

LECTURE NOTES

For Health Extension Trainees in Ethiopia

Personal Hygiene



**Ethiopia Public Health
Training Initiative**

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In collaboration with the Ethiopia Public Health Training Initiative, The Carter Center,
the Ethiopia Ministry of Health, and the Ethiopia Ministry of Education

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This material is intended for educational use only by practicing health care workers or students and faculty in a health care field.

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Introduction

Health extension service at household level in the rural is believed to solve the major health problems that can be alleviated with the professionals trained at a level of 10+1 complete. The training of such health extension students is new program to Ethiopia. Due to this there is shortage of teaching/learning materials in the area of personal hygiene for health extension students and teachers.

In this case the preparation of the lecture note on the area will help the students and the teachers for the teaching and learning process which is prepared at their level. Moreover, the lecture note will help the health extension worker as a manual while doing their tasks.

There are not available teaching materials on personal hygiene. The Carter Center EPHTI appreciated the problem and promoted the development of this lecture note that could help as teaching and reference materials for health extension students.

In developing countries like Ethiopia, modern treatment facilities are lacking due to socio-economic constraints. It is estimated that about 80 % of illnesses are caused due to poor environmental and personal hygiene. Promoting good personal hygiene and sanitation is therefore, the preferred option to improve the quality of life at the grass root level.

In this lecture note the importance of keeping personal hygiene is emphasized and the outcome of bad personal hygiene is explained.

This lecture note gives a thorough review of how to keep a personal hygiene at rural settings.

Topics covered in this lecture note are:

- The learning objectives: what students are expected to accomplish upon completion of a particular topic
- Key concepts: Summary of selected key terms included in the lecture note.
- Illustrations: these will aid students to achieve a better understanding of the subject matter.
- Review questions: a cross check to test if students have grasped the concepts stated in the chapter.
- Reference: citation of books and other sources use in developing this lecture note.

Learning Objectives

After the end of this chapter, students will be able to:

- Define different terms related to hygiene
- Explain how to keep the hygiene of different parts of the body and cloth
- Identify the ways of intervention to prevent contamination from environment to human and vice versa.
- Teach the individuals how to protect personal hygiene with the available resource.
- Know where and how to communicate personal hygiene
- Identify the areas where to create behavioral change in our community.
- Identify community values related to personal hygiene.

UNIT ONE

Introduction

Personal hygiene is keeping our body, our teeth, our hair, our clothes and our genital area clean. It is one of the mechanisms used for breaking disease transmission cycles. It also helps the individual to have a good aesthetic value by the people he/she is living with. Moreover, it is a good figure of better living style.

Personal hygiene is therefore, a measure taken at individual level to promote personal cleanliness so that transmission of diseases from source to susceptible hosts is prevented. It can be seen the most effective in protecting the health of communities where treatment options are constraints due to lack of health care delivery systems. Many health problems are due to poor hygiene behavior. The benefits of safe water supply and sanitation efforts in a given community can easily be lost if the communities still carry on with the poor personal hygiene behavior. For instance the source water in a refugee settlement in Eastern Sudan was protected and tested as microbiologically very good. However, during transport on donkeys back the quality has deteriorated by the time it was brought home. Similar water quality deterioration was noted in Jimma town as water was transported from the source to collection pots at home. The same is true for foods that are brought to the market and finally to our

home to prepare our breakfast, lunch or dinner. If community hygiene is not practiced during preparation, storage and service, the food can easily be contaminated and can cause food borne diseases. The water that we drink and the food we eat need to be kept in a sanitary condition and used hygienically. Health extension programs, therefore, should consider carefully the changes in hygiene practices and improve water and sanitation facilities. To achieve these goals, hygiene education plays a central role and has to be applied on a sustainable way.

1.1. The History and development of Hygiene

The concept of hygiene dates back to the time when first man has moved into the caves to protect himself from the forces of nature that acts against his survival. The known religious leaders Prophet Moses and Prophet Mohamed have stated to their followers to wash their body before religious practices and even before meal. This practice is more probably true to other religions and sects of the world.

Our parents even before our school days have taught us the importance of hygiene at a household level and we all are trained to behave in a certain manner so that hygiene is maintained depending on the level of understanding of the community. Therefore, the concept of hygiene as an art is as old as the history of mankind although nowadays it has been recognized as a science of its own.

