

LECTURE NOTES

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Healthy Home Environments

For Health Extension Workers



**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

November 2004



Funded under USAID Cooperative Agreement No. 663-A-00-00-0358-00.

Produced 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.

Acknowledgments

The development of this lecture note for training Health Extension workers is an arduous assignment for Ato Alemayehu Haddis at Jimma University.

Essentially, it required the consolidation and merging of existing in depth training materials, examination of Health Extension Package manuals and the Curriculum.

Recognizing the importance of and the need for the preparation of the lecture note for the Training of Health Extension workers THE CARTER CENTER (TCC) ETHIOPIA PUBLIC HEALTH TRAINING INITIATIVE (EPHTI) facilitated the task for Jimma University to write the lecture note in consultation with the Health Extension Coordinating Office of the Federal Ministry of Health.

Finally the Federal Ministry of Health would like to express special words of gratitude for those who contributed and endeavored to the development of this lecture note and to TCC/USAID for the technical and financial support.

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UNIT ONE

Housing And Health

Learning Objectives

After completing this unit, the trainee will be able to:

- Define housing and/or residential environment.
- Understand the basic requirement for a house.
- Explain in general terms the rural housing types and situations in Ethiopian.
- Describe the association of housing to human health.

1.1 Introduction for the unit

Pre historic man lived in caves to protect himself against the sun, rain intruders and wild animals. It is not known how early he started building a home for himself.

Along with food and clothing, shelter has long been regarded as a basic need for human life. At a minimum, shelter has to provide protection against the stresses of the physical environment, as well as satisfying people's psychological requirements for a "place" or territory of their own and a focus for the primary social group, the family.

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The ways in which human beings meet this basic need are countless; a vast range of materials is used in building their shelter (Wood, brick, earth, concrete, stone, foliage, animal skin, ice) and there is a great diversity of patterns in which structures are spaced, clustered or, even moved about. Ownership and tenure of housing and land also vary widely, and legal provisions that address low-income groups to have adequate housing are scarce or non-existent. The provision of housing is closely related to occupation & economic activity, which are themselves dependent on geographical, technological & climatic factors. The quality & distribution of housing clearly reflects a country's economic status, social values and political character.

The housing situation in Ethiopia is very poor and exposes inhabitants to different health problems such as communicable diseases, asthma, rheumatism and the like. Most rural houses are constructed from less durable materials and are poorly ventilated and lighted. Urban houses are also very much crowded and lack the basic sanitation facilities. The situation is worsened by the unplanned urbanization and rapid population growth. The aim of this chapter is therefore to equip the health extension workers with knowledge and skills that assist them to alleviate health problems related to housing.

1.2 Housing in Ethiopia

As mentioned in the Introduction, The situation of housing in Ethiopia is very poor. It means that houses are built of less durable materials, with earthen floor, common living rooms with animals, inadequate doors and windows, poor sanitary facilities and very little space to accommodate the family members (overcrowded). On the other hand, Ethiopians are well known in the site selection for villages, which are built on an extended family basis or on Sebeka's. These small rural villages are built on **Ambas** or **plateaus** of mountains. This helps people to:

1. Easily communicate by yelling, by beating drums or by using signals such as fire whenever a threat from an enemy or wild animals comes.
2. To protect themselves from an enemy i.e. watch the enemy from every corner and attack from above
3. Protect themselves from flooding etc. However since people live on plateaus, one can imagine the time spent by women & children to fetch water from rivers & springs which are usually found at the foot of mountains & the valleys.

The *Tukul*, the traditional Ethiopian House is a circular thatched house with no sufficient windows. The tukul usually is not provided with dual egress. It has only one room & if there is a 2nd it is usually a *Gata*- a partition for animals.

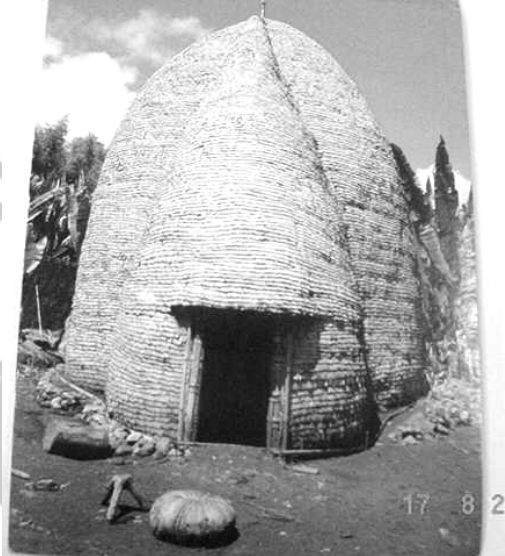


Fig. 1. One of the traditional Ethiopian house

The furnishings of an Ethiopian peasant house include:

- The Medeb - Made of mud, earth, stone and wood, which is used to seat on or sleep.
- The Kot- a bed made of wood that is raised to a height of about 2 mts.
- The Gulicha- a fireplace in the middle of a room to cook & heat room

The life span of an Ethiopia Tukul on the average is about 10 years

These days, however, the tukul is being substituted by houses that are constructed with corrugated iron sheets (CIS) and there is a rapid growth of urbanization. This still needs special attention & policy support so that we have standards both for rural & urban houses.

