, people live in close proximity with cows, pigs, chickens and other domestic animals. Cowsheds and piggeries are common features in most rural homes in countries like India. Rodents and birds in the vicinity of the home can also transmit diseases.

Domestic animals can carry a variety of pathogens which, if transferred to humans, can cause disease. Chickens are known to carry food poisoning organisms such as **Salmonella and Campylobacter spp**. **Leptospirosis** is an infection carried by domestic animals such as cattle, sheep, goats, pigs, and also by cats, rats and other rodents. The animals pass the organism in urine which can then contaminate water or food. **Bovine Tuberculosis and Brucellosis** are diseases carried by cattle and goats; usually this is an occupational disease which affects farmers and dairy workers, but infection can occur in rural homes, where people live in close proximity with cattle and goats. Pigs can sometimes be a carrier of **Anthrax**. **Psittacosis** is an infection of the lungs causing fever, cough etc. It is primarily a disease of birds including parrots, parakeets, pigeons, sparrows, ducks, turkeys, fowl etc. **Plague** is now a rare disease. It is primarily transmitted by rodents. Humans can get infected from bites of flees which feed on the blood of an infected rat.

Infections can be passed from animals to humans in several ways. Some infections are carried on the fur of animals. Infections can be transferred by touching and stroking animals and not washing hands. Other germs are excreted in the faeces of animals and they can remain in the environment, especially in moist areas. Survival and transfer into food and water occurs in the same way as it does for human pathogens. Meat can become contaminated when animals are slaughtered and prepared for eating. Faecal pathogens can easily get into water used for irrigating crops.

Hygiene measures

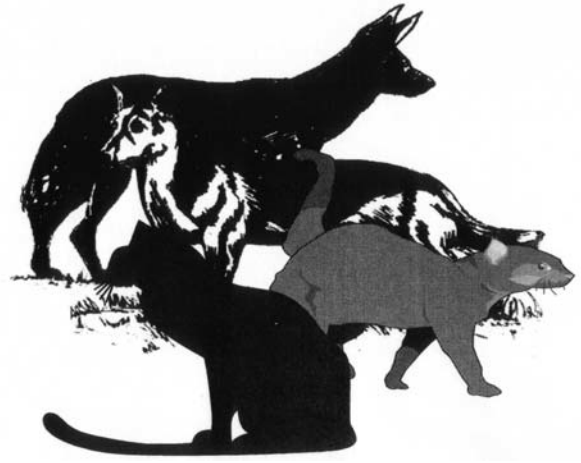
Hygiene of animal sheds is an important issue for rural homes. There should be adequate arrangement for disposal of the faecal waste (faeces & urine) of domestic animals, and as far as possible animal sheds should be separate and detached from homes. Introduction of bio-gas stoves in rural homes could solve the problem of animal waste/human waste disposal, but these are not applicable in all communities. Other measures should include control of rodents. Proper disposal of refuse is very important for the control of rodents.

Key messages

2. Domestic pets

Pets can pose a risk of infection. Pets can carry germs such as *Salmonella* in their faeces, on their fur, paws and in their mouth. Good hygiene can reduce these risks.

Always wash hands after touching animals or their food, toys, litter trays, etc., and especially before preparing food for human consumption.



Pets and illness

- ✓ Pets are best housed and fed elsewhere than in the kitchen
- ✓ Ensure pets are regularly checked for signs of infection
- ✓ If a pet becomes ill, seek advice from a vet
- ✓ Ensure all animals receive up to date immunisations and important treatments such as worming and flea treatments.

Pets and food

- ✓ Keep pet food separate from human food
- ✓ Ensure pets have their own dishes and utensils
- ✓ Keep pets off kitchen surfaces where food is prepared.

Pets and cleaning

- ✓ Clean cages and bedding regularly, and litter trays daily
- ✓ Avoid cleaning pet cages etc in the kitchen sink
- ✓ Use gloves and paper towels to clean up animal faeces
- ✓ Flush pet faeces down the toilet or place in plastic bags, secured and place in the waste bin
- ✓ Hygienically clean floors used by pets regularly, by cleaning followed by disinfection, or using a disinfectant/cleaner
- ✓ Pet “spills” e.g. faeces & vomit should be cleaned up immediately and surfaces cleaned and disinfected
- ✓ Pregnant women should avoid cleaning cat litter trays.

2. DOMESTIC PETS

Community workers/teachers notes

Owners of pets need to be made aware of the potential infection hazards associated with their pets. There is evidence to show that the presence of pets in the home is associated with increased levels of contamination in the kitchen and bathroom. Domestic cats, dogs and other types of pets, although apparently healthy, can act as carriers of enteric pathogens such as *Salmonella* and *Campylobacter*. Pets such as cats and dogs can bring pathogens into the home on their paws and contaminate kitchen food surfaces as well as floor surfaces. In these situations, additional hygiene measures need to be considered.

What are the risks?

There is evidence that pets (including birds) can harbour infections that can be transmitted to humans. These diseases include bacterial, viral, parasitic and fungal infections, such as those listed in the table below. Domestic animals such as cats and dogs can also harbour moulds and yeasts on their coats. Puppies and kittens with diarrhoea can pass on infections such as *Campylobacter*.

Germ	Cat	Dog	Rabbit
Campylobacter	✔	✔	
Cryptosporidium		✔	✔
Listeria		✔	✔
Pasteurella	✔	✔	
Salmonella	✔	✔	✔
Toxocaria		✔	✔
Toxoplasma	✔		

Infections can be passed from animals to humans in several ways. Some infections are carried on the fur of animals. Infections can be transferred by touching and stroking animals and not washing hands. Other germs are excreted in the faeces of animals and they can remain in the environment, especially in moist areas. Survival and transfer via surfaces occurs in the same way as it does for human pathogens. For example, *Cryptosporidium* can remain viable in the environment for up to 12 months. Fungal skin infections such as ringworm can be transmitted to humans by direct contact with animals. Water-borne transmission from pets to humans has also been documented.

Infections can be passed on from animals in the kitchen. The importance of keeping separate equipment for pets, cleaning surfaces where pets have touched, and washing hands before food preparation, should be stressed.

Pregnant women should not handle litter trays as germs excreted in animal faeces, e.g. *Toxoplasma gondii*, can affect the developing foetus. Listeria is also a particular risk for pregnant women. If there is a baby in the house, ideally, reptiles should not be kept.

Hygiene measures

The principles of preventing the spread of germs from animals are the same as those for humans.

Key messages

3. Insects

Insect-borne diseases are common in developing countries. Transmission may take place through bites of bloodsucking insects e.g. mosquitoes, or transfer of germs (e.g. from faeces to food) by insects like houseflies.

Insect	**Disease**
Mosquito borne disease	Malaria, dengue fever, filiarisis
Houseflies	Diarrhoea, dysentery, cholera, amoebiasis, hepatitis, polio, etc.
Sandflies	Sandfly fever, kala-azar and oriental sore (cutaneous leishmaniasis)
Lice (head louse or pubic louse)	Pediculosis. Lice can also transmit typhus and relapsing fever
Fleas	Plague
Bedbugs	Bedbugs as yet have not been shown to spread any diseases
Cockroaches	They have potential to spread diseases as houseflies do, but there is no conclusive proof yet to that effect
Ticks and mites	Under exceptional conditions they transmit diseases such as Kyasananur forest disease, typhus, relapsing fever, etc. Scabies is caused by a particular type of adult mite

3. INSECTS

Community workers/teachers notes

What are the risks?
Insect-borne diseases are common in developing countries. Transmission may take place through bites of blood-sucking insects such as mosquitoes, or transfer of germs (e.g. from faeces to food) by insects such as houseflies.

Mosquitoes
Anopheles mosquitoes carry and transmit malaria and viral infections such as encephalitis. Large scale measures for control of *Anopheles* mosquitoes are taken as a part of the national malaria control programmes. The *Culex* mosquito is responsible for spread of filariasis (elephantiasis) and encephalitis. *Anopheles* and *Culex* breed in dirty water sources such as septic tanks, blocked gutters, pools of waste water, dirty ponds, etc. Dengue fever and other viral fevers are spread by Aedes mosquito which breeds in small sources of water such as overhead cisterns, small tanks, flower-pots, air-conditioner units and potable water in earthenware jars.

Houseflies
The common housefly carries germs from human faeces and wastes to food. In this way, it can spread infective diarrhoea, dysentery, cholera, amoebiasis, hepatitis, polio, etc. Eggs are laid in decaying organic matter, such as vegetable or fruit debris, animal and human excreta, refuse, etc.

Sandflies
Sandflies spread diseases such as sandfly fever, kala-azar and oriental sore (cutaneous leishmaniasis). Eggs are laid on moist soil, in cracks and crevices in the ground or walls, or in heaps of rubble. Flies feed on decaying organic matter.

Lice
Lice live on the human body, either on the head (head louse) or pubic region (pubic louse). The infestation, known as pediculosis, is common among people with low standard of personal cleanliness. Lice can also transmit typhus and relapsing fever.

Fleas
Fleas are responsible for transmission of plague from rats to humans.

Bedbugs
Bedbugs are wingless insects feeding on human blood, but as yet have not been shown to spread any diseases. They live in cracks and crevices of beds and lower portions of the walls, hidden between layers in the mattresses and seams of clothing, furniture such as chairs, etc.

Cockroaches
Cockroaches breed in humid and dark places with poor ventilation, e.g., cupboards in the kitchen and stores, refrigerators, underground drains, etc. They are generally active during night, feeding on food residues and other eatables. They have potential to spread diseases as houseflies do, but there is no conclusive proof yet to that effect.

Ticks and mites
Biologically, these are not insects, but are arthropods. Ticks are ectoparasites of both domestic and wild animals. Only under exceptional conditions they attack man and transmit diseases such as Kyasananur forest disease, typhus, relapsing fever, etc. Scabies is caused by a particular type of adult mite.

Key messages

4. Household measures for control of insects

Measures for control of insects is the function of the local public health authority, but household measures are also key. Methods of control differ for different insects according to their lifestyle and the mode of infection transmission and includes

Control measure	Mosquitos	House-fly	Sandfly	Lice	Fleas	Bedbugs	Cockroaches	Ticks and mites
Protective clothing	✔							
Mosquito or other net	✔		✔					
Cover household water containers	✔							
Control of wastewater	✔							
Safe faeces disposal, cover latrines and septic tanks	✔	✔						
Keep food covered		✔					✔	
Safe disposal of refuse		✔			✔		✔	
Use of insecticides		✔		✔	✔	✔	✔	✔
Use of insect repellant								
Personal hygiene				✔				
Laundering of clothes				✔				
Control of rodents					✔			✔
Good home hygiene	✔	✔				✔	✔	✔
Control of domestic animals					✔			

4. HOUSEHOLD MEASURES FOR CONTROL OF INSECTS

Community workers/teachers notes

Measures for the control of insects are the responsibility of the local public health authority, but household measures include not providing breeding places, sanitary disposal of kitchen and other household wastes, thorough cleanliness, etc. Personal protection is possible by (a) covering the body with clothes, and (b) using mosquito net and repellents. Methods of control differ for different insects according to their lifestyle. The mode of infection transmission includes:

- Wearing clothes covering as much of the body as possible, e.g., wearing long-sleeved shirts in the evening
- Sleeping under mosquito-nets (note: sandfly nets are finer than mosquito nets), and making the house mosquito proof. Mosquito-net impregnated with contact insecticide is now available and, if not washed, retains its effect for about six months
- Covering water-tanks (including ends of overflow pipes) of houses and buildings with wire mesh to prevent mosquitoes entering the tanks and breeding in them
- Waste-water should not be allowed to stagnate around the house (see module 3)
- Disposing of faeces, keeping toilets and latrines covered and covering septic tanks (and ventilation pipes) with wire mesh (see module 5)
- Collecting household refuse in a closed bag or a dustbin with a fitting cover (see module 3)
- Using insecticides and insecticide aerosol sprays
- Using mosquito repellent in the room or on the exposed skin
- Control of lice is basically through personal cleanliness and care of hair. Infestation can be treated by benzyl benzoate or gamma-benzene hexachloride lotion or anti-lice preparations applied to the hair for a few hours. Frequent hair-washing & combing with fine toothed comb helps remove dead insects
- Laundering clothes regularly to eliminate lice (see module 5)
- Controlling rats in and around the home to control fleas. Eliminate rat burrows and breeding places, etc.
- Home cleanliness, better design of food storage cupboard, not leaving food residues for insects to feed on. Covering openings of drains in bathrooms etc to prevent them entering the home from underground drains
- Domestic animals like cattle, dog, etc., should be kept clean and free from ticks and mites by regular vigilance and periodic treatment with insecticides.