How do we ensure a change in hygienic behavior in a given community has occurred in the direction desirable to promote healthy life style? The recognition of existing poor hygienic behavior is the first step in developing hygiene education aimed at reducing sanitation related diseases in a particular community. Hygiene education should aim at encouraging the target community to be interested in having cleaner home, cleaner surrounding, cleaner neighborhood and cleaner environment through a greater understanding of why such cleanliness is necessary. It is only when such understanding is growing those sanitation efforts can succeed in making a difference and become sustainable.

1.2. Disease Causation

As indicated at the beginning of this lecture note, the environmental health extension worker should focus on the following areas with respect to health information to better understand the importance of personal hygiene:

- The causative agents
- The mode of transmission
- Early diagnosis and treatment of cases
- Prevention and sanitary control measures

Disease transmission commonly occurs as a result of unhygienic disposal of human and household waste combined with poor hygienic practices. For disease to occur three conditions must be fulfilled:

- Source of infection
- A susceptible host
- Environment

Therefore, the fight against diseases requires:

- Recognition of microscopic forms of life
- Establishing microbes cause a specific disease
- Knowledge of methods of transmission of the disease
- Methods to fight the disease by applying different intervention like personal hygiene.

Exercises

1. What is the importance of personal hygiene? Discuss in brief.
2. How can disease be caused?

UNIT TWO

How Can Personal Hygiene Help In Breaking The Disease Transmission Cycle?

In the figure below (fig 1) emphasis has been shown how contamination from one environment to the other environment like water and to human can happen. On the other side the diagram also shows where to apply a personal hygiene and environmental hygiene to interrupt or cut the vicious cycle for disease causation (*numbered boxes*). The trainees are strongly advised students and instructors to understand and explain the impact of environmental hygiene on personal hygiene and vice versa.