1.3 Definitions

Housing- Housing is more than shelter or the physical structure. A more descriptive term is the RESIDENTIAL ENVIRONMENT, which is defined by the WHO expert committee on the public health aspects of housing as:

“The physical structure that man uses for shelter and the environs of that structure including all necessary services, facilities equipment and devices needed or desired for the physical and mental health and social well-being of the family and the individual”.

Substandard housing- is said to exist when there are 1.51` or more persons per room in a dwelling unit, when the dwelling unit has no private bath or is dilapidated, or when the dwelling unit has no running water.

A slum is a “highly congested, usually urban, residential area characterized by deteriorated unsanitary buildings, poverty & social disorganization”

As slum is a neighborhood in which dwellings lack private inside toilet & bath facilities, hot & cold running water, adequate light, heat, ventilation, quiet, clean air, and space for the number of persons housed. It is also a heavily populated area in which housing & other living conditions are extremely poor.

A blighted area - to blight is to “ Prevent the growth and fertility of; hence to ruin; frustrate” (Webster). A blighted area is an area of no growth in which buildings are permitted to deteriorate. These areas can't serve any purpose for the time being. Examples of blighted areas are: Marshy areas, Rocky areas (quarries).

Note: *Avoid blight areas in town planning & zoning as they are likely to develop into slums.*

Environmental Sanitation: means the control of all those factors in mans physical environment which exercise or may exercise a deleterious effect on his physical development, health and survival. In particular it refers to the control of housing, to ensure that it is of a character likely to:

- Provide as few opportunities as possible for the transmission of disease especially respiratory infections; and
- Encourage healthful habit, in the occupants.

Standard house- a safe, sanitary & comfortable dwelling that satisfies the definition of housing

Housing unit- A separate and independent bode intended for habitation by one household

Conventional housing unit- One built with materials and workmanship considered acceptable for housing in the country or area where it is located

Rudimentary housing unit- One erected principally with local materials and not normally conforming to the standards for a conventional housing unit.

Improvised housing unit:- One in an unplanned group of similar units, crudely built of locally available scrap & naturally available materials.

Dwelling unit- A room or group of rooms in a conventional housing structure, arranged or intended for use by a household

Room- Space in a housing unit enclosed by walls reaching from the floor to the ceiling or roof covering or to a height of at

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least two meters above the ground, of a size large enough to hold a bed for an adult (at least four square meters)

Housing code- (Laws, rules, ordinances) enforcing on the legal control of housing.

These laws are used to clearly regulate.

a) The physical condition of a house

- Location
- Soil formation
- Flooding
- Arthropod & Rodent infestation
- Water supply systems
- Light, heat, ventilation, overcrowding

b) The biological conditions (Bacterial factors)

c) Social Environment- Disturbance due to Noise

- Smell (bad odor)
- Smoke
- Drainage

Building code- a uniform set of rules applied with and mainly deals with plan and permit. Materials for construction of a building are checked before a building permit is given by the city council or health unit.

Sanitary code- deals with the sanitary conditions of the environment from the point of public health practice. The sanitary code may deal with:

- Control of stray dogs
- Control of rodents

Zoning code - deals with the principle of dividing an area in the community into various zones. City planning is becoming more and more important in urban development. Two of its most important features are control of zoning and subdivision of land.

Consideration in zoning

1. Get or develop a general plan indicating
 - a) Basic community services
 - water supplies
 - waste disposal
 - health centers
 - schools etc.
 - b) Open spaces
 - c) Commercial, residential & industrial areas indicating some more details like:
 - Main roads
 - Boundaries etc.

2. Discuss the general plan with other authorities
3. Finalize & implement your final plan should clearly & reasonably indicate

- Areas for simple & multiple family buildings
- Separate area of commercial & industrial areas from residential occupancies preferably with buffer zones
- Proximity of shopping centers
- Places of employment- satellite cities
- Off street parking
- School, health services & other institutions

1.4 Health aspects of housing

Housing is intimately related to health. The structure, location, facilities, environment and use of human shelter have a strong impact on the state of physical, mental & social well being. Poor housing conditions & uses may provide weak defenses against death, disease and injury or even increase vulnerability to them. Adequate and appropriate housing on the other hand, not only protect people against health hazards but also help to promote physical health, economic productivity, psychological well being and social vigor.

Poor housing may be a predisposing factor for one or all the following.