Further Reading

“Our Health in our Hands” , School of Health Sciences. University of Pune, India Editors: Dr. N.S. Deodhar & Dr. P.V. Sathe.

Module 7
Where there is more risk – healthcare at home

Key messages

1.When there is more risk of infection

The aim of this module is to understand and deal with some of the factors that can increase the risk of infection. This happens more often, and is more serious than people often think. For people at extra risk, infections are likely to be more serious and may require hospitalisation.

Those at greater risk of infection include:

- People who are:
  - generally healthy, but have an increased risk of infection e.g. newborne babies
  - including people who live in poor living conditions or have an unhealthy lifestyle
- People who are at greater risk of infection:
  - due to underlying disease or treatment including people with indwelling catheters, surgical wounds
  - including people who require use of medical equipment and dressings.

A person can have more than one risk factor at the same time.

In addition:

- People who have an infection pose a risk to other family members.

What to do

In situations where there is more risk, preventing infection, for the most part, still means;

‘Targeting your hygiene to get rid of as many germs as possible WHERE and WHEN there is a risk of them spreading.’

Before using this module, you should have read modules 1-8, which explains the principles of targeted hygiene, and how to put targeted hygiene into practice.

In situations where there is more risk, the major differences are that;

- Some practices e.g. those involving invasive devices, such as catheters, disposing of contaminated waste, dealing with medical equipment etc need to be carried out by a trained nurse or carer
- If hygiene practices are not correctly carried out, the risk of and from infection is much greater.

This module gives guidance on dealing with the situations that can arise where there is more risk of infection.

1. WHEN THERE IS MORE RISK OF INFECTION

Community workers/teachers notes

Immunity to infection

It is likely that we are exposed to infectious agents from an infected person or to microbes in the environment every day of our lives. So why don't we get infections more often than we do? This is because our body has a well-defined immune system that protects us. The immune system protects us in two ways (see Table).

Non-specific immunity	Specific immunity
• Intact skin, stomach acid, cough reflex and tears protect us from exposure to harmful microbes (i.e. germs) • The skin and other parts of the body are colonised by harmless microbes (the commensal flora) which help to exclude microbes (germs/pathogens) that have the potential to cause infection • If germs enter the body, they are engulfed and destroyed by white blood cells (called phagocytes) in the blood stream and lymph. This process causes inflammation, which gives the symptoms of pain, swelling, heat and possibly pus.	• Antibodies produced by the immune system protect us against specific diseases (e.g. measles) • Immunity is acquired by 'natural' exposure to a pathogen or through vaccination with a non-infectious preparation of the pathogen • Antibodies are specific to the disease, e.g. having chickenpox infection provides immunity against chickenpox, but not measles • Starting at birth, we gradually build up a 'library' of antibodies as we move to new environments and are exposed to new microbes, e.g. children starting nursery school often pick up infections.

People at extra risk

If these immune mechanisms are underdeveloped or impaired in some way due to disease, this puts us at greater risk of infection. Living in poverty and in poor conditions is very stressful and can also lower immunity to infection. Poverty usually means that people eat food that is cheaper and low in nutrition. A balanced diet is essential for a healthy immune system as it helps to fight infection. In addition, if people smoke, drink large amounts of alcohol or take drugs, their ability to fight infection is further reduced.

People who have an infection and pose a risk to other family members

People who are infected or ill have the potential to shed large numbers of bacteria, viruses, etc., into their environment. Many/most human pathogens (including all viruses) do not 'live' outside the human host, but many can survive in large numbers in the air, in the toilet, on the surfaces of the hands or tissues used to wipe the nose. Survival may be for several hours, and for some microbes (e.g. norovirus, *Staphylococcus aureus*) for several days or even weeks.

In these "key messages", the various groups or subgroups of people who are either at greater risk or who pose a greater risk of infection were identified This module describes each of these five groups and gives guidance on how to prevent the spread of infection in these circumstances.

2.People who are generally healthy, but at extra risk of infection

Even healthy people are at extra risk of infection at certain times of their lives. This includes:

- The very young (children under the age of five and particularly those under the age of one year)
- The elderly (over 65 years)
- Pregnant women are particularly vulnerable to certain infections, e.g. urinary infections. Some infections can harm the unborn baby (e.g. listeriosis, rubella, toxoplasmosis).

Good hygiene practice, correctly and consistently applied is the appropriate way to reduce infection risks for these groups.

In addition:

For babies under one year

✓ Feeding utensils should be decontaminated by boiling or using a disinfectant.

Pregnant women

✓ Pregnant women should specifically avoid contact with cats and cat litter, which can transmit toxoplasmosis.

For all of these groups

✓ Ensure that they have a good diet but do not eat high risk food or drinks (e.g. under-cooked eggs, raw egg dishes, undercooked meat and poultry, raw shellfish, unpasteurised cheeses)

✓ Make sure that they have the appropriate immunisations and that these are kept up to date

✓ Avoid contact with carers or family members with known or suspected infection.

2. PEOPLE WHO ARE GENERALLY HEALTHY, BUT ARE AT EXTRA RISK OF INFECTION

Community workers/teachers notes

It is not only sick people who are at extra risk of infection, even healthy people for quite natural reasons are at extra risk at certain times of their lives:

- The very young - Babies and children under the age of five years are more at risk of infection because their immune systems are not yet fully developed. They will also have weak cough reflexes and chest muscles that put them at risk of chest infections.
- The elderly - The immune system weakens with age; so older people may develop infections that they could have resisted when younger (e.g. influenza). Like babies, older people often have weakened cough reflexes and chest muscles, which increase the risk of chest infections.
- Pregnant women - During pregnancy, women are more likely to develop certain infections due to the changes in their body. There are also some infections that can be harmful to the unborn baby (e.g. listeriosis and rubella) since during pregnancy these infections can be passed on to the foetus.

People in these circumstances, particularly the elderly, often need support and assistance to practice good hygiene in their homes and minimise the risk of infection. Good hygiene for these family members should focus on reducing the opportunities for them to be exposed to the germs that are in the home.

The key to reducing the risk is good hygiene. The most important vehicles for infection are food and water (gut infections) and the air (respiratory infections). The key surfaces for infection transmission are the hands, cloths, and hand and food contact surfaces.

In addition to this, they may need reminding about which foods to avoid, such as uncooked or undercooked eggs (which carry a particular risk of *Salmonella*), undercooked meat and poultry, raw shellfish, or cheeses made with unpasteurised milk (which carry a particular risk of *Listeria*). Ensuring that the person has a nourishing diet and plenty of fluids can help to protect them against infection.

Immunisations protect against specific infections, e.g. influenza, pneumococcal or meningococcal vaccines. People may need to be encouraged to take advantage of immunisations (e.g. MMR vaccines for babies) and to keep their immunisations up to date. For example, some older people don’t take up the offer of a flu vaccine because they don’t realise how dangerous flu can be, as they get older.

Key messages

3. People at increased risk of infection

Some people, particularly those undergoing medical treatment and those recently discharged from hospital are more prone to infection. People with increased risk of infection include those who:

- Have underlying illnesses, e.g. diabetes
- Are taking medication which affects the immune system, e.g. anticancer drugs, steroids
- Are immuno-compromised through other infections, e.g. HIV/AIDS
- Are under stress, have a poor diet or drink too much alcohol
- Have open wounds and/or pressure sores
- Have indwelling catheters, etc.

Good hygiene practice, correctly and consistently applied, is the appropriate way to reduce infection risks for these groups.

They can also gain some protection from infection by:

- Adopting a nourishing diet and healthy lifestyle
- Having the appropriate immunisations and following medical advice where appropriate
- Avoiding contact with family members with known or suspected infections.

There will be additional high risk care activities have to be undertaken for these people, e.g. care of catheters or wounds. Managing these activities is described in the following topic.

3. PEOPLE AT INCREASED RISK OF INFECTION

Community workers/teachers notes

Some people, particularly those undergoing medical treatment and those recently discharged from hospital, are more prone to infection because their defences against infection are not working properly or are artificially broken.

Weakened body defences put us at risk, not only from 'primary pathogens' (e.g. *Salmonella, Shigella*, etc.) but also from 'opportunist pathogens' (e.g. *Pseudomonas aeruginosa* and *Staphylococcus aureus*) which are quite often found in the home environment. These microbes are not usually infectious to those who are 'healthy' but can take advantage when the body's normal defences are not working properly.

Some normally harmless organisms cause infection if they enter a part of the body where they don't usually live, e.g. when a contaminated device is inserted into the body, or resident skin microbes are transferred to a wound or device by unwashed hands.

People who have an increased risk of infection include:

- **People who have underlying illnesses, are under stress, have a poor diet or drink too much alcohol** - Certain diseases and conditions can suppress the immune system, and include diabetes, cancers, such as leukaemia, HIV infections and problems with the spleen (or following spleen removal). Excessive alcohol consumption and stress can have a similar effect.
- **People taking medications and drugs** - Drug treatments, such as steroids or anti-cancer treatments, prevent the immune system from working properly. Antibiotics can reduce the number of normal, protective microbes on our skin, in our mouth and gut, etc.
- **People whose natural defences are artificially broken** - This includes people who have a surgical or other type of wound, those with indwelling catheters or other invasive lines such as PEG tubes and Hickman lines. These enter the body and provide an easy entry point for germs.

Good hygiene for these family members should focus on reducing the opportunities for them to be exposed to the germs that are in the home. The key to reducing the risk is good hygiene practice as outlined in the previous modules. Key vehicles for infection are food (gut infections), water and the air (respiratory infections). Key surfaces for infection transmission are hands, cloths, and hand and food contact surfaces. Ensuring that the person has a nourishing diet and plenty of fluids can help to protect them against infection.

Key messages

4. Medical equipment and dressings

For patients discharged from hospital, attending out-patient clinics, the elderly or disabled, special procedures that may need to be performed for them, e.g. catheter or dressing replacement, put them at high risk of infection.

Risks of infection vary according to **what** the item is, **how** it is used and what it is **used for** (see Table).

Although there are fewer facilities at home, and conditions may be difficult, infection risks can be minimised by the following:

- Procedures such as enteral feeding or catheter care should only be undertaken by trainers carers
- Ensure that the area and surfaces around the person being cared for are kept clean and tidy
- **Always wash hands** before and after undertaking any care procedure, and after handling any equipment. Use alcohol hand gel if soap and water is not available
- Store high & medium risk equipment in a clean cupboard or box
- Place high risk equipment on a hygienically clean surface to prepare for use
- After cleaning equipment or disposing of equipment/dressings, always wash hands.

All of these procedures should, if possible be carried out by a trained nurse or carer.

Risk	Why?	What?	What to do
High	The item enters the body or touches broken skin or mucous membranes.	• Bladder and suction catheters • Intravenous lines and needles • Wound and other dressings • Indwelling urinary catheters and drainage bags • Invasive lines such as PEG tubes and Hickman lines.	Use sterile items*. Wrap in plastic and throw them away when finished with.
Medium	Equipment touches unbroken skin/membranes but can become soiled when used.	• Peak flow meter mouth pieces • Mouth care items and tongue depressors • Enternal feeding equipment • Nebulisers and humidifiers • Thermometers.	Wash, dry and disinfect between uses or use disposable itmes and throw away**.
Low	Equipment does not normally touch broken skin or has little direct contact with the user.	• Commodes, lifts/bath hoists • Mattresses, wash bowls, nebuliser masks • Pressure relieving mattresses and cushions • Pumps and machinery • Stored dressing packs.	Wash and dry between uses. Disinfect if soiled with body fluids. Keep items stored above floo level and dust free.

Follow any manufacturer's special cleaning and care instructions for equipment.

* Sterile items marked as 'single use' items must be thrown away after use, **never re- used**.