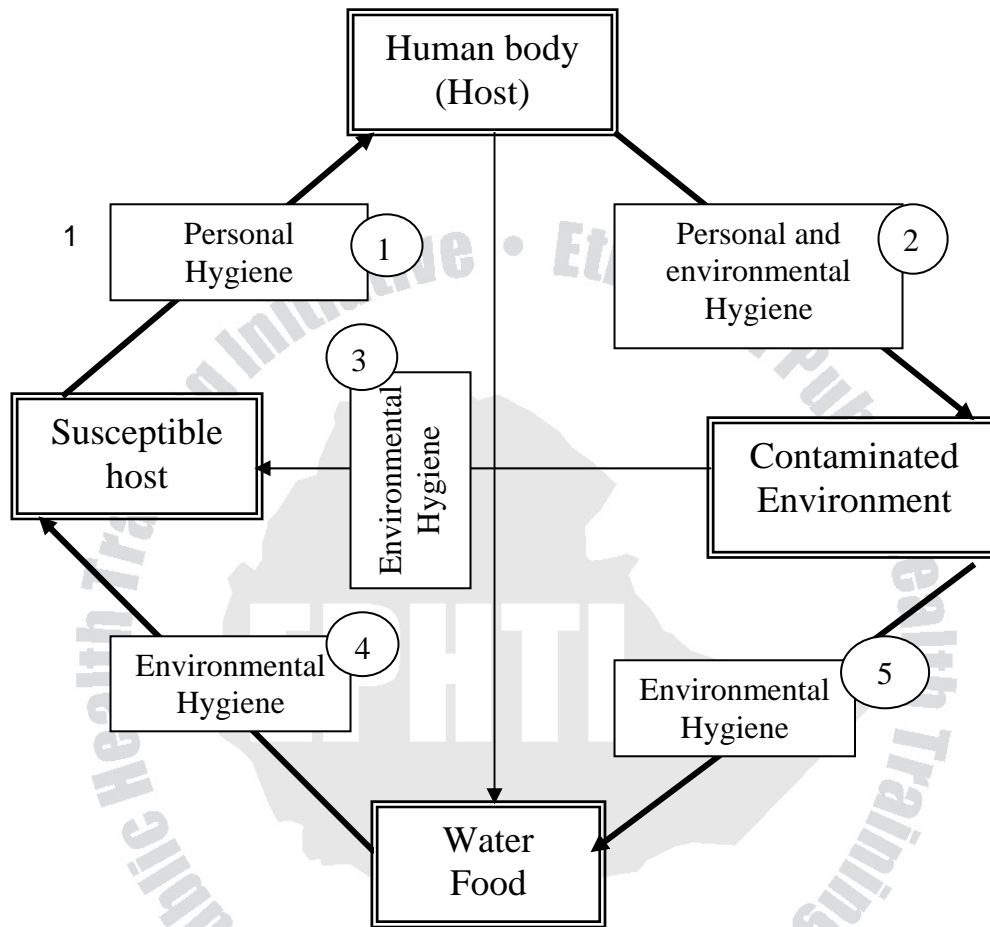


Figure 1. Mode of transmission of disease and contamination from unhygienic person and environment to healthy individual and vice versa.

In the above diagram, intervention number “1” teaches us how personal hygiene can protect the susceptible host (human body). Number “2” indicates keeping personal hygiene can help the

individual to not contaminate the environment and as well as keeping the environmental hygiene helps to not contaminate or affect the hygiene of the susceptible host. Number “3 and 4” also tell us that keeping environmental hygiene will protect the susceptible host from contamination. Intervention number “5” demonstrates how environmental hygiene protects the water from being contaminated by contaminated environment like soil.

Exercises

1. Write four basic fact how hygiene was practiced in old days?
2. Write five major causation of diseases
3. Describe the effect of applying personal and environmental hygiene on breaking disease transmission cycle and explain the relationships to each other.

UNIT THREE

How Does Hygiene And Sanitation Prevents Us From Developing A Disease?

Like any other forms of life, microbes that cause illness require suitable environment to survive, grow and multiply. Hence, when these basic requirements are not met due to cleanliness microbial growth and multiplication is discouraged denying them their chance of causing disease.

To understand the survival of microbes, it's good to see the basic requirements that microbes need to grow which are relevant for personal hygiene.

3.1. Basic requirements of microbial growth

There are four basic requirements for microbes to grow in the environment:

1. **Water:** Like all other forms of life, microbes require water to grow. Ideally a water content of 25-40% is required for optimal growth of microbes in a medium and no microbial activity takes place if the water content is less than 3%. Note, however, that as conditions become drier bacteria can form resistant stages called spores. These spores can germinate into vegetative cells when moisture content is improving. This

tells us that, after we have washed our body, hair and clothes we need to dry it so that the microorganisms will not get favorable moisture to grow.

2. **Temperature:** Depending on the type of species and limits of tolerance, microbes vary in their temperature requirement. For example, soil bacteria grow best at 25°C where as pathogenic bacteria are active at 37°C.
3. **Light:** Microbial growth and multiplication is favored by darkness or dim light. Bright light conditions, on the other hand, discourage growth and multiplication. In fact direct sun rays can kill most bacteria. In this case sunbath and exposing clothes for sunshine will help to have a better personal hygiene.
4. **Oxygen:** Aerobic forms of bacteria require oxygen for survival and multiplication and when this is lacking their growth is inhibited.
5. **Favorable pH:** Pathogenic organisms generally prefer a neutral pH, or pH around 7. A sudden change in pH, either above or below 7 will kill the organism. Applying recommended chemicals, like soap, to clean our body, hair or cloth will help to kill the harbored microbes.

6. **Food:** food is also a growth requirement for microorganisms. They consume many of the foods that we eat. Limiting the amount of food available to a microbial population will limit their growth. For example, through the practice of cleaning and sanitation of plates, equipment, and other measures, one can greatly control the growth of many disease causing and other microbes.
7. **Favorable Osmotic Pressure:** living microbes have a certain saline or salt concentration within their cells. If these organisms are placed in a surrounding environment which contains either more or less salt or sugar than the cell itself, their growth will be inhibited, it is because the cells will get shrink or burst out.