Communicable disease transmission

- | | | |
|----------------------------|------------------|--------------------|
| a) Viral disease | - Mumps | - Whooping cough |
| | - Measles | - Diphtheria |
| | - Smallpox | |
| b) Arthropod borne disease | - Scabies | - Jigger or chigoe |
| | - Pediculosis | - Trypanosomiasis |
| | - Tick paralysis | - Onchocerciasis |

Increased home accidents- Home accidents are greater in slum housing than in well designed & maintained housing

Lower social importance/ Respect given to the dwellers

- Slum dwellers seldom invite guests to their homes
- Rites & unrest (crime) due to the depressing aspects of crowded, hot, unsanitary and commonly Rat & Cockroach infested, unventilated, slum housing in drab, congested residential neighborhoods lacking the amenities, character & dignity to self respect.

Discomfort

Living in hot tenement apartments or rooms with:-

- No cross ventilation
- No air conditioning
- Inadequate insulation etc.

1.5 Basic requirement for housing

Fundamental physiological needs

- Maintenance of a thermal environment that will avoid undue heat loss from the human body
- Maintenance of a thermal environment that will permit adequate heat loss from the human body
- Provision of an atmosphere of reasonable chemical purity
- Provision of adequate day light illumination and avoidance of day light glare
- Provision for admission of direct sunlight
- Provision of adequate artificial illumination and avoidance of glare.
- Protection against excessive noise (and radiation)
- Provision of adequate space for exercise and play of children

Fundamental psychological need

- Provision of adequate privacy for the individual
- Provision of adequate opportunities for normal family life.
- Provision of adequate opportunities for normal community life

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- Provision of adequate facilities that make possible the performance of the tasks of the household without undue physiological and mental fatigue
- Provision of facilities for aesthetic satisfaction in the house and its surroundings
- Provision of possibilities for aesthetic satisfaction in the house and its surroundings
- Concordance with prevailing social standards of the local community

Protection against communicable Disease

- Provision of safe and adequate water supply
- Protection of the water supply system against contamination within the dwelling
- Protection of toilet facilities of such a character as to minimize the danger of disease transmission
- Protection against contamination of the interior surface of the dwelling
- Avoidance of insanitary condition in the vicinity of the dwellings
- Exclusion from the dwelling of vermin that may play a part in the transmissions of disease.
- Provision of facilities for keeping food, and milk un safe

- Provision of sufficient space in sleeping rooms to minimize the danger of contact infections.

Protection against accidents

- Erection of a dwelling with such materials and methods of construction as to minimize danger of accidents due to collapse of any part of the structure.
- Control conditions likely to cause fire or promote its spread
- Provision of adequate facilities for escape in case of fire
- Protection against danger of electrical shocks and burns
- Protection against gas poisoning
- Protection against falls and other mechanical injuries in the home
- Protection of the neighborhoods against hazards of automobile traffic.

UNIT TWO

Characteristics Of Good Housing

Learning Objectives

After completing this unit, the trainee will be able to:

- Assist the community in site selection.
- Understand the design and construction requirements for rural housing.
- Apply and demonstrate the principles of lighting and ventilation in housing.

2.1. Introduction

Good housing also called as standard housing requires basic services and facilities like water supply, waste disposal facilities, lighting, ventilation, ample space and recreation areas and so on. Basically, there should be clearly defined standards to these services and facilities in order to evaluate the housing quality. Here is given detailed explanation to some of these requirements.

2.2 Sitting of a house

The first consideration is the nature of the soil. There are three types of soil:

- Clay soil
 - Sandy soil and
 - Loam soil - which is a mixture of clay and sandy soils.
-
- Clay soil holds water and makes living conditions damp.
 - Sandy soil doesn't act as an adequate filter for normal domestic sanitary conditions.
 - Loam soil is the best type of soil for the construction site of houses.
 - The site chosen should not be in a swampy area where insects readily breed; it should not be liable to flooding either.
 - The best sites are on the on the sides of hills; the worst are at the bottom of the valley.
 - The ground for the house site should therefore be high, dry, well drained and airy.
 - There should be a gentle slope for drainage
 - Houses should be constructed in areas where there is no natural disaster such as earth quacks
 - Availability of reliable water sources must be assessed

- The residential area must be away from factories, dusty road, waste dumping area etc.

Site planning Of a house (Applicable to villages in rural areas)

In hot countries like Ethiopia, the house should be built so that the longer axis lies in an east- west direction, with the windows pointing north and south. This avoids having the sun heating the rooms during the day. Rooms should be kept cool for ideal conditions.

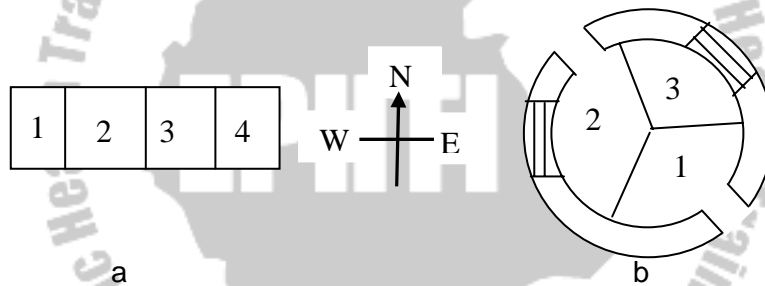


Fig. 2: Ground plan of a House. (a) Rectangular houses (b) Circular houses

Recommended allocation of rooms

a) Rectangular houses

- Cooking room
- Eating and living room
- Sleeping room

- Washing and sanitation room

b) Circular houses

- Eating and living room
- Sleeping room
- Store for water, Utensils and other food items

Note that cooking area is not indicated for a circular house with the assumption that a separate kitchen outside of the main house is constructed with raised stoves.