** Equipment marked as 'single patient use' can be hygienically cleaned and re-used on the same person. Throw away when no longer needed and never use on another person.

4. MEDICAL EQUIPMENT AND DRESSINGS

Community workers/teachers notes

Carers (either community nurses etc or in some cases family members) who undertake specific care procedures such as renewing dressings, catheter care or enteral feeding, should undergo training in the correct procedure to minimise the risk of infection.

It is also essential that these carers receive instruction on the correct care of equipment. **Risks** of infection for these items however, vary according to **what** is being used, **how** it is being used and what it is being **used for**, i.e. items that carry the greatest risks of infection are those that come into contact with broken skin or mucous membranes, particularly those inserted through the skin.

It is thus vital that medical and patient care equipment is cared for in the correct manner according to the level of risk.

High risk items

- High risk items that come into contact with broken skin or are inserted through the skin or into body cavities are required to be sterile (i.e. free from all microbes). Such items are supplied in a sterile form. These items are marked for ‘single use’ and must be discarded after use, i.e. not re-used. They have been manufactured and quality assured as sterile for use once only
- Sterile packs of dressings and disposable items such as catheter bags should be stored off the floor and kept covered and dry. If the outer packaging becomes contaminated this increases the risk of contaminating the equipment when the package is opened.

Medium risk items

- Medium risk items, including some that can come into contact with broken skin, must be hygienically clean (i.e. free from as many microbes as possible but not quality assured sterile)
- Some items can be re-used, but because the infection risks are relatively high, they should be used for one person only. These are marked as ‘single patient use’ and should be used in line with manufacturers’ instructions. Care should be taken when using cleaning materials and disinfectants to avoid any damage
- Some equipment is quite specialised and needs specific methods of cleaning and cleaning products for decontamination. Manufacturers should supply instructions
- Humidifiers can become a source (reservoir) of infection from stagnant water and hard water scale left in the machine. They should be emptied, cleaned out, filled with fresh drinking water daily and regularly de-scaled
- Nebulisers should be rinsed with fresh drinking water after use and stored dry. Tubing should be drained and stored dry.

Low risk items

- Low risk items should, as far as possible, be hygienically cleaned.

5. People who pose a risk to others because they are infected

There may be family members who have an infection and pose a risk of spreading it to others. They may be:

- Infected and ill (including infected wounds)
- A carrier but showing no symptoms, e.g. carrying methicillin resistant *Staphylococcus aureus* (MRSA) on their skin or in a wound or *Salmonella* in their gut.

Good hygiene practice correctly and consistently applied, is the way to reduce infection risks from these groups.

Pay strict attention to:

- ✓ Hand hygiene, particularly after contact with infected wounds or infected materials
- ✓ Ensuring infected people/carriers do not prepare food
- ✓ Hygienic cleaning of hand contact surfaces, toilet facilities and any medical equipment
- ✓ Handling and laundering of clothing and linen if someone has diarrhoea and vomiting
- ✓ Hygiene of cleaning cloths
- ✓ Safe handling and disposal of contaminated medical and patient care equipment
- ✓ Safe disposal of infected spills, e.g. vomit and excreta (see module 7 Floors and soft furnishings).

In addition:

- Infected people should avoid contact with vulnerable people
- If someone is vomiting, keep the room well ventilated and discourage others from entering the room.

Note: 'Superbugs' such as MRSA are resistant to antibiotics but not to disinfectants.

5. PEOPLE WHO POSE A RISK TO OTHERS BECAUSE THEY ARE INFECTED

Community workers/teachers notes

Good hygiene should focus on preventing the spread of germs from infected people to other family members. The key to reducing the risk of spread is targeted hygiene. Key vehicles for infection are food and water (gut infections) and the air (respiratory infections). Key surfaces for infection spread are hands, cloths, and hand and food contact surfaces.

Diarrhoea and vomiting

There are many bacteria and viruses that cause diarrhoea and vomiting and they can spread very easily. Microbes can settle on surfaces around the area where a person has been ill, e.g. vomited. People can be infectious even if they only have stomach cramps or nausea and may continue to be infectious up to 48 hours afterwards. Carers should remain off work until 48 hours after the last time they were ill. Infected people should avoid contact with vulnerable individuals and should not prepare food.

Hygiene measures

Hygienic cleaning of bathrooms, toilets, commodes and any surfaces frequently touched by hands is essential, together with hand washing. Soiled linen should be handled whilst wearing protective clothing and washed separately.

Respiratory infections

These can spread very easily in the home. Microbes are spread by coughing and sneezing and can cause an infection if someone else breathes in the germs. Cold viruses and possibly ‘flu viruses can contaminate surfaces and used tissues, and if fingers come into contact with these, then infection can occur by rubbing the nasal mucosa or the eyes.

People who have heavy colds or flu like symptoms should avoid contact with vulnerable groups including the very young and old.

Hygiene measures

Disposable tissues should be used to cover the mouth and nose when coughing and sneezing. These tissues should be disposed of into plastic bags, sealed and placed in the bin. As always, careful attention should be paid to hand washing and hygienic cleaning should be stressed. Wearing masks will not protect either the carer or the ill person.

Skins infections and infected wounds

These infections can be caused by bacteria, viruses and fungi and can easily spread via the hands of carers and the affected person, as well as via medical equipment and other surfaces. Dressings that are not changed often enough and become soiled and wet can contaminate surfaces and increase the risk of spread. Skin infections should be reported to a doctor to ensure the correct treatment. People with skin infections should avoid contact with vulnerable people and should avoid preparing food if the infection affects their hands.

Hygiene measures

Dressings should be changed frequently, before they become wet. Safe handling and disposal of dressings and rigorous hand hygiene are key.

Part 3
Developing a hygiene promotion programme – adapting to local conditions

1. Understanding the basics

Key messages

The basic rules of home hygiene are the same for ALL homes in ALL communities because:

- The sources of germs are the same
- The routes of spread of germs are the same
- The means of prevention are the same.

But hygiene promotion needs may differ significantly from one community to another because:

- The relative importance of different routes of spread (e.g. faecal:oral versus person-to-person transmission) is different in different communities
- The basic facilities (e.g. water sanitation etc) needed to put hygiene into practice may or may not be available.

- As a community worker, or a trainer of community workers, you are in a unique position - only you have proper understanding of the community you are working in. By combining your local knowledge with a broad-based understanding of hygiene, you are the person best placed to devise a hygiene promotion programme which meets the needs of your community
- The aim of this training resource is to give you an understanding of the principles of home hygiene and how to put hygiene into practice
- Before you can use this material you need to understand your community and community environment.

1. UNDERSTANDING THE BASICS

Community workers/teachers notes

The basic rules of home hygiene are the same for ALL communities regardless of whether it is a prosperous urban community living in modern well-served accommodation, or whether it is a poor community living in a rural village with limited access to water and sanitation. This is because:

- The sources of germs (people, food, animals water etc) are the same
- The potential routes of spread of germs are the same
- The ways of preventing infection through hygiene are the same.

Understanding hygiene promotion needs of your community

However the infectious disease (ID) transmission risks faced by different communities, and the solutions adopted to reduce ID risks are likely to differ significantly because:

- The relative importance of different routes of spread (e.g. faecal:oral, person-to-person, foodborne etc) is different for different communities
- The basic facilities (water, sanitation etc) needed to put hygiene into practice may or may not be available

These two factors must be taken into account in designing a hygiene promotion programme.

In poor rural communities, it is thought that the faecal:oral route is the major cause of ID transmission, the root cause being inadequate sanitation and lack of handwashing, often due to lack of access to water. Infection resulting from buying contaminated food, or from person-to-person transmission is also a problem, but its contribution to the ID burden compared with that caused by faecal:oral transmission may be relatively much less. By contrast, in prosperous communities where sanitation is adequate, although faecal:oral transfer may be a problem, foodborne and person-to-person transmission may be the more significant contributors to the overall burden of infection. Unfortunately there is no data available from which we can measure the relative importance of different routes of transmission in different communities, but we must bear in mind that hygiene promotion programmes for the poorest communities which focus on prevention of faecal:oral transmission may not be the most appropriate for higher income communities.

Adapting to local conditions

This resource is intended to be used by community workers of all types ranging from school teachers to community workers to doctors and community nurses. It aims to address the whole range of social situations within developing countries, from prosperous communities where water and sanitation is adequate, to urban and rural unserved communities. It also addresses the whole range of activities which play a part in reducing ID risks in the home. Although the major burden of ID is in the poorest communities, the burden of ID is unacceptable even amongst the more prosperous communities. This training resource is intended to provide the technical information needed for developing a hygiene promotion programme regardless of social and environmental conditions.

The role of the community worker

If a hygiene promotion programme is to be successful, it must be adapted to meet the needs of the specific community. As a community worker, a trainer of community workers or a schoolteacher, you are in a unique position - only you have an in depth understanding of the community you are working in. By combining your knowledge of your community with a broad-based understanding of hygiene, you are the person who is best placed to devise a hygiene promotion programme which meets its needs. The aim of this training resource is to give you an understanding of the principles of home hygiene and how to put hygiene into practice. In part 3 of this resource we look at how to combine knowledge of hygiene practice, with understanding of the community you are working in order to devise a hygiene promotion programme.

Before developing a hygiene promotion programme you need to

- Understand your community environment
- Understand your community.

2. Understanding your community environment

Key messages

Before designing a hygiene promotion programme you need to know more about the community environment – and the facilities which are available in that environment:

- **What infectious diseases are you aiming to control?**
  - diarrhoeal disease, respiratory disease, skin disease, trachoma etc.
- **What facilities do the families have for disposal of faeces?**
  - toilets, latrines, no facilities
- **What is the availability of water in the home?**
  - from a pump, from a well etc. etc.
- **What is the quality of the water?**
  - is the quantity limited? - is the supply intermittent?
- **What provision is made for disposal of refuse?**
  - municipal, none
- **What provision is made for disposal of wastewater?**
- **What is the microbial quality of the food which the family brings into the home?**
  - raw food purchased from a supermarket, market etc, or cultivated in the environs of the home may be contaminated with germs.

In addition you need to understand the people in the community.

2. UNDERSTANDING YOUR COMMUNITY ENVIRONMENT

Community workers/teachers notes

Before designing a hygiene promotion programme you need to find out more about the community environment and what are the "risky practices". You also need to know what basic amenities are available in the community and what is lacking.

1. What infectious diseases are you aiming to control?
Hygiene promotion should take account of the diseases which you want to target. For the poorest communities with inadequate access to water and sanitation, the primary concern is usually about preventing transmission of diarrhoeal diseases. This means preventing faecal organisms from people and animals which live within the community from getting into water and food, or being consumed by direct hand-to-mouth transfer. Some hygiene activities are common to preventing a range of diseases e.g. handwashing is key to prevention of faecal:oral transmission of diarrhoeal diseases, but also plays a role in reducing person-to-person transmission, and spread of respiratory viruses which can occur via hands and surfaces. By contrast if, e.g., prevention of trachoma and skin diseases such as impetigo are your main concern, personal hygiene i.e. regular bathing of the body and the eyes is the key. Further guidance on the relative importance of different hygiene measures for different diseases is given in Appendix 3.

2. What facilities do families have for disposal of faeces?
The status of the community in terms of basic sanitation amenities is key to determining hygiene promotion requirements. Where facilities are inadequate, addressing the needs to improve access to sanitation must be an essential part of an overall programme. Activities to increase access to facilities include promotion of a package of low-cost sanitation facilities which are tailored to meet the specific needs of the community.

3. What is the availability of water in the home?
The status of the community in terms of access to water is also key. This means not only safe water for drinking – but also adequate water for hygiene purposes. Working to improve access to water must form an essential part of the programme in communities where this is lacking. Water may be a concern even in prosperous urban communities where there is a municipal supply. This can occur if the supply system is poorly maintained or intermittent, in which case, clean water from the distribution plant may be contaminated by the time it reaches the home. Where the water supply is intermittent it is vital that hygiene promotion programmes include guidance on treatment handling and safe storage of water at home.

4. What provision is made for disposal of refuse? What provision is made for disposal of wastewater?
It is important to establish what provisions have been made for regular collection of refuse within the community. In situations where there is no municipal or other provision, mobilising the community to organise their own system must form an essential part of a hygiene programme. Similarly the means for preventing accumulation of rain and waste-water in the environs of the home must be assessed.