Exercises

1. What do microbes need to grow?

UNIT FOUR

Things To Consider During Hygiene Education

- 4.1 Respect local wisdom:** society has accumulated many useful ideas through generation, some with direct and others indirect benefits
- 4.2 Respect the personality of the trainee:** Usually you are going to deal with people who are older than you and probably with no formal training. They need be respected and approached politely creating a friendly atmosphere
- 4.3 Choose your words of communication:** If the language of communication deteriorates the trainee will take defensive position thus may refuse to take advice
- 4.4 Take the economic status of the community into account:** At present, the housing and life style of rural communities in Ethiopia is substandard. You should frame your hygiene education taking that reality into account.
- 4.5 Respect their culture:** The culture of a given community, no matter we label it as right or wrong, need to be respected. For instance, only men not women due to cultural influences use sanitary facilities in some areas of southern Ethiopia. Deep Wells dug in Sudan were rejected as a source of water supply until a nearby pond was stocked with fishes believing that whenever there is fish the water is good in quality.

Exercise

1. Write the four basic requirements for microbes to grow.
2. Mention 3 things, to consider during hygiene education



UNIT FIVE

Personal Cleanliness

Keeping personal cleanliness costs very little when it is compared with its importance. In this case everybody can practice it at home with the available materials. Personal cleanliness includes; the hygiene of the hand, body, feet, tooth, eye, cloths, genital areas, and the like.

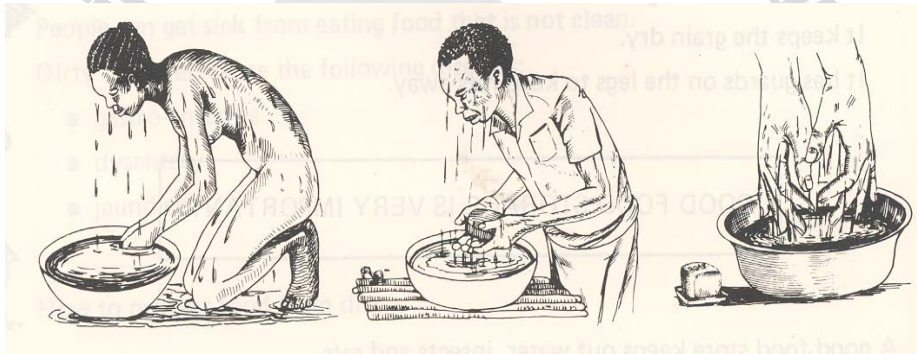


Figure 2. General body, face, and hand cleaning (source: community health worker's manual, 1985)

5.1 The Hand

Ethiopia being located in the tropical region, germs are numerous in:

- Dust
- Dirt
- Most objects we handle everyday

Moreover, the relatively hot and humid climate makes our hands sweat and the oily secretions from the skin form a suitable

environment for germs to grow and multiply. Failure to perform appropriate hand hygiene is considered to be important route for disease transmission because there is always poor compliance even among educated people.

Finger nails, if not properly cleaned and trimmed, are suitable locations for accumulation of dirt and germs.

5.1.1 Consequence of poor hygiene of fingernails

If the hygiene of fingernails are not good it will have the following consequences:

- Skin disease by way of scratching the skin followed by contamination of the normal skin
- Intestinal worms will be harbored in the fingernails and most probably there is a possibility of transfer into the mouth when eating.
- Contamination of food during food preparation: The chance of contracting disease this way is remarkable where hands are often used for preparation and feeding.



Courtesy: photo Worku, 2004

Figure 3. Hand washing before and after toilet visit as well as before food preparation is mandatory personal hygiene.

5.1.2 Hand washing equipment

Like some urban communities of Ethiopia, standard hand washing basins are hardly available due to economic constraints and lack of basic facilities like piped water. But the absence of this facility will not hinder from having appropriate hand washing.

Hand washing facilities can be constructed from the local material that we have in any household. On the other hand, if preparing and constructing convenient hand washing facility is impossible, we just can use metal or plastic cans for pouring water (fig. 2).