2.3 The physical structure

The housing structure in rural communities in Ethiopia is made of less durable materials. The housing design is also poor. Both the materials of construction and the design has slight variation in different parts of the country. Two major reasons can be mentioned for the housing design variation.

- Customs and traditions.
For example, the shape of the Gurage houses is different from the Amhara, houses although they are made of the same materials
- Type of locally available materials.
Example bamboo houses, stone houses

Whatever the material or the design may be, rural houses structures should have the following minimum requirements.

Floor

- It should be impermeable so that it can be easily washed and kept clean and dry
- Should be smooth and free from cracks
- Should be dump proof

Walls

- It should be strong enough to resist wind, flood, heavy rainfall and other natural or manmade disasters
- Should not support the harborage of rodents, and other vermin
- Should be smooth and tidy

Roof

- Should be reasonably high – at least 2.5 meters for CIS and 3 meters for thatched houses
- Should be provided with eaves to protect the house from wind rain and sun
- Should be smooth and neatly arranged and good to look at

Kitchen

Every dwelling house must have a separate kitchen. The kitchen must be protected against dust and smoke, adequately lighted, and provided with sanitary facilities like water supply and washing compartment.

2.4 General design and construction requirements for rural housing

- There should be at least two living rooms
- There must be ample verandah space to protect the house from flood and dampness
- The built up area should not exceed one third of the total area
- There should be a separate kitchen with paved sink or platform for washing utensils
- The house should be provided with a sanitary latrine
- The window area must be at least 10 percent of the floor area
- There should be a sanitary well or a tube well within a quarter of a mile from the house
- It is unsanitary to keep cattle and livestock in dwelling houses. Cattle sheds should be at least 25ft away from dwelling houses. A cattle shed should be open on all sides. An approximate area of 8ft X 4ft is sufficient for each head of cattle.
- There should be adequate arrangement for the disposal of solid and liquid wastes.
- The house should have ample space for the play of children and should also be fenced

- The provision of garden and clean space within the compound gives the house more aesthetic value.

2.5 Provisions for urban housing

The sanitary requirements of an housing are different from those of rural housing. With the understanding that some of the requirements mentioned for rural areas also are applicable to the urban setting and vice versa, Urban-housing units should meet the following criteria.

Water supply

- Quality- should be free from micro- organisms & other suspended & dissolved substances
- Quantity- Average consumption in the Ethiopian community is 40- 60L per person per day (for all domestic purposes).
- No cross connections
- It should preferably be inside the living room
- Should be provided by a private Bath.

Toilet facilities

- Preferably a private toilet facility inside the house should be installed.

- If toilet facility is not available there should be a provision for private latrine.

Sewer connections

- A good standard house should be provided with sewer lines connected to the municipal main sewerage system. These sewer lines should be arranged in such a way that there is no leakage and doesn't pollute the water supply systems

Electricity- There has to be artificial illumination both in the house and the compound.

Natural illumination - Windows- $1/10^{\text{th}}$ of floor area in every room should be provided for windows. (Windows 50-45% operable)

Good sitting and design of a house (See sections 2-1 and 2-2)

Prevention of dampness

In tropical countries with a heavy rainfall, houses are preferably built of stilts, to keep them above the dumpy earth. In drier climates the house walls should contain a *damp-course* made of water proof materials. (See fig.3)

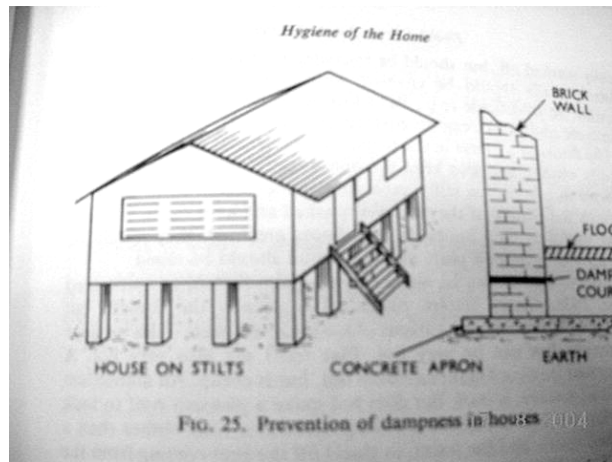


Fig. 3 Prevention of dampness

Space –There must be sufficient space for inhabitants to avoid over crowding-

Overcrowding exists if there are:

- More than 1.5 persons per habitable room
- Less than 40ft² of sleeping area per person

Additionally the dwelling should provide at least 150-ft² space for first occupant & 100 ft² for every additional occupant. Overcrowding can also be expressed in terms of room crowding, that is if there exists more than 1.5 persons per habitable room.