5. What is the microbial quality of the food which people bring to their home?
In module 2 we discussed how raw food purchased from a supermarket, market etc, or cultivated in the environs of the home may be contaminated with harmful microbes. Because food is safe to eat once it has been thoroughly cooked, people often do not realise the extent of the germ risk from bringing raw food into the home. Although safe to eat and handle after cooking, good hygiene is vital to prevent transfer of germs from raw foods to other foods during preparation for cooking. Whereas hygiene promotion programmes aimed at preventing faecal:oral transfer stress handwashing after defecation and before handling food, reducing the risks from contaminated food brought into the home means handwashing and hygienic cleaning of surfaces immediately AFTER handling raw food. Find out as much information as possible about the microbial quality of foods, particularly raw foods, in your community.

NOTE: Although optimum standards of personal and domestic hygiene practices cannot be achieved without also improving the basic amenities like water supply and sanitation, even where these amenities are poor there is still significant scope for reducing the burden of infection and cross-infection by improving hygiene practices at home. However there is no disputing the evidence that the greatest health impact comes from a package of measures that combine hygiene promotion with appropriate improvement to water and sanitation services.

3. Understanding your community

Key messages

- **What are their concerns about hygiene? Listen and find out**
  - what do they know, understand and want to know?
- **What is the educational status of your community?**
- **Who are the respected sources of knowledge in the community?**
  - community workers, community nurses, midwives, school teachers
- **Are there cultural or religious beliefs which govern attitudes to hygiene?**
  - family traditions, religious and community leaders
- **What is the availability of hygiene products such as soap, disinfectant, plastic bags, etc etc?**
  - are they affordable by the community?

3. UNDERSTANDING YOUR COMMUNITY

Community workers/teachers notes

1. What are their concerns about hygiene - what do they know, understand and want to know?
In setting up a hygiene promotion programme it is important to involve the community itself and to understand what are their major concerns about ID and hygiene. Combating disease through hygiene means involving all the community in better hygiene behaviour. If any group is left out of the decision-making process, then the impact will be seriously damaging. School hygiene education is a vitally important part of hygiene promotion and there is no doubt that children are powerful agents of change.

2. What is the educational status of your community?
The number and complexity of the hygiene messages which can be communicated will depend on the educational status of the community.

3. Who are the figures in the community who are respected as a source of knowledge?
If community hygiene promotion programmes are to be successful, it is vital to identify the "authority figures" who are respected sources of information for the family, and work through these groups to promote good hygiene practice. These "authority figures" may be very diverse in nature, ranging from schoolteachers to community nurses, midwives, health visitors and environmental health workers. Interestingly doctors, although they are respected source of health information, are rarely participants in raising awareness of the importance of hygiene or giving hygiene advice. It is important to recognise that the "respected community members" for hygiene advice differ significantly from one country to another, as do the agencies involved in administering them, and the government departments responsible for them.

One of the major problems in identifying key community workers is that, in most countries, the separate aspects of home hygiene i.e food hygiene, general hygiene, childcare, care of the elderly, care of the sick, water, sanitation, school education etc are dealt with by separate agencies. It is extremely rare that "home hygiene" is defined as an issue per se and responsibility allocated to a single source. If hygiene promotion programmes are to be successful there is a need to bring the separate agencies together and, if possible, develop programmes in collaboration. At the very least it is vital to gain their endorsement of the programme.

4. Are there any specific cultural or religious beliefs which govern attitudes to hygiene?
In identifying authority figures for hygiene, it must be recognised that in some countries "family traditions" are strong and the mother still retains a central role in caring for the home and rearing children. On one hand this is an advantage, in that passing down homecare education (including hygiene education) to children is a strong tradition in these communities – but there is also a disadvantage in that "outdated/bad" practice as well as good practice may be being reinforced. Where the mother is the absolute authority figure, this presents problems for achieving change from "bad" to "good" practice. In some communities, religious leaders can strongly influence hygiene attitudes and hygiene practices. In many communities there is a strong tradition and pride in "cleanliness" in the home, but there is a need to create understanding that "cleaning" (making the home look nice) is not the same as "hygiene" (preventing infectious disease transmission).

5. What is the availability of hygiene products such as soap, disinfectant, plastic bags, etc etc? Are they affordable by the community in question?
Hygiene promotion programmes must take into account of the availability and affordability of basic hygiene products such as soap, disinfectant and plastic bags for waste disposal within the community.

Hygiene promotion should be the first element of an integrated programme to bring improved water and sanitation, not a margin add-on to a technical project. Having assessed your community and community needs, the next stage is to:
- Select your target audience
- Decide on which aspect of hygiene should be promoted
- Select channels and methods of communication.

4. Choosing your target audience

Key messages

- Hygiene promotion programmes are usually more successful when targeted at groups who are at “life change stages” which make them open to behaviour change:
  - New mothers
  - Children at school
  - Those caring for family members who are infected or who are at extra risk of infection, e.g. the very young, the elderly, those who are immune-compromised through pre-existing disease HIV/AIDS or as a result of drug treatments
- These are the **primary target audience** for hygiene promotion.

But

- It is also important to reach others who influence how they behave i.e
  - **“secondary targets”** - fathers, mothers in law, neighbours and social contacts may exert peer pressure
  - **“tertiary” groups** - opinion formers and people in authority in different walks of life including teachers, religious leaders, government officers, political and community leaders etc.

4. CHOOSING YOUR TARGET AUDIENCE

Community workers/teachers notes

In any community, regardless of socio-economic conditions, health promotion programmes are usually more successful when targeted at groups who are at “life change stages”, which make them more open to behaviour change. For hygiene education and promotion, indications are that the following groups are key:

- New mothers
- Children at school.

Also

- Those caring for family members who are infected or who are at extra risk of infection. Demographic and social changes mean that these groups now make up an increasing proportion of the family group. Those at extra risk of infection include:
  - those who are immune-compromised through pre-existing disease or as a result of drug treatments
  - In countries where the HIV/AIDS crisis is acute, those who are affected pose a significant risk within the family both because they are so vulnerable to infection and, when infected, they represent a risk to other family members.

School hygiene education is key but relying on children to take hygiene messages back into the home is not sufficient; hygiene promotion must be targeted at the family as a whole.

Although your primary target audiences will be mothers, school children and caregivers, and anyone carrying out risky practices, it is also important to reach the people who influence your primary target audiences, such as fathers, mothers-in-law, neighbours and social contacts that exert peer pressure (the “secondary target audiences”). You may also consider communicating with the opinion formers and people in authority in different walks of life, such as teachers, religious leaders, government officers, political and community leaders (the “tertiary” groups).

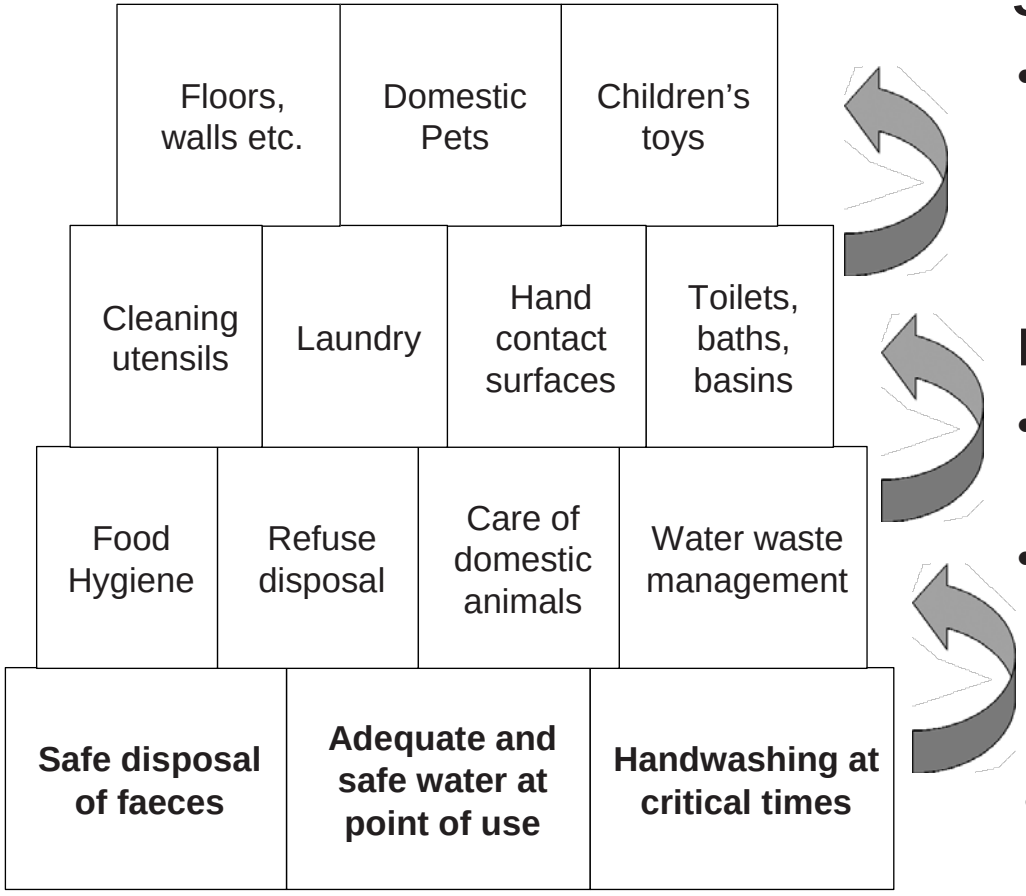
Involving women in home hygiene promotion

The participation of women in hygiene promotion activities is important because of their central role in domestic activities in developing country situations. Women (mothers & housewives) are the most appropriate target audience for changing behaviour in respect to bathing/washing clothes or utensils, collection of water and selection of water sources, educating children about personal hygiene, cleaning babies and disposing of their faeces, safe water storage, disposal of human excreta & refuse, prevention of accumulation of water in the home and peridomestic environment and preventing vector breeding.

Note: It can be argued that if people understood the basic principles of hygiene in the home they would be better able to practice hygiene in their workplace. This applies for example to food vendors on the street. At the present time such people clearly segregate between what they do at work and what they do at home, such that food handling in the workplace is seen to carry a different set of rules to food handling at home.

5. Selecting which hygiene procedures to promote - identifying risky behaviours

Key messages



Set priorities

- Ideally all aspects of hygiene should be promoted, but programmes are usually more successful if they focus on a small number of activities.

Develop a key stage programme

- Build hygiene practices into programmes in stages
- Stage 1 means ensuring safe disposal of faeces, access to adequate safe water at point of use, and handwashing at critical times
- When these three components are "in place" move to stage 2, stage 3 and stage 4.

5. SELECTING WHICH HYGIENE PROCEDURES TO PROMOTE – IDENTIFYING RISKY BEHAVIOURS

Community workers/teachers notes

Although there is some tendency to assume that "hygiene" means primarily handwashing, in reality it includes all activities covered in this resource. All aspects of hygiene are based on the same underlying principles; hygiene practices after using the toilet or changing a baby's nappy are little different from those which should be applied after handling raw meat or poultry. However, because food and water hygiene, sanitation, care of the sick, etc. are dealt with by separate agencies the family tend to receive "fragmented", and sometimes conflicting, information (e.g. rules for handwashing are promoted separately from rules for food hygiene). Ideally, therefore, promotion programmes should address all aspects of hygiene, rather than focussing on one or two specific practices in isolation.