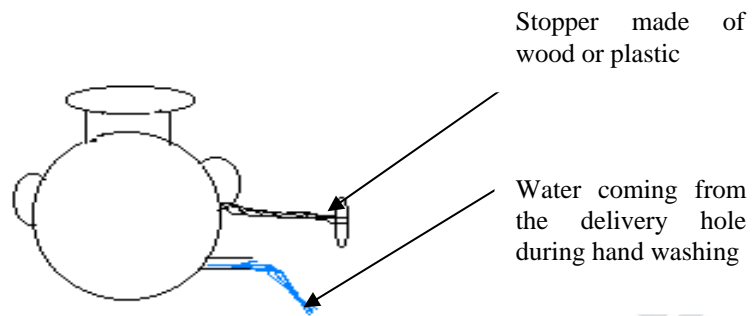


Figure 4. Hand washing equipment made from local clay pot (Agaw, 2004)

For more convenience we can prepare hand washing unit from local clay pot (fig. 4), plastic or 'Kil'. From these materials we can make by perforating a water delivery hole with a stopper for delivering water.

The hand washing clay pot can be made by local potters and this hole can be made from the very beginning while making the pot. If this is not possible, perforation of the delivery hole can be made using sharp iron material like knife and the stopper can be made just from the local materials available in the area. Such hand washing equipments can be hanged on outdoor, so that it will be easier for the family members to wash their hands and face after toilet visit, before and after meal or after contacting dirt material.

Figure 5 shows the hand washing equipment made from the available plastic material in Jimma hospital. This equipment is used by individuals who are working in hospital to take hand washing after their job.



Courtesy: photo Worku, 2004 (photo taken with permission)

Figure 5. Portable hand washing basin can be easily constructed for rural health centers and even for hospitals that do not have reliable water distribution systems.

5.1.3 Control measures to prevent the transmission of diseases from hands

- Keep finger nails always clean
- Keep finger nails always trimmed or short
- Use soap for hand washing before and after eating
- Use soap for hand washing after visiting latrine

- Use soap for hand washing before any food preparation is carried out.

Improper hand washing is no better than no hand washing at all. It is a common practice, even among the intellectual community, to quickly wash hands without using soap. The reduction in germ load on our hands will not be remarkable by using water alone and thus we should convince first ourselves and then the health workers and the community about the importance of hand hygiene and how correctly to perform it. But when soap is a constraint, we can wash hands for longer time (about 30 seconds), or after toilet visit or touching dirty matter, one can wash his/her hand using ash. Using ash for hand washing will help to increase the friction while rubbing the two hands.

5.2 The feet

We are a bit reluctant to wash regularly our feet than to our hands. Is that because they are located further away or because they are less useful parts of our body? Because less attention is paid in cleaning our toes we suffer from a number of health problems. Between the toes, sweating of the skin makes a good breeding site for spores of fungus infection called athlete's foot. When cleanliness of the toes is neglected, the bad odor generated has social consequences especially if you are working in an office with poor ventilation.

In most rural communities of Ethiopia, people are used to walk in a bare foot. The people in these communities need to wash their feet frequently than the people who are wearing shoes, because the foot is exposed to the soil and surrounding environment.

If individuals fail to have frequent wash, hookworm and jigger flea can easily enter the feet and cause infections.



Courtesy: photo Worku, 2004 (photo taken with permission)

Figure 6. Regular washing of our feet prevents from fungal attack and undesirable health consequences

5.2.1 How to keep our feet hygienic

We can keep our feet hygienic by cleaning:

- the feet
- the shoes and
- socks

After the shoes and socks are washed we need to keep in the sunshine to dry and possibly to kill the germs. Like wise, after

washing feet, individuals need to wait until it gets dry before wearing shoes.

5.2.2 Method of avoiding foot disease

- Regular washing of feet with soap
- Wearing of clean socks to absorb the sweat if possible
- Wearing of shoes if possible

In rural village when people cannot afford expensive shoes locally made sandals can be used as effective replacement. The disadvantage of leather shoes that expose the feet for fungal infection is rarely seen in sandal shoes.

5.3 The skin

Sweat and oily secretion from the skin cause dust to stick on its surface. This clogs the skin pores and interferes with the natural function of the skin. Moreover, bacteria can readily breed on the surface of the skin to cause various disease and undesirable odor. Certain species of flies can deposit their eggs on clothes when left outside for drying and the larva will grow under human skin causing irritation. If germs or parasites that settle on the skin as a result of poor personal hygiene produce a lesion, the barrier to protect delicate internal organs of the body is lost and systemic infections are likely to occur.