Each person should normally have 1000 cu. ft of space for comfort, but if the room is well provided with doors & windows

this volume may be reduced. If a room has less than 500 cu.ft. of living space per person, it is said to be over crowded.

From psychological & social points of view separate facilities for meaningful use of leisure time and separate living room besides the sleeping room is necessary. Based on these considerations the environmental hygienist recommend single-family dwellings built with at least two rooms besides kitchen and bath.

Dual egress – Dual egress means two exit doors. The minimum requirement for a house is that it has to have at least two doors at opposite directions or diagonally so that there is an emergency exit. It also is can be used to facilitate accessibility, lighting and ventilation.

Heating-

- At least 3/4th (75%) of the dwelling should be provided with heating devices (rooms except W.C. & stores)
- Dwellings need to be heated to a temperature of 68⁰F (measured at 18 inches above floor.
- Excessive heating is also dangerous. In areas where there is excessive heat proofing techniques as illustrated in fig.4 can be introduced.

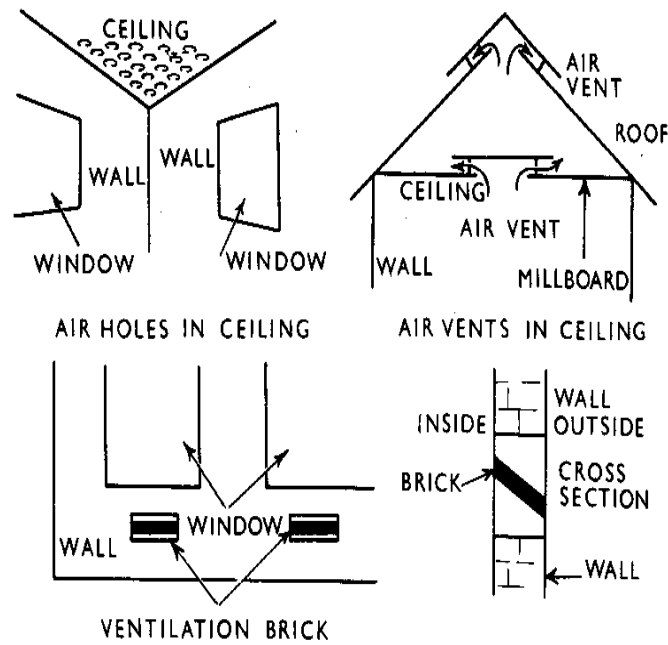


Fig. 4 - Protection against heat.

Arthropod, rodent, and other animal infestations such as dogs, cats, etc.

A standard house is one which is free from rodent infestation, stray dogs and cats and insect proof. Some of the techniques used in urban areas to make houses rat proof is shown in fig 5. There is a rich experience in rural areas to make the barn rat proof houses especially the barn

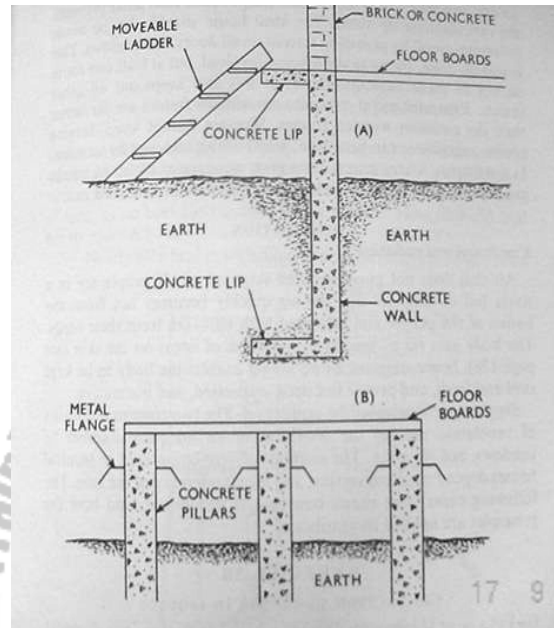


Fig. 5 - Making buildings rat proof

Lack of solid waste disposal area makes a house substandard.

Solid waste can be managed in different ways in different areas. Its management also is dependent on the type of waste generated. In any case one or a combination of the following disposal methods are recommended for a single-family house.