Target a small number of specific practices – set priorities

Set against this however, experience shows that programmes are more successful if they focus on a small number of activities at any one time. In developing a programme it is thus

advisable to operate a "key stage programme" in which hygiene practices are built into programmes in stages. Stage 1 means ensuring that three basic requirements are in place – safe disposal of faeces, access to adequate safe water, and handwashing at critical times. Only when these three components are "in place" should you consider moving to stage 2, stage 3 and stage 4. "Key message 5" suggests a key stage programme for developing country situations. but this structure may need to be modified to meet local needs and respond to local conditions. For example:

- For rural and urban unserved communities, the priority is to educate and empower people on how to achieve safe disposal of faeces, ensure a sufficient supply of clean water for drinking and how to develop a culture in which handwashing at critical times is an accepted norm
- For other communities, the extent to which the community needs to take responsibility for activities in stage 1 and 2 will vary according to prevailing conditions i.e the availability of water, sanitation, municipal waste collection and wastewater drainage
- For urban middle class served communities, although basic amenities of sanitation, water and refuse collection may be available, promotion of handwashing at critical times and safe refuse disposal are still a major priority. If municipal water quality is poor, promoting "water at point of use", hygiene must also be included as a priority. For these communities it should be possible to build keystage 2 and 3 interventions into hygiene promotion programmes
- In some cases, the programme will be dictated by the specific disease which you wish to target e.g. trachoma, impetigo.

UNICEF "Facts for Life" prioritises 7 key messages which "all families have the right to know":

1. Faeces should be disposed of safely
2. Wash hands thoroughly after contact with faeces, before touching food and before feeding children
3. Use water that is from a safe source or is purified. Keep water containers covered
4. Wash or cook raw food. Cooked food should be eaten without delay or reheated
5. Keep food, utensils and food preparation surfaces clean. Store food in covered containers
6. Washing the face with soap and water every day helps to prevent eye infections
7. Dispose of all household refuse safely.

Assessing the health impact of hygiene interventions

The key stage programme suggested here is based on assessment of the available microbial data, combined with data, where available, from intervention studies designed to assess the

relative health impact of different hygiene interventions. The data however is far from complete, and open to question as to its reliability and general applicability. Current data suggests that promotion of handwashing, safe disposal of faeces and household water treatment and safe storage could reduce the burden of diarrhoeal disease by up to 47%, 32% and 35-42% respectively (Clasen and Cairncross 2004, Curtis and Cairncross 2003, Fewtrell et al 2005). A study in Pakistan suggested that promotion of handwashing could reduce the risk of pneumonia in children under 5, by 50% ((Luby et al 2005). At the present time there is no data on the health impact of promoting food hygiene, relative to other hygiene interventions, but it may be that, in some communities, the risks associated with poor food hygiene may be greater than those associated with household water quality. Assessment of the relative importance of hygiene for e.g. hand and food contact surfaces, cloths, toilets and laundry is based largely on microbiological data indicating the likely occurence, survival and spread of pathogens via these surfaces.

6. Keep messages as simple as possible

Having decided which hygiene practices you wish to target:

- For each practice, decide which “rules” are the most important
- Adapt the messages to suit the target audience and the facilities available to them - be realistic
- Keep the messages as few as possible
- Keep the messages as short as possible
- Be clear and simple - use language which your target audience will understand
- Keep messages positive
- Be consistent.

6. KEEP MESSAGES AS SIMPLE AS POSSIBLE

Not too many messages

For each risk practice, keep the messages as simple and as few as possible.

For example, although module 1 identifies 7 critical times for handwashing, only the first three are important for preventing faecal:oral transmission:

1. After defecation
2. Before eating and preparing food
3. After cleaning the bottoms of babies and toddlers.

Keep messages positive and constructive

People learn best and will listen for longer if messages are entertaining. Programmes which attempt to frighten people tend to also alienate them. Messages which consist of do's and don'ts can be frustrating and demoralising, particularly where they demand actions which are unrealistic for poor families in relation to the facilities which they have available.

Adapt the modules as necessary

This resource has been produced in modular form so that it can be adapted to local conditions by selecting only the modules and practices relevant to your programme. For each practice, the "key messages" are given. In many cases all the messages are applicable to all groups, but for some topics, adaptation may be necessary.

E.g. fridges & washing machines are not available in all homes!

7. Motivating hygiene behaviour change

Key messages

- **One of the greatest problems is developing the means to communicate with the target audience in a way that will motivate behaviour change**
- **"Top down" approaches, which "lecture" at mothers and threaten them with disease tend to have disappointing results**
- **It is often more cost effective to rely on social ambitions rather than health arguments to persuade people to adopt better hygiene practices.**

Identifying motives for behaviour change

- These motives may have little to do with health. e.g. it may be easier to persuade people to clear up faeces in order to get rid of the smell
- Design programmes to create "demand" for hygiene.

Communicating with the target audience

- Identify communication channels appropriate to the community - radio, TV, print media, social groups etc.
- Several channels with the same messages reinforce one another
- Mass media reach many people, but are more easily forgotten
- Face-to-face discussion and/or participatory approaches are more effective, but more costly
- Hygiene needs 'marketing' on a mass scale.

Sustaining behaviour change

- Participatory approaches engender ownership and help to ensure that behaviour change is sustained
- Building sustainability means building knowledge and skills to allow communities to take over management of their own programmes.

7. MOTIVATING HYGIENE BEHAVIOUR CHANGE

Community workers/teachers notes

Perhaps the greatest problem in improving home hygiene standards is developing the means to communicate with the target audience and to motivate behavioural change. Those who manage hygiene improvements often want to promote hygiene by educating people on the links between good hygiene and better health. Current approaches, which "lecture" at mothers and threaten them with disease in their children if they do not comply, have had disappointing results. Local people often do not see health benefits as the primary reason for improving their hygiene habits. Thus there is a paradox that, for the quickest and widest adoption of good hygiene practice, it is often more cost effective to rely on social ambitions rather than health arguments to persuade people to adopt better hygiene practices.

Identify the motives for behaviour change

These motives often have little to do with health. People may be persuaded to wash their hands so that their neighbour will respect them or so that their hands smell nice. Understanding what motivates hygiene behaviour is key; recent studies indicate that in reality hygiene is motivated by the desire for order and aesthetics, and that communications programmes designed to create "demand" for hygiene by building on these goals work better than traditional education methods. By working with your target group you can discover their views of safer hygiene practices and build on these perceptions.

How can we best reach and communicate with the target audience

In order for a hygiene promotion programme to be effective we need to understand how the target audience communicates - what proportion listens to the radio, watches TV, reads magazines or newspapers, or attends social groups or religious functions. Traditional or existing channels are easier to use than setting up new ones. Several channels giving the same messages can reinforce one another. Mass media reach many people, but the messages are more easily forgotten. Face-to-face discussion and/or participatory approaches can be highly effective in encouraging behaviour change, but tend to be very costly per capita.

Indications are that, if hygiene practices such as hand washing are to become a universal norm, hygiene promotion on a mass scale is needed; hygiene and handwashing need 'marketing' on a mass scale to persuade people of the benefits.

Sustaining behaviour change

Participatory approaches that involve and mobilise the community also engender ownership and commitment by the community. This can help to ensure that behaviour change is sustained rather than short term. Building sustainability is also about building knowledge and skills in the community to allow communities to take over the management of their own programmes.

Practical Manuals on Hygiene Promotion in developing countries

There are a number of practical manuals which give detailed guidance on designing and actioning hygiene promotion programmes in deprived communities:

- Sanitation and Hygiene Promotion: programming guidance 2005. Water Supply and Sanitation Collaborative Council: http://www.wsscc.org/dataweb.cfm?code=586/
- Towards better programming: a manual on hygiene promotion 1999.UNICEF Water, Environment and Sanitation Technical Series http://www.unicef.org/wes/files/hman.pdf
- A participatory approach for the control of diarrhoeal diseases. PHAST step by step guide. 1998 World Health Organisation www.who.int/water_sanitation_health/hygiene/envsan/phast/en/
- Encouraging Change; sustainable steps in water supply sanitation and hygiene. 2003 Sally Sutton and Hope Nkoloma, TALC, PO Box 40, St Albans, Herts AL1 5TX. (Talc@talcuk.org)
- The handwashing handbook: a guide for developing a hygiene promotion program to increase handwashing with soap. World Bank WSP http://siteresources.worldbank.org/INTWSS/Publications/20389151/HandwashingHandbook.pdf

8. Hygiene education

Key messages

Hygiene promotion is not the same as hygiene education:

Educating people about germs and how they are transmitted will not per se motivate people to change their behaviour.

Wherever possible hygiene promotion programmes should aim to communicate some basic understanding of infectious disease, how it is caused and how it is spread i.e the chain of infection:

- Simple demonstrations using e.g. fluorescent powder to show how infections are spread e.g. via hands to food following toilet visits can be very effective in motivating behaviour change

- Wherever possible hygiene education should be included as part of “secondary school education”. This should be a follow up to “primary school training” in basic hygiene practices, such as handwashing after toilet visits and before eating food.

8. HYGIENE EDUCATION

Community workers/teachers notes

Hygiene promotion is not the same as hygiene education

In devising a hygiene promotion programme it is important to decide to what extent it should be “rule–based” (i.e “key messages”) and to what extent it is appropriate to communicate some basic understanding of infectious disease, how it is caused and how it is spread.

Opinions differ as to whether, and to what extent, hygiene promotion should include education on the germ theory of disease and the routes of transmission of infection. A number of factors need to be borne in mind:

- Traditional school-based teaching is of little value to hard-pressed mothers who have other priorities for their time and energy
- Fear of germs and diseases is rarely a strong enough motivation to change domestic practices
- Communities often have their own explanations of the causes of infectious diseases and will reject messages which contradict these views.

The extent to which it may be possible to educate the community about infectious diseases will depend on educational standards and other factors. In some communities it may be appropriate to explain about bacteria viruses etc as agents of disease. In others it may only be appropriate to introduce the concept of “an infectious agent” which is spread. Experience is showing that simple demonstrations using a dye or pigment to show how infections can be spread e.g. via the hands to food following toilet visits can be very effective in motivating behaviour change. Even more effective for visualising the invisible spread of infections is by the use of commercially-available fluorescent dye products (e.g. “glogerm”) which are only visible under UV light. They can be used in participatory sessions to demonstrate the invisible spread of disease from e.g. the hands to food. You can coat an object (e.g. a raw food or toilet paper) with the powder and then ask the person to touch the object and then touch a door handle or handle other foods, or even prepare a meal in the normal way. You can then pass the UV light over the area to show how the hands and other surfaces have become contaminated without their knowledge. The UV training aid can also be used to test the effectiveness of hygiene procedures such as handwashing.

Hygiene education in its true sense (i.e understanding germs and germ transmission) is probably most appropriate as part of the “secondary” school education. In primary school, the priority is to promote the basic hygiene practices, such as handwashing after toilet visits and before eating food. In secondary schools, broader hygiene education should be included to “educate” children - as the “future adults” in the community who will eventually become responsible for raising a healthy family.

Some participatory exercises to develop understanding of hygiene are described in the following page.

8. PARTICIPATORY EXERCISES TO DEVELOP UNDERSTANDING OF HOME HYGIENE

Community workers/teachers notes

Face-to-face discussion and/or participatory approaches can be highly effective in encouraging behaviour change.

A participatory approach to help community workers develop water, sanitation and hygiene promotion projects in unserved communities is described in “A participatory approach for the control of Diarrhoeal diseases. PHAST step by step guide.” 1998 World Health Organisation www.who.int/water_sanitation_health/hygiene/envsan/phast/en/

A number of other groups exercises can be used to develop understanding of hygiene.

Exercise 1

Work with the person or group to select a typical contaminated source in the home. This could be a *Salmonella*-contaminated chicken, a person with an infection such as a cold or diarrhoea and vomiting, or a kitten with *Campylobacter*. Ask the person/group to work out for themselves how the germs are most likely to spread from the specified source and cause infection to someone in the home. Next, get them to think critically about whether their current practices are likely to prevent that spread, which actions are the most important, and whether and how they could do better.

Exercise 2

Check understanding by asking the person or group to consider a specific procedure such as hand washing or hygienically cleaning a chopping board. Ask them to tell you and/or demonstrate;

- when/in what situations the procedure is necessary
- where the germs are likely to have come from in that situation
- what sort of germs are most likely to be present
- what hygienic cleaning process should be chosen in that situation and why
- how to do it properly
- what factors could cause the procedure to fail
- what will happen to the germs during the hygiene process.