5.3.1 Methods of skin care

- Wash your body with warm water and soap preferably everyday to remove dust and dirt
- Wear the right size and type of clothes to suit local weather conditions
- Regular exposure of the skin to air and sunlight is beneficial

5.4 Hygiene of the clothes

Clothes help to protect our body from cold and other conditions and to maintain warmth. Clothes that are not clean contribute to the multiplication of pests and the spread of pest borne diseases. Dressing clean clothes day and night is mandatory for better health.

The sweat that comes from our body as dirt during activities accumulates on the body. It gives bad smell. Therefore, keeping our clothes clean as we keep our body is very important.



Courtesy: photo Worku, 2004

Figure 7. Proper drying of clothes after washing.

Clothes can be washed and cleaned by water and soap or 'ENDOD' or other local cleaning materials. After washing it has to be sufficiently dried by sunshine and/or wind. Proper place has to be sought for washed clothes to avoid recontamination. Health problems that emanate from clothes that are not hygienic are:

- Typhus
- Relapsing fever
- Bad smell
- Body itching, ulceration, etc.

To prevent the above problems:

- Regular washing and changing of clothes especially for children since it frequently get dirty.
- Frequent washing, outdoor drying and if possible ironing and putting in clean places.
- Regular washing of night clothes such as bed sheets
- Regular outdoor airing and washing as required of heavy clothes such as blankets and others.
- Boiling for at least 10 minutes and outdoor drying of all clothes that are infested with lice.
- Boiling and steaming of night clothes. The clothes should be immersed while boiling. Care should be taken not to release the steam from the clothes.
- Delousing clothes with 10% DDT or 1% malathion and keeping them for one day at time of epidemic outbreak.

- Putting infested clothes in a plastic bag and exposing to frequent sunshine till one can see dead louse. This might take 2-3 days or more depending on the amount of the cloth and sunshine available. In most cases white plastic bag is preferred.
- Report epidemics outbreak

5.5 The mouth and teeth

It is important in tropical countries to keep the mouth and teeth clean at all times. If this aspect of oral hygiene is neglected, food particles caught between the teeth decay quickly causing gum and tooth disease as well as bad breath.

To prevent this undesirable situation, immediately after eating, the tooth should be brushed and the mouth flushed out with copious amount of water. The water used for rinsing the mouth can be clean water or water with a little salt dissolved in it. In situation where proper toothbrush is not available, traditional brushes such as twigs of selected trees can be effective substitutes particularly in rural settings. If tooth decay and gum diseases occur, it is necessary to visit the nearby health facility to correct the problem.

We should discourage people who are using a piece of glass or charcoal or other hard material because it will remove the enamel part of the teeth.



Courtesy: photo Enanu, 2004 (photo taken with permission)

Figure 8. Traditional tooth brushes can keep your teeth healthy and your smile fresh!

5.6 The head, nose and eyes

5.6.1 The Head

The scalp and hair should be kept clean by washing with soap and warm water at intervals of a week. A dirty scalp harbor parasites such

as lice, which can transmit disease. Lack of sleep due to irritation caused by the parasites can also be a cause for irritation, inability to sleep and consequently poor health. Dirt on the head can also allow spores of ringworm to develop.



Courtesy: photo Worku, 2004

Figure 9. Proper and regular washing of hairs will discourage parasites that are adapted to live on the scalp of our head hiding in the hair.

5.6.2 The Nose

The nose, which is part of the respiratory system, contains hairs in the nostrils that filter dirt and germs from the air. Thus the nose serves as a protecting device against the entrance of harmful substances into our lungs and circulatory system. For this reason the nostrils should at all times keep clean by using a handkerchief or blowing at intervals to remove the accumulated dust and spores. This way, the incidence

of infection that usually starts at the throat can be reduced or controlled.



Courtesy: photo Worku, 2004

Figure 10. Periodic blowing of our nose using a handkerchief will keep the air passage clean and the protective role of cilia and mucous in proper functioning order

5.6.3 The eye

Dirty eye is the place for common housefly. Regular washing keep the eyes clean. Germs carried on the flies' legs can be deposited in or near the eyes and may cause diseases, which eventually lead to blindness. The best example in our setting is trachoma which has affected many rural communities of Ethiopia. Trachoma can be prevented by regular eye hygiene.