- An onsite incinerator like the one indicated on Fig. 6
- A solid waste disposal pit operated in a controlled manner

- A solid waste collection bin for use in municipal collection systems

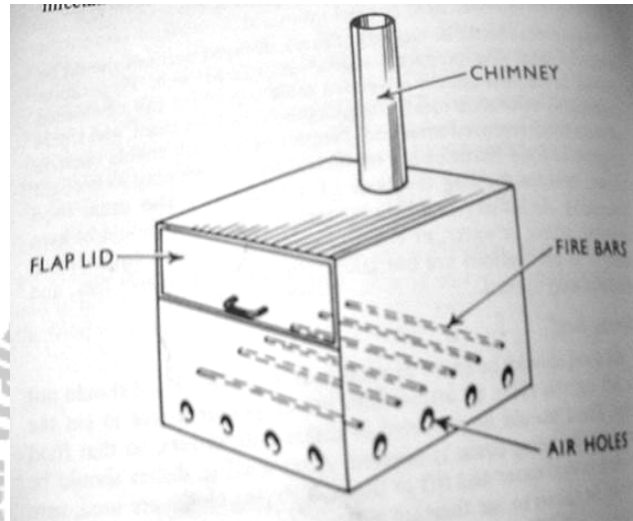


Fig.6 -An onsite incinerator

Other waste management options to be motivated in the community include:

- Household composting
- Waste recycling and reuse
- Waste minimization

Provision of animal slaughtering area

The environmental survey for appraisal should also include (reflect) the proximity and effects of industry, heavy traffic,

recreational facilities, schools, churches, business and shopping centers, smoke, noise, dust, man made & natural disasters and other factors that determine the suitability of an area for residential use.

Provision of proper natural and artificial ventilation mechanisms.

In order to maintain comfortable living conditions in an occupied room, it is necessary to have adequate ventilation. The simplest way to do this is to replace the warm, humid air by the cool, dry, fresh air.

Functions of ventilation: - ventilation has three functions.

- To keep the air moving
- To keep the air cool
- To keep the air dry

These functions are attempted in small houses by natural means by wind and by convection currents.

The wind can blow directly into a house and thus supply fresh air, or it can blow past the house and suck out the stagnant air. In either case, there must be adequate window space, with windows in walls facing each other to allow cross or through ventilation.

Convection currents arise from a room becoming warm, and the hot air rising escapes. Convection currents only arise if the

heating effect is at a low level in the room. Fresh, cooler air is then drawn through the windows. In order to cause these convection currents, there must be a ceiling to the room, to protect the room from the radiated heat from the roof, and adequate ventilation spaces to allow warm air to escape. Ventilation normally depends upon air holes in the ceiling. Look at the Fig 7 for detailed illustration.

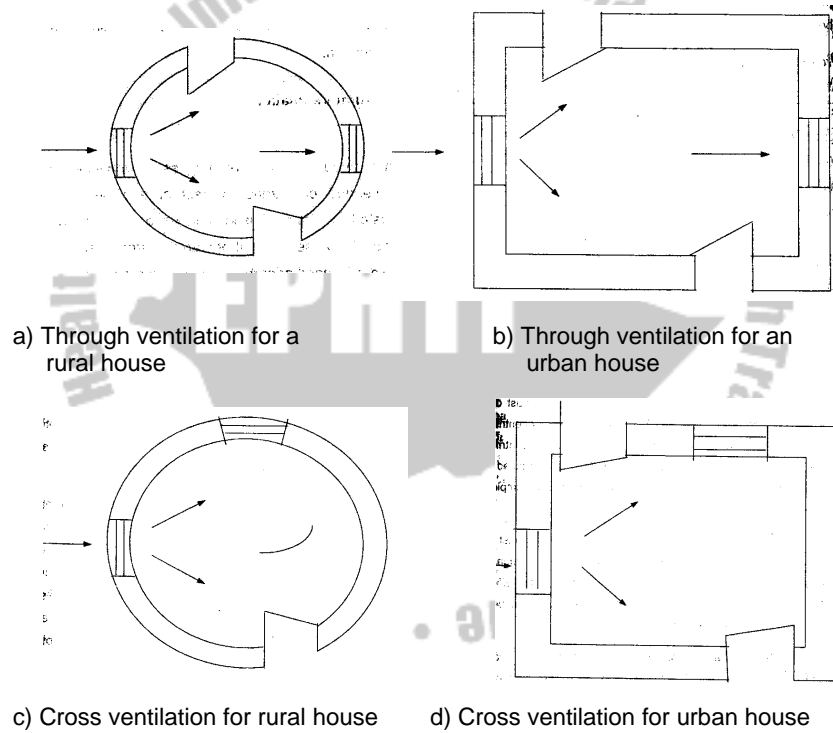


Fig. 7 Methods of ventilation

Evaluation:- 4 or more deficiencies make a house slum. A rating of housing quality based on penalty scoring system is used to arrive at a numerical value of the housing quality. This is helpful to know the degree of improvement.



UNIT THREE

Indoor Air Pollution

Learning Objectives

After completing this unit, the trainee will be able to:

- Define indoor air pollution.
- List specific air pollutants and their sources.
- Explain preventive measures against indoor air pollution.