Exercise 3

One of the problems you face as a community worker (or trainer) is persuading people that when it comes to preventing transmission of infection what is ‘visibly clean’ is not necessarily ‘hygienically clean’. Many trainers find it useful to use commercially-available fluorescent dye products which are visible only under UV light (e.g. “glogerm") to help them visualise the spread of invisible germs. You can coat an object with the powder and then ask someone to handle the object in the normal way. You can then pass the UV light over the object and its environment to see which other objects and sites have become contaminated during handling. Another exercise involves coating a surface or object with the powder or paint and asking someone to clean the item in the normal way. The UV light can be used to see how well the surface or object was cleaned. The UV training aid can also be used to test the effectiveness of hand washing. If fluorescent dye is not available, you can use a paint or pigment to show how germs are spread.

Appendices

Appendix 1. Infectious diseases related to water, sanitation and hygiene

Infectious diseases related to water, sanitation and hygiene which are prevalent in developing countries are numerous and include those caused by micro- organisms (bacteria, viruses, fungi & protozoa), parasitic worms (helminths), and other organisms such as mites which cause scabies. This appendix shows how infectious diseases can have different routes of spread. This means that it is very important that the hygiene practices you target are the ones that are important for the diseases you want to control. This information is summarised for quick reference in Appendix 3

1.1 Intestinal infections and infestations

The many intestinal infections are difficult to classify. A classification, developed by the World Bank is shown in Appendix 2. Almost all these diseases are relevant in developing countries.

1.1.1 Diarrhoea-causing infections and enteric fevers

Diarrhoeal diseases are caused by a variety of bacteria, viruses and protozoa (see Appendix 2, Table 1). The organisms are shed in large numbers in the faeces of an infected person. In developing countries, viruses are increasingly recognised as a cause of diarrhoeal disease and diseases range from the trivial to the serious or even fatal. All of these organisms are transmitted via the faecal-oral route (i.e from the faeces of an infected person or animal, to the mouth of another person). Although improvements in excreta disposal have a significant impact in preventing transmission, the impact on disease prevalence can vary since some infections can also spread very easily from person-to-person. For bacterial diseases, faecal:oral routes with longer transmission cycles are also possible, such as contamination of crops or water sources with faecal material. Some species e.g. *Campylobacter, Salmonella* and *Yersinia* spp. are also passed in the faeces of animals and birds. Since these pathogens are also prevalent in affluent communities in Europe and North America which have high standards of sanitary facilities, this suggests that they may not be greatly influenced by sanitation improvements.

It is estimated that 1g of faeces may contain up to 10 million virus particles or 1 million bacterial cells. The infectious dose (i.e the number of bacterial cells or virus particules required to produce infection) can be very low for some pathogens such as Campylobacter and noroviruses (as little as 10-100 cells or particles), but higher for others (e.g. the infectious dose for Salmonella in adults may be as high as 1 million cells).

1.1.2. Poliomyelitis and Hepatitis A viruses

Poliomyelitis and hepatitis A have several epidemiological features in common with other enteric pathogens. Transmission is via the faecal-oral route and infective doses are probably low.

1.1.3. Helminths which are soil-transmitted

This includes worms such as the hookworms, *Ascaris* and *Trichuris*. Adult worms of *Ascaris* and *Trichuris* live in the human intestine, and eggs or larvae are
passed in faeces (or via the anus). Eggs must remain in a suitable environment (usually warm, moist soil) for 5-6 weeks before they become infectious. Infection results from ingesting food or dirt contaminated by infective eggs. Hookworms eggs also develop in warm, moist soil. After a week or so, larvae are formed that cause reinfection by penetrating unbroken skin, usually of the foot. Since hookworm eggs are not immediately infective, personal cleanliness has little effect, but measures that avoid faecal contamination of the floor, yard or fields will limit transmission. Since hookworm eggs can survive for months in soil, adequate treatment of excreta is essentially if it is to be used as fertilizer.

1.1.4. Helminths with intermediate stages in the pig or cow

The adult form of beef tapeworms (Taenia saginata) and pork tapeworms (T.solium) live in the human intestine. Eggs are passed in faeces, usually contained in worm segments, and must be ingested by cattle or pigs where they form cysts in muscles and other sites. Humans are reinfected by eating cysts in raw or undercooked meat. Transmission is prevented by safe disposal of human excreta to prevent access from cattle's or pigs, and adequate treatment of nightsoil prior to use as fertiliser.

1.1.5. Helminths with aquatic intermediate hosts

Helminths which infect humans only after passing through developmental stages in one or more aquatic hosts include shistosomiasis (*Schistosoma mansoni* and *S.haematobium*) which are of major public health importance in many African countries, some areas of Middle East and China. The worms are passed in excreta and must then pass a stage in the body of an aquatic host, usually a snail. They then reinfect humans through the skin. Appropriate excreta disposal methods can help to control them by preventing untreated excreta from reaching water in which the aquatic hosts live. However, in all cases except Schistosoma mansoni and S.haematobium, animal faeces are also a source of infection, control which means that measures restricted to safe human excreta disposal have only a partial effect. Since one egg can multiply in the snail host to produce a thousand larvae, a low level of faecal contamination in water may still be enough to maintain transmission and infection can occur when insufficiently cooked fish, crabs, crayfish or aquatic vegetation are eaten.

1.2 Guinea worm

Guinea worm (*Dracunculus medinensis*) is a species of worm that also requires an aquatic intermediate host. Infection is always by ingestion of contaminated water, but the organism is not excreted in faeces. Worms mature in human tissues and migrate to lie subcutaneously in a limb. Numerous larvae develop within the body of the worm, inducing a blister in the skin, which breaks down. Larvae are discharged when water is sensed by the worm. The life cycle continues if larvae reach water-containing copepods Cyclops, which eat the larvae. Development of the larvae takes place in the body of the Cyclops which are infective to humans if ingested. Guinea worm is a unique water-related infection because it can be eradicated solely by community water supply improvements.

1.3. Infections transmitted by Water-Related Insects

A large group of infections, several of them of major international public health importance, are transmitted by flies or mosquitoes which breed in water or bite near water.

1.3.1 Malaria

Malaria is one of the most serious and widespread diseases of our time. It is caused by various species of the protozoan Plasmodium and is transmitted by various species of the mosquito Anopheles. Reduction of Anopheles breeding sites requires detailed knowledge of the ecology of the vector species in the given location. Domestic water supply projects are unlikely to reduce the number of breeding sites. In some arid areas malaria transmission is seasonal, occurring only when the rains create suitable breeding sites. In such areas it is possible that inadequate control of waste and rain water could prolong the period of malaria transmission into the dry season.

1.3.2 Yellow Fever and Dengue

Yellow fever and dengue are caused by viruses transmitted, mainly in urban areas, from human to human by the mosquito Aedes aegypti. A.aegypti is a peridomestic mosquito that can breed even in small volumes of rainwater or piped water. Favourite sites include jars, cans, gutters, cisterns, coconut shell and car tyres. A water supply and sanitation scheme that provides good drainage and reduces the need to store water may reduce breeding, although rainwater sites will be unaffected.

1.3.3 Bancroftian filariasis

Bancroftian filariasis is a mosquito-borne helminth infection which is prevalent on the East Africa coast, in northeast Africa, the Middle East, Asia and Latin America. It is transmitted mainly by members of the Culex pipiens family (particularly by Culex guinquefasciatus). The mosquito is a major nocturnal nuisance in tropical cities and can breed in highly polluted waters. In town and cities where the piped water supply is increased in the absence of adequate sewerage, drainage and sullage disposal, stagnant and polluted bodies of water are created which increase breeding opportunities for Culex spp. Poorly maintained septic tanks, cesspools and flooded pit latrines also tend to proliferate in rapidly growing tropical cities and have the same effect. Transmission of Wuchereria bancrofti with its clinical consequences (elephantiasis and hydrocele) is most frequently seen in lower age groups. Sanitation and waste-water disposal schemes are key to prevention of this disease.

1.4. Skin, eye and louse-borne infections

Skin infections are extremely common and varied in the tropics. Infections are transmitted in conditions of poor personal cleanliness. Superficial fungal infection, skin sepsis and ulcers are caused by a variety of bacterial and a wide range of fungal species. Scabies is caused by a species of mite (*Sarcoptes scabiei*); in some regions the prevalence of scabies exceeds 50% among school children. *Staphylococcus aureus* is a bacterium which causes skin infections (abscesses, impetigo) and eye infections (sticky eye, styes). Transmission of skin infections is by close contact (skin-to-skin) or via clothing or bed linen. In recent years there have been marked increases in serious infections caused by fungi previously regarded as non-pathogenic. These generally occur in people with impaired host defences secondary to underlying diseases such as AIDS, or who are undergoing immuno-suppressive therapy, or have damaged skin surface. Because these fungi take advantage of the host-debilitating conditions, they are called opportunistic mycoses. Examples include *Candida albicans* (oral and vaginal thrush) and *Aspergillus fumigatus* (respiratory disease).

Eye infections are a major problem in developing countries. Most serious of the common infections is trachoma (caused by the bacterium *Chlamydium trachomatis*), which is particularly prevalent in arid areas of India and elsewhere. Trachoma often leads to impaired vision and sometimes blindness. Various forms of conjunctivitis (especially acute bacteria) are also very common. Transmission is by direct eye- to-eye transfer of infective discharge by fingers, clothing or flies. Diseases transmitted by body lice (louse-borne typhus (*Rickettsia prowazeki*) and louse-borne relapsing fever (*Borrelia recurrentis*)) can be reduced by controlling louse population, and regular body and clothes washing.

1.5. Respiratory infections

The common cold is a viral infection of the upper respiratory tract that affects all age groups, which can be caused by up to 200 different viruses. Over 50% of common colds are caused by rhinoviruses; other causative viruses include coronaviruses, parainfluenza virus and respiratory syncytial virus. Common cold viruses are transmitted by inhaling virus particles from the air, but can be transmitted by touching respiratory secretions on a person's skin (e.g. when shaking hands) or on environmental surfaces (e.g. doorknobs) and then by touching the eye, nose or mouth. There is evidence that poor hygiene is a factor in the tranmsission of the SARS virus.

There are three types of influenza viruses: A, B and C. Type A constantly changes with new strains appearing regularly and is usually responsible for the large epidemics. Influenza can spread from person to person by direct contact due to sneezing and coughing. It can also be spread via hands by contact with objects that an infected person has contaminated with infectious nose and throat secretions. However, because the influenza-virus is more fragile than e.g. rhinovirus, this route of transmission may be less important than for common colds. Hygiene also plays a part in preventing tranmsission of Tuberculosis.

Legionella pneumophila is a bacterium which normally resides in conditions in the home and peri-domestic environment where stagnant water collects. It can cause infection of the respiratory tract (legionnaires disease) if the organism is inhaled. Aerosolisation of water droplets contaminated with Legionella can occur with poorly maintained showers or air-conditioning systems.

Further Reading

Medical Microbiology PR Murray WL Drew, GS Kobayashi, JH Thompson (1990) Wolfe Puiblishing Ltd., London, England.

Appendix 2 - Transmission routes for infectious diseases

In module 1 we tried to visualise infectious disease transmission and the role of hygiene from the viewpoint of the family and the range of problems they face in protecting themselves from disease. This approach would seem the most appropriate to this training resource. We showed that for an infection to occur, there must always be a source of that infection and a route of spread or tranmsission. Visualising the transmission of microbes and helminths however can be difficult for a number of reasons:

- In some situations an agent may be a source of germs, and in others it may be the means of spread e.g. an infected person is a source of germs, whilst their hands can spread infection from a source (e.g. contaminated food to another person) without them becoming infected.
- The routes of transmission vary for different organisms. Whist some agents are transmitted by fairly specific routes, others may be transmitted via a variety of routes. In particular the classifications of diseases as water and excreta related are overlapping. All excreta-related infections are also water related except for the hook-worm Strongyloides, and beef and pork tapeworms. Whilst many water-related infections are also excreta related some (e.g. skin infections, trachoma, Guinea worm and malaria) are not. Water-borne disease can be transmitted by any faecal:oral route that permits faecal material to pass into the mouth. Thus, cholera may be spread via contaminated food as well as contaminated water.

In order to formulate prevention strategies policy makers usually prefer to categorise infections according to their route of transmission. In this appendix, water and excreta-related infections are classified into groups according epidemiological features, in order to highlight their amenability to prevention through interventions in water supply, excreta disposal, or hygienic behaviour.