5.6.3.1 When should we wash our eyes?

- In the morning together with our face
- After exposure to dust or other contagious matter
- After it has been touched with a dirty hand
- After exposure to smoke and soot

The water we use must be clean from contaminants.

5.6.4 The genitalia

Emphasis has to be given to keep the pubic and genital areas clean.

The Benefits of keeping genital hygiene are:

- Prevent disease transmission
- Prevent insect infestation
- Good relationship with sexual partner
- Prevent from developing offensive smell

Shaving of pubic hair is one of the main important parts for the genital hygiene. It helps to avoid the harborage of pests and make cleaning of the genital organ easier.

Cleaning of genital areas can be done during general body cleaning or taking shower. But there are conditions where some one need specifically do cleaning of genital areas. These are:

- Before and after sexual intercourse: this will keep the genital area clean and help to avoid from having bad smell.
- Ejaculation: Sometimes men can ejaculate while they are sleeping. In this case it is important to wash it.
- During menstruation period: females need to clean the genital area frequently during this period.
- Before and after delivery: Frequent cleaning of the genital organ before birth will give comfortable condition for the person in charge to deliver the mother. In addition, this helps to prevent the child from getting HIV infection. Since there is high fluid discharge frequent cleaning and caring after delivery helps the mother from developing offensive smell and probably infection.

5.6.4.1 Care that should be taken during menstruation

Since it is a natural law, females have a monthly menstrual cycle starting from the age of puberty in the normal circumstance. In order to maintain menstrual hygiene, it is important to use clean and soft cloths. The use of pieces of clothes becomes imperative when pads

made out of cotton are scarce. These clothes must frequently be changed and washed. The used up cloths should be soaked for some time in water and washed with soap, and dried and ventilated outdoor. In the communities those who can afford to buy, use of disposable sanitary towels or lady pads has to be encouraged. The used pads or cloths have to be burnt or buried to make it out of the reach of people and animals.

Exercises

1. Why do we wash out?
 - hands
 - feet
 - face
 - the body
 - the nail
 - the genitalia

UNIT SIX

Children's Hygiene

More care and personal hygiene has to be provided for children. They are often affected by communicable diseases that occur due to, poor personal hygiene as a result of their defecation and urination on their clothes, bodies and sleeping places. In addition, they also often touch dirty materials like feces by their hands and feet while they are trying to play and crawl on the ground.

Health problems that occur as a result of poor hygiene of children:-

- Diarrhea
- Intestinal parasitosis
- Conjunctivitis (reddening of the eye)
- Scabies
- Fungal infection
- Upper respiratory tract infection

Prevention:

- The children have to be washed with clean water and soap in the morning, night and after the child touches dirty material
- Washing the hands of children with clean water and soap before meal
- Regular washing of their body

- Washing children with clean water and soap after they defecated and urinated
- Keeping the environment clean where they spend the day
- Washing the hands of children and mother before breast feeding
- Frequent cleaning of children's cloths and playing toys, etc.

Exercises

1. Why children need more care during washing?
2. How do you prevent diarrhea in a community.
3. What will be the role of the mother in keeping their children healthy?