3.1. Introduction

Community air pollution is generally regarded as the presence in the “ambient” atmosphere of substances put there by the activities of humans in concentration sufficient to interfere directly or indirectly with ones comfort safety or health or with the full use of ones property

3.2 Sources of air pollution

There are various ways in which the air we breathe can get polluted. Listed below are the sources of air pollution.

Natural origin

- Ashes and smoke from volcanic eruptions.
- Forest fire
- Dust storms
- Decay of organic matter in the absence of oxygen releases considerable amount of methane gas.
- Respiration from plants and animals
 - Humans release CO₂ and water vapor to the atmosphere
 - Some plants produce volatile Hydrocarbons

Human origin

- Combustion emissions from automobile
- Fire and lamps consume O₂ & release CO₂ and water vapor.
- Fire (in building not provided with proper fire proofing materials)
- Industry- The major industries generating air pollutants include:
 - Steel mills
 - Metal smelters
 - Oil refineries
 - Pulp and paper mills
 - Hide processing
 - Cement factory etc.

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Pollutant	Major source	Effects
Total suspended Particulate (TSP) (solid or liquid form)	Combustion Industrial process	<ol style="list-style-type: none"> 1. Acts synergistically with SO₂ as respiratory irritant 2. Grim deposits 3. Obscure visibility 4. Corrode metals
Sulfur dioxide (SO ₂) (gas)	Coal burning Power plants Metal smelters Industrial boilers Oil refineries	<ol style="list-style-type: none"> 1. Respiratory problems 2. Corrode structures like metal and stones. 3. Damage textiles 4. Toxic to plants 5. Precursor of acid rain
Carbon monoxide (CO) (gas)	Motor Vehicles	<ol style="list-style-type: none"> 1. Aggravates cardio vascular disease 2. Impairs with perception & mental process 3. Fatal at high concentration.
Nitrogen dioxide (NO ₂) (gas)	Motor vehicles Power plants	<ol style="list-style-type: none"> 1. Respiratory irritant. 2. Toxic to plants 3. Reduce visibility 4. Precursor of Ozone 5. Precursor of acid rain
Ozone (O ₃) (gas)	Motor vehicles (In directly)	<ol style="list-style-type: none"> 1. Respiratory irritant 2. Toxic to plants 3. Corrodes Rubber, paint

Pollutant	Major source	Effects
Hydrocarbons (HC) (gas)	Motor vehicles evaporation from gas stations etc.	1. Precursor of O ₃ Some types are carcinogens
Lead (Pb) (metal aerosol)	Motor	1. Damage the blood vessels, nervous system and kidneys

Table 1- Major air pollutants, sources and effects

3.3 Indoor Air Pollutants

Some of the more common air pollutants known to be present in the home environment include

Radon gas and its decay products.

- Radon is a radioactive contaminant originating from the natural decay of uranium. Radon is present in high concentrations in certain types of soil and rocks such as granite, slate and phosphates.
- Radon can easily be deposited in dirt floors, cracks in cement floors & walls and can be emitted whenever there is difference in Air pressure & can be inhaled or “diluted” to the atmosphere
- Radon is dangerous because it is radioactive. It can be inhaled & deposited in the lungs increasing the risk of cancer.

Products of combustion (carbon monoxide, Nitrogen oxides and particulates

These common outdoor air pollutants can reach very high levels inside homes where:

- Gas stoves or other gas appliances are used
- Kerosene heaters or wood burning stoves are operating
- Auto emissions can enter homes or
- There are cigarette smokers

Formaldehyde

This substance is known to cause skin and respiratory irritation. Formaldehyde is now suspected of being carcinogenic as well.

A wide variety of household products contain formaldehyde. Insulation materials, particleboard, plywood, some floor coverings and textiles may contain formaldehyde.

Chemical fumes & particles released by numerous household products such as:

Furniture polish, Air fresher, paints, Hair spray, Oven cleaners, Pesticides,

Disinfectants, Solvents etc., can reach very high levels in doors and can cause cancer, skin diseases and emotional disorders

Biological Pollutants

A diverse group of living organisms, most of them too small to be seen with the naked eye can also pose serious air quality problems inside homes & public buildings.

Ambient air may contain high concentrations of Bacteria & fungal spores and occasionally cause disease outbreaks.

Many allergens are associated with exposure to household dust, which may contain fungal spores, bacteria, animal dung, and feces of roaches or mites.

3.4 Diseases associated with indoor Air pollution

Indoor air pollution affects both ages and sexes but the danger is greatest for groups such as the very young, the very old, pregnant women, and those who suffer from debilitating illnesses such as asthma, or heart diseases.

- People who spend a great deal of time indoors in rural houses are more likely to be affected
- Those living in or near big cities are likely to have more exposure due to heavy automobile emissions.
- Polluting industries

- According to some data the impact of indoor air pollution as a risk factors for several illnesses is quite widespread & serious in Africa
- Mortality & morbidity from respiratory diseases in < 5 children is tremendous due to wood smoke
- In most African countries respiratory illnesses reach among the top two or three diseases
- Observation in Nigeria reveals that mortality rates were lowest during the driest months when cooking was done outdoors, thus reducing exposure of infants to the fumes.