2.1 Excreta-Related Infections

Infections related to human excreta (urine and faeces) are summarised in Table 1. There are 2 possible transmission mechanisms for excreta-related pathogens:

2.1.1 Transmission via infected excreta

The pathogen is released into the environment in the faeces or urine of an infected individual. It is estimated that 1g of faeces may contain up to 10 million virus particles, 1 million bacterial cells or 1000 parasitic eggs. Transmission can then occur via a variety of routes including faecal:oral routes involves water, food, hands and other surfaces, insects, soil, etc. The infectious dose (i.e the number of bacterial cells or virus particles required to produce infection can be very low for some pathogens such as Campylobacter and noroviruses (as little as 10-100 cells or particles), but higher for others (e.g. the ID for Salmonella in adults may be as high as 1 million cells.

2.1.2 Transmission by an insect vector

- Insects such as flies and cockroaches that visit excreta or faecally polluted sites to breed or feed can mechanically carry excreted pathogens to food on their bodies and in their intestinal tracts. The extent of their importance in spreading excreted pathogens in uncertain.
- Bancroftian filariasis, is transmitted by members of the Culex pipiens group of mosquitoes (especially by C.quinquefasciatus) that breed in sewage and other heavily polluted waters for instance in septic tanks and flooded pit latrines.

The routes of tranmsission of excreta-related pathogens is summarised in Table 1

2. 2 Control of Excreta-Related Infections

The methods used in the control of the different categories of exctreta-related pathogns are summarised in Table 1. It is essential that people of all ages use toilets or latrines wherever these are available, and keep them clean. Otherwise faeces should be buried immediately, and not left lying around. For most of these diseases an improved excreta disposal is only one of several control measures. Disposal of children's excreta is just as important as that of adults. Studies in the past have often failed to detect beneficial effects from improved sanitation because, although latrines were built, they were not kept clean and were not used by children, or by adults when working in the fields. It is generally thought that safe excreta disposal cannot have significant impact in control of excreta- related infection without simultaneous improvement in hygiene behavior in respect of hand washing, water and food handling and storage etc.

2.3 Water Related Infections

There are 2 major groups of water-related diseases. The first group are water-related infectious diseases which are some of the greatest causes of diseases and death. The second group includes diseases caused by chemical substances, such as fluorosis (linked to high fluoride levels in drinking water) and infantile methemoglobinemia (related to high nitrate levels in drinking water). While toxic chemicals in drinking water are a major public health concern in some countries (e.g. contamination of water with arsenic in Bangladesh), the focus of this resource is on strategies for preventing the spread of infectious diseases. Further information on chemical-related diseases can be obtained from?

In most or all developing countries, chemical-related diseases are overwhelmingly overshadowed by the water-related infections, but some of them are slowly gaining importance in countries such as India, particularly due to industrial developments. In this section only water related infections will be discussed. Table 2 summarises the four water-related transmission routes and links them to their appropriate preventive strategies. These transmission routes include

2.3.1 Water-borne route

Water-borne, transmission occurs when the pathogen is in water that is drunk by a person or animal. Water-borne diseases include infections, notably cholera and typhoid, but also a wide range of other diseases, such as infectious hepatitis, and some diarrhoeas and dysenteries. Note: the term water-borne disease is often misused so that it has become almost synonymous with water-related disease.

2.3.2 Water-washed route

There are many infections of the intestinal tract and of the skin that especially in the tropics may be significantly reduced following improvements in the domestic and personal hygiene. These are infections which can be transmitted via surfaces such as the hands or other parts of the body, and via surfaces such as hand and food contact surfaces. Preventing disease transmission via this route depends on the use of water for hygiene purposes. The means that the incidence of water-washed diseases may be reduced following an increase in the volume of water available and/or used for hygiene purposes irrespective of the quality of that water. Water-washed diseases are of three main types:

- Diarrhoeal diseases such as cholera, bacillary dysentery which are excreted in the faeces of an infected person.
- Infections of the skin or eyes include bacterial infections (including trachoma), and fungal infections. These infections are related to poor personal hygiene (infrequent bathing)
- Infections carried by lice or mites e.g. louse-borne relapsing fever. For these infection good hygiene is important for reducing the probability of infestation since body lice cannot persist on people who regularly bath themselves and launder their underclothes.

2.3.3 Water based route

Water based diseases, such as shistosomiasis and Guinea worm, are those in which the pathogen spends part of its lifecycle in water and depend on aquatic intermediate hosts to complete their life-cycle. Since the degree of sickness depends upon the number of worms that infect, control is measured in terms of the intensity of infection as well as the number of people infected.

2.3.4 Insect vector route

The fourth route is via insects that either breed in water or bite near water. Malaria, yellow fever, dengue and onchocerciasis (river blindness). For example are transmitted by insects that breed in water whereas West African trypanosomiasis (Gambian sleeping sickness) is transmitted by the reverine tsetse fly (Glossina app) which bites near water.

Table – 1 Routes of transmission of Excreta-Related Infections and preventive strategies

	Category	Infection	Pathogenic Agent	Dominant transmission focus	Major control measures
1	Faecal-oral (nonbacterial) (Nonlatent, low infectious dose)	Poliomyelitis Hepatitis A Rotavirus diarrhoea Amoebic dysentery Giardiasis Balantidiasis Enterobiasis	V V V P P P H H	Person to person contact Domestic contamination	Domestic water supply Improved hygiene Provision of toilets Health education Personal Hygiene Hand Washing
2	Faecal-oral (bacterial) (Nonlatent, medium or high Infectious dose, moderately persistent and able to multiply)	Campylobacter enteritis Cholera *E.coli* diarrhoea Salmonellosis Shigelloslis Yersiniosis Enteric fevers Typhoid Paratyphoid	B B B B B B B B B	Person to person contact Domestic contamination Water contamination Crop Contamination	Domestic water supply Improved housing Improved home hygiene Provision of toilets Excreta treatment prior to reuse or discharge Improved personal hygiene, handwashing
3	Soil-transmitted helminths (Latent and persistent with no intermediate host)	Ascariasis Trichuriasis Hookworm Strongloidiasis	H H H H	Yard contamination Ground contamination in communal defecation area Crop contamination	Provision of toilets with clean floors (hookworm) Excreta treatment prior to land application
4	Beef and pork tapeworms (Latent and persistent with cow or pig intermediate host)	Taeniasis	H	Yard contamination Field contamination Fodder contamination	Provision of toilets Excreta treatment prior to land application Cooking and meat inspection, food hygiene
5	Water based helminths (Latent and persistent with aquatic intermediate host)	Schistosomiasis Clonorchiasis Diphyllobothriasis Fasciolopsis Paragonimiasis	H H H H H	Water contamination	Provision of toilets Excreta treatment prior to discharge Control of animals harbouring infection Cooking
6	Excreta related insect vectors	Filariasis (transmitted by *Culex pipiens* mosquitoes) Infections in Categories 1-5 may be transmitted by flies and cockroaches	H	Insects breed in various faecally contaminated sites	Identification and elimination of potential breeding sites Peridomestic Hygiene Waste water disposal Use of mosquito netting

B = bacterium; P = protozoan; H = helminths; V =

Table – 2 Route of transmission of water-related infections and preventive strategies

Transmission route	Preventive Strategy
Water-borne	Improve quality of drinking water Prevent casual use of other unimproved sources
Water-washed	Increase water quantity used Improve accessibility and reliability of domestic water supply Improve hygiene (Domestic & Personal Hygiene)
Water-based	Decrease need for contact with infected water Control snail populations (a) Reduce contamination of surface water by excreta (b)
Water-related insect vector	Improve surface water management Destroy breeding sites of insects Decrease need to visit breeding sites Use mosquito netting } Peridomestic Hygiene

(a) Applies to schistomiasis only,
(b) The preventive strategies appropriate to the water based worms depend upon the precise life cycle of each.

Appendix 3 - Understanding your community environment - What infections are you aiming to control?

Infectious diseases have different routes of spread. Make sure that the hygiene practices you target are the ones which are important for the diseases you want to control.

Infections	**Relative importance of different control measures for preventing spread of different infections**					
	Water quality	Water availabilit	Excreta disposal	Personal & domestic cleanliness	Wastewater disposal	Food hygiene
1. Diarrhoeal diseases and enteric fevers						
Viral agents	2	3	2	3	0	2
Bacterial agents	3	3	2	3	0	3
Protozoal agents	1	3	2	3	0	2
2. Poliomyelitis and hepatitis A						
	1	3	2	3	0	1
3. Respiratory infections						
	0	2	2	2	0	0
4. Helminth infections						
Ascaris and trichuris	0	1	3	1	1	2
Hookworm	0	1	3	1	1	2
Tapeworm	0	1	3	0	0	3
5. Helminths with intermediate hosts						
Shistosomiasis etc	0	0	3	0	0	3
Guinea worm	3	0	0	0	0	0
6. Skin, eye and louse-borne infections						
Trachoma, conjunctivitis & scabies	0	3	0	3	0	0
7. Infections spread by water-related insects						
Malaria	0	0	0	0	1	0
Yellow & dengue fevers	0	0	0	0	1	0
Bancroftian filariasis	0	0	3	0	3	0
0 = no importance; 0 = little importance 2 = moderate importance; 3 = great importance						

(*) Richard Feachem, London School of Hygiene & Tropical Medicine

Appendix 4 - Chemical Disinfectants explained

Introduction

In situations (times and places) where there is a risk, hygienic cleaning should be applied to get rid of as many germs as possible and thus prevent them from being spread. A hygienically clean surface can be achieved either by:

- Removing as many germs as possible from the surface (by thorough cleaning using a detergent followed by rinsing) or
- Or by killing them *in situ* by a disinfection process
- In some cases, a combination of the two approaches is used.

Note: Hygienic cleaning thus does not always mean killing germs. It can be achieved by removal of germs using detergent or soap and warm or hot water. However, for risk surfaces that cannot be properly rinsed (e.g. fixed kitchen surfaces, taps, toilet flush handles, door handles and nappy changing surfaces) or surfaces such as cloths, where the germs become too firmly attached, the appropriate means to achieve hygienic cleaning is by cleaning followed by, or accompanied by, a disinfection process.

Indications are that disinfectants can also achieve a higher level of risk reduction compared to that achieved by soap or detergent-based cleaning and rinsing, and thus may be advisable in situations where there is more risk. In the following module we outline the types of chemical disinfectant products which are available and give guidance on how to select and use the correct product in different situations.

Note: disinfection of drinking water is dealt with in module 4.

Questions and answers

Q: What are chemical disinfectants?
A: They are products that kill germs (harmful bacteria, fungi viruses etc.).

Q: How do I know if the product I am using is a disinfectant?
A: Read the label carefully, if it is a disinfectant the label will say “disinfectant” and/or “kills” germs or bacteria etc. Note that some commercial products, e.g. bleaches, say that they kill germs but are not actually labelled as “disinfectants”.

Q: Do all disinfectants kill all types of germs?
A: No, so again read the label to check that the product will kill the type or types of germs (bacteria, fungi and/or viruses) which may be present All disinfectants kill bacteria (called bactericidal). Some will also kill fungi (fungicidal), bacterial spores (sporicidal) and/or viruses(virucidal).

Q: What is an antibacterial product?

A: "Antibacterial" means that the product acts against bacteria in some unspecified way. Some products labelled "antibacterial" will kill bacteria whilst others may only prevent them multiplying. So its important to check that the product states that it "kills bacteria". An antibacterial is not necessarily anti-fungal or anti-viral too.

Q: What is a "biocide"?

A: Biocide is a broad term for a substance that kills, inactivates or otherwise controls certain living organisms. It includes antiseptics and disinfectants, which combat micro-organisms, and also includes pesticides.

Q: When do I need to use a disinfectant?

A: The table in Module 5 (*Targeted Hygiene – Reducing the Risks*) can help you to decide when you need to use a chemical disinfectant or when cleaning or using a heating method is recommended.

Q: There are so many products to choose from, how can I choose the right disinfectant?