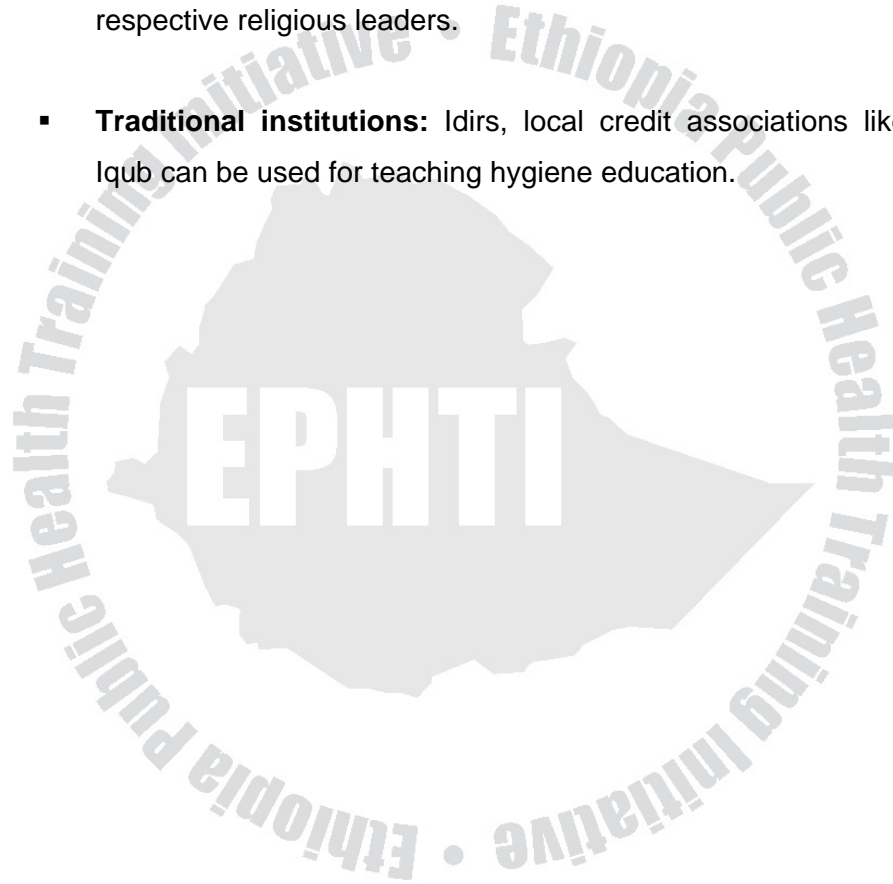
UNIT SEVEN

Communicating Hygiene Education With The Community

7.1 Place for communicating the message

- **House to house visit:** to address the information and to see the personal hygiene condition of the family members.
- **Village level:** to give uniform information for large group of people with in short period of time. We can use community health agent or the community leader to gather people in the convenient place and time.
- **Schools:** to address the information for same group of people in relation to their educational level.
- **Health institutions:** Helps to address patients and other people who are visiting the health institution. More often, morning and early afternoon times are used to get many people in the waiting area. In addition, personal hygiene education can be given in health center or hospital wards arrangement made with other health worker.

- **Religious institutions:** Churches and Mosques are very good sites for teaching hygiene, since many people can be found. Here, religious values should be considered respectfully and arrangements must be used together with respective religious leaders.
- **Traditional institutions:** Idirs, local credit associations like Iqub can be used for teaching hygiene education.



UNIT EIGHT

Modes Of Communication

During personal hygiene education communication can be:

- Person to person (one for one) conversation/ discussion: this can be handled by making house to house visit (home visit
- Conducting meeting
- Conducting team meetings
- Using demonstration sites
- Showing dramas, presenting musical shows, poems, use of local sayings and proverbs
- Presenting to the public different programs on public holidays
- Using tape recorders, and other media
- Using posters, leaflets, bulletins
- Using newspapers radio, television and similar communication materials and equipment, local mass media.
- Using mobile health education equipment.

Exercises

1. Write four communication methods
2. Which kind of communication is very important to promote personal hygiene.
3. Mention three indigenous media for effective personal hygiene.

Review questions

1. What is the importance of personal hygiene? Discuss in brief
2. How can disease be caused?
3. Describe the effect of applying personal and environmental hygiene on breaking disease transmission cycle and explain the relationships to each other.
4. What do microbes need to grow?
5. Explain the importance of cleaning different body parts and the cloth.
6. How do you communicate hygiene education to the community and individuals?

GLOSSARY

Hygiene: is a condition or practices conducive to maintaining health and preventing disease, especially by keeping cleanliness.

Miasis: infection developed by fly larvae.

Personal hygiene: is an individual's practice to keep the cleanliness of his all parts of body and clothes which can help to prevent disease transmission and create ones good aesthetic condition.

p^H: it is the negative logarithmic value of hydrogen ion concentration in a solution or compound. If the pH is level is below 7, the substance is acidic and if above 7, it is considered basic.

Isotonic solution: a solution that have equal salt or sugar concentration with that of the cell.

Hypotonic solution: is a condition where the saline or sugar concentration within the cell is greater than that of the surrounding environment.

Hypertonic solution: a condition where the surrounding solution have higher salt or sugar concentration than the cell of the organism.

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