Here are some of the major health problems associated with Indoor air pollution

Chronic obstructive lung disease (COLD)

Exposure to smoke and other combustion products, particularly as related to cooking methods, affects the health of women in Africa.

Cancer

Cancer is probably the most critical health hazard associate with air pollution.

Low birth weight

Exposure of pregnant women to indoor air pollution is one of the risk factors that contribute to low birth weight. It is

associated with perinatal and infant ill health (as in the case of Tobacco – women - child relationship

Nutrition & fuel scarcity

There are indirect health problems brought about by the current practice of Biomass combustion for cooking. The traditional cooking practice with biomass fuel is inefficient. Due to this more fuel and time is spent to cook a certain food item. There are two main problems that are associated to such a practice.

- Changes in diet or selection of foods which require less cooking time
- Food contamination due to limited possibilities of re- heating “left overs” or boiling water, etc.

Ethiopian villages

In rural Ethiopia both cooking & Heating in houses are carried out in traditional way. The most common way of arrangement is a fire inside a house with a cooking pot resting on three stones over the fire. The fuels used include a wide range of materials such as:

- Agricultural waste
- Dried dung from animals
- Wood
- Kerosene

Women and children are usually engaged in gathering the fuel.

Combustion of Biomass (wood, plant products and residues, animal dung) under primitive conditions produces large quantities of smoke & pungent odor indoors.

Biomass burning under primitive conditions has only an efficiency of 7-8%. Because of this inefficiency, large amount of uncombusted materials are produced in the form of smoke and irritating gases. According to some statistical data Ethiopia is the 2nd largest biomass fuel user in Africa as a source of energy.

3.5 Possible solutions to Indoor Air pollution

Production of sufficient wood

- Planting trees to replace the ones that are cut.

Improving the design of stoves with the ones that

- Improve combustion efficiency
- Reduce indoor air pollution
- Accommodate the variety of fuels used
- Adapted to specific conditions such as periods of cooking pot size etc.
- Easily made of local materials and skills at costs that are affordable

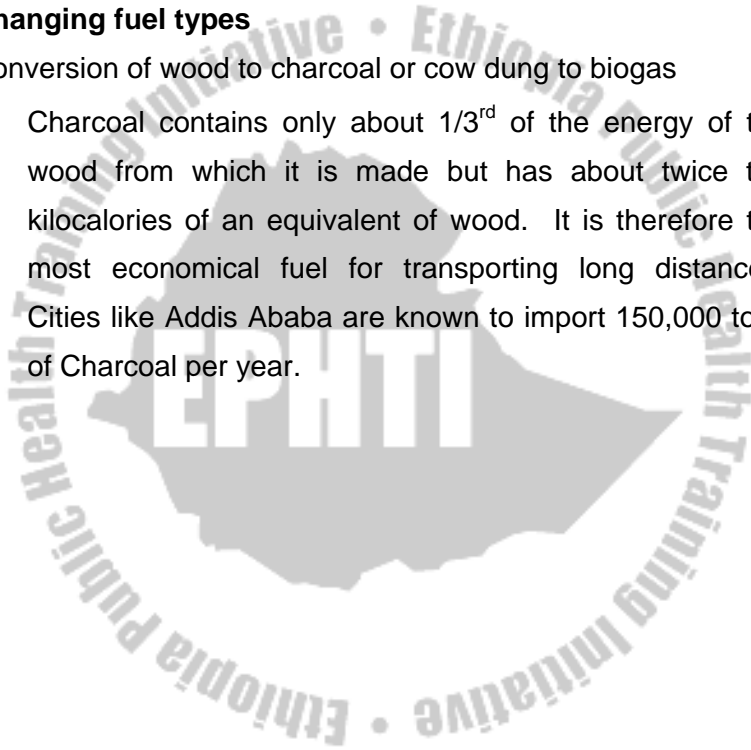
Improving the venting of smoke & fume to the outside

- Improving kitchen facilities
- Better & more efficient cooking practices
- Communal preparation of certain food items (If applicable)

Changing fuel types

Conversion of wood to charcoal or cow dung to biogas

- Charcoal contains only about 1/3rd of the energy of the wood from which it is made but has about twice the kilocalories of an equivalent of wood. It is therefore the most economical fuel for transporting long distances. Cities like Addis Ababa are known to import 150,000 tons of Charcoal per year.



UNIT FOUR

Upgrading Existing Ethiopian Housing Structures

Learning Objectives

After completing this unit, the trainee will be able to:

- Understand methods of upgrading.
- Help villagers to upgrade existing houses so that slum dwellers are minimized.

4.1 The need for Upgrading

As mentioned before the Ethiopian housing structures are very poor and unhealthy. Hygienic practices start at home and if the housing environment is not convenient to live, then health promotion is impossible. Provision of Improved housing environment is also plays a fundamental role in the promotion of the health of mothers and