A: Different disinfectant products use a variety of active ingredients and are suited to different situations. When selecting a product, decide what are the key properties you need from the product. For example, think about what type of germs you need to combat, what type of surface or material you need to disinfect, whether you are dealing with small or large areas, whether the surface is going to be used for food preparation. You may also feel that the scent of the product is important. Many disinfecting products are either bleach-based (either chlorine or oxygen) or alcohol-based. Other products contain a variety of active ingredients (e.g. phenol, benzalkonium chloride, chlorhexidine, triclosan, pine oil) and so their properties vary. This means that you will need to check the product packaging and/or manufacturer's instructions for the active ingredients and other information on its properties and limitations.

Use the checklist and table below to help you choose the best disinfectant for a particular purpose by asking 'What properties do I need?' and comparing it with 'What properties does the disinfectant have?' If this information is not available contact the product manufacturer.

Q: What is the checklist to consider when choosing and using a disinfectant?

A: Disinfectants will only kill enough germs make the surface safe if used at the right concentration and for the right contact time. At lower concentrations the product may kill, or prevent growth of, some microbes, but will probably not enough to achieve "disinfection". Some disinfectants need to be diluted, while others (e.g. alcohol-based products) do not. The choice of disinfectant and the concentration and contact time will depend on what you want to achieve and the conditions under which the disinfectant must work.

The following are the most important factors you need to consider:

a) The type of germs

Some disinfectants are active against all types of germs (bacteria, viruses, fungi etc) whilst some are only active against bacteria. Make sure that you choose a product that has the right "spectrum" of action.

b) If soiled

If the surface, or object, that is being disinfected is soiled with dirt, food, faeces, pus, blood etc the disinfectant will be less effective. This means you should either clean the surface (or object) before applying the disinfectant, or you may use a combined disinfectant cleaner. You may also need to use a higher disinfectant concentration, so follow manufacturer's instructions. In situations where surfaces are heavily soiled e.g. with vomit and faeces, then you must remove as much of the "soil" as possible before disinfecting. In doing this make sure you wear gloves, use disposable cloths and dispose of the contaminated materials carefully

c) Concentration and contact time

Some disinfectants will kill germs quickly; others need longer. Some types of germs, e.g. bacterial or fungal spores, take longer to kill. So, again, read the label and leave the disinfectant on the surface for the right length of time.

d) Hard water

Some disinfectants are affected if they are diluted in hard water. In general however disinfectant products are tested to ensure that they are effective in hard water areas.

e) Presence of detergent or soap

Some types of detergents or soap inactivate some disinfectants. If you are using a combined disinfectant cleaner, make sure you use a commercially formulated product, don't make up your own disinfectant/cleaner mixture. If you are going to clean and then disinfect, rinse the surface to remove traces of detergent, before applying the disinfectant.

f) Type of surface material

Make sure that the disinfectant is suitable for the surface you need to disinfect. Some disinfectants have a bleaching action or can damage certain types of surfaces. Some disinfectants are not safe for use on the skin.

Q: How long will the disinfectant action last

A; That depends. If a surface is dry it will stay "hygienic" until reused, or recontaminated. If a surface is damp (e.g. a damp cloth) then the small number of microbes not killed by the disinfectant can grow again within a few hours. This is why targeted hygiene means hygienic cleaning of surfaces, cloths etc at the right time, i.e. wash your hands not only **after** visiting the toilet or handling raw meat or poultry, but also **before** handling ready to eat food.

Q: What is a descalent?

A: It is a product that removes lime-scale. Some products can also prevent the build up of lime-scale if used regularly. Some cleaning or disinfecting products may also include a descaling ingredient.

Q: How do I know which laundry washing powders or tablets contain bleach?

A: Bleach-based laundry products are either powders (biological or non-biological) or solid tablets. The term 'oxygen based bleaching agent' should be listed in the ingredients list on the packaging. Liquid laundry products and liquid capsules, or products designed for coloured clothes (colour care products) do not contain bleach.

Q: How do I know that the product will be effective?

A: All disinfectants should comply with standard tests for efficacy. European Standards include tests for bactericidal activity (**EN 1276 and EN 13697**) fungicidal activity (**EN 1650 and EN 13697**), sporicidal activity (**EN 13704**) and virucidal activity (EN 13610). Read the label or refer to manufacturers instruction to make sure that the product meets these requirements and can thus produce a satisfactory risk reduction.

When selecting a disinfectant, decide what proporties you need and find the disinfectant which meets your needs

What property do I need	What properties does the product have?			
	Bleach (either chlorine-based e.g. sodium hypochlorite or oxygen-based e.g. hydrogen peroxide)	**Alcohol (ethyl or isopropyl)**	**Phenolics (e.g. Jeyes fluid) and pine fluids**	**Products containing other actives e.g. quaternary ammonium compounds, chlorhexidine, triclosan**
Which types of germs do I need to kill?	Kills all types of bacteria, fungi, viruses and bacterial and fungal spores at the recommended concentration*	Kills bacteria, fungi but only effective against some viruses	Kills bacteria, fungi but only effective against some viruses	Action varies according to concentration; some products are only formulated to prevent growth of germs. Active against bacteria and fungi but tend to have limited action against viruses
How quickly does the product need to act?	Acts very quickly (within 1 minute) but longer contact times are required for spores	Acts quickly (within 1 minute)	Follow the manufacturers instructions	
Are there any soil, dirt or food residues on the surface?	Affected by soiling. If soiling is light, clean and then disinfect or use a combined bleach/cleaner formulation. If heavily soiled always clean before disinfecting	Not effective on dirty surfaces or dirty hands	Efficacy can be reduced in the presence of soiling, so you may need to use higher concentrations. Follow the manufacturers instructions	
How hard is the water?	Not inactivated by hard water	Not relevant – products are used undiluted	Varies, but action may be affected by hard water. Check the manufacturers advice	
What type of surface needs disinfecting?	Suitable for hard surfaces, including food contact surfaces) cloths and white laundry	Suitable for hands and small surfaces e.g. work surfaces thermometers etc	Suitable for all types of hard surfaces, sinks, drains etc. Not suitable for food contact surfaces	Suitable for hands and small surfaces e.g. work surfaces. Some products (e.g. quats) suitable for food contact surfaces
Are there any other possible down sides	Chorine-based bleaches could damage and/or bleach coloured fabrics carpets and soft furnishings and erode metal surfaces	May dry the skin, use one that contains an emollient	Phenolics can have a strong odour. Can be inactivated by detergents may be in other cleaning products	Can be inactivated by detergents that may be in other cleaning products

*For bleach, e.g. chlorine-based, the recommended use concentration can vary from as low as 250ppm (for infant feeding bottles) and up to as much as 10,000ppm (for treating blood) according to how the bleach is to be used and what it is used for. Thus it is very important to follow manufacturers instructions for use.

References

1. Bloomfield, SF. Applying a risk assessment and the targeted approach to home hygiene. British Journal of Infection Control 2002; 3:14-17.

2. Curtis V, Cairncross S. Effect of washing hands with soap on diarrhoea risk in the community: a systematic review. Lancet Infect Dis 2003; 3:275–81.

1. Clasen TF, Cairncross S. Household water management: refining the dominant paradigm. Tropical Medicine and International Health. 2004: 9,187-191.

2. Fewtrell L, Kauffman RB, Kay D, Enanoria W, Haller L, Colford JM. Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis. Lancet Infectious Diseases 2005; 5: 42-52.

3. Luby SP, Agboatwalla M, Fahin DR, Painter M, Arshed A, Hoekstra RM. Effect of handwashing on child health: a randomised controlled trial. Lancet 2005; 366:225-233.

Further Reading

General

1. Beumer R, Bloomfield SF, Exner M, Fara GM Nath KJ and Scott E. The infection potential in the domestic setting and the role of hygiene practice in reducing infection. 2002, http://www.ifh-homehygiene.org/2public/INFPOT2.pdf

2. Beumer R, Bloomfield SF, Exner M, Fara GM, Nath KJ and Scott E. Hygiene procedures in the home and their effectiveness: A review of the scientific evidence base. 2002. http://www.ifh-homehygiene.org/2public/hygprocevbasefinal2.pdf

Household water treatment and safe storage

1. Bloomfield SF, Nath KJ, Jones M. Household water storage, handling and point-of-use treatment. A review commissioned by the IFH. 2006. http://www.ifh-homehygiene.org/2003/2library/low_res_water_paper.pdf

2. Managing water in the home: accelerated gains from improved water supply. 2002 World Health Organization, Geneva: WHO/SDE/WSH/02.07

Guidelines, practical manuals and other hygiene promotion materials

There are a number of practical manuals which give detailed guidance on designing and actioning hygiene promotion programmes in deprived communities:

IFH Guidelines and training resource

1. Guidelines for prevention of infection and cross infection the domestic environment: focus on issues in developing countries http://www.ifh-homehygiene.org/2003/2public/IFH-Guidelines%202002_last.pdf

2. Recommendations for selection of suitable hygiene procedures for use in the domestic environment. http://www.ifh-homehygiene.org/2public/2pub04.htm

3. Home Hygiene - prevention of infection at home: a training resource for carers and their trainers http://www.ifh-homehygiene.org/2003/2public/2pub06.asp

Hygiene promotion

1. Water Supply and Sanitation Collaborative Council. Sanitation and Hygiene Promotion: programming guidance. 2005. http://www.wsscc.org/dataweb.cfm?code=586/

2. UNICEF Water, Environment and Sanitation Technical Series. Towards better programming: a manual on hygiene promotion 1999. http://www.unicef.org/wes/files/hman.pdf

3. World Health Organisation. A participatory approach for the control of diarrhoeal diseases. PHAST step by step guide. 1998. http://www.who.int/water_sanitation_health/hygiene/envsan/phast/en/

4. Sutton S and Nkoloma H. Encouraging Change; sustainable steps in water supply sanitation and hygiene. 2003. TALC, PO Box 40, St Albans, Herts AL1 5TX. (Talc@talcuk.org)

Handwashing

1. World Bank WSP. The handwashing handbook: a guide for developing a hygiene promotion program to increase handwashing with soap. http://siteresources.worldbank.org/INTWSS/Publications/20389151/HandwashingHandbook.pdf

1. ***Food Hygiene***

1. Food Safety department, WHO, Geneva. Bringing food safety home. How to use the “WHO 5 keys to safer food” to create effective food safety training for specific target audiences. 2006. http://www.who.int/foodsafety/consumer/en

Household water treatment and safe storage

1. WHO Geneva. Preventing travellers diarrhoea: how to make drinking water safe. 2005. http://www.who.int/water_sanitation_health/hygiene/envsan/sdwtravel.pdf

Water Supply and Sanitation Collaborative Council (WSSCC)

The Water Supply and Sanitation Collaborative Council (WSSCC) is a global multi-stakeholder partnership and membership organization that works to save lives and improve livelihoods. It does so by enhancing collaboration among sector agencies and professionals who are working to improve access for the 2.5 billion people without safe sanitation and the 780 million people without clean drinking water. Through its work, WSSCC contributes to the broader goals of poverty eradication, health and environmental improvement, gender equality and long-term social and economic development. WSSCC supports coalitions in around 20 countries, members in more than 160 countries, and a Geneva-based Secretariat hosted by the United Nations Office for Project Services (UNOPS).

Water Supply & Sanitation Collaborative Council (WSSCC)
15, Chemin Louis-Dunant
1202 Geneva, Switzerland
Tel: +41 22 560 81 81
Fax: +41 22 560 81 84
www.wsscc.org
www.facebook.com/WatSanCollabCouncil
www.twitter.com/WatSanCollabCou

International Scientific Forum on Home Hygiene (IFH)

The IFH is a non-profit, non-government organisation comprising scientists and healthcare professionals who play an active role in hygiene policy and scientific research. The activities of the IFH are developed in consultation with an advisory board of hygiene experts drawn from Europe, the USA and South Asia. Through its international initiatives the IFH is working to raise awareness of the fundamental role that home hygiene plays in preventing infectious disease, and to promote understanding of good hygiene practice in situations where infection risk exists including food hygiene, general hygiene, personal hygiene and the care of the sick and other "at risk" groups. The IFH is also seeking to promote research into areas of home hygiene which are currently not well understood and facilitate debate and consensus on issues relating to home hygiene.

International Scientific Forum on Home Hygiene (IFH)
Old Dairy Cottage, Woodhouse Lane,
Montacute, Somerset, TA15 6XL, UK
secretariat@ifh-homehygiene.org
www.ifh-homehygiene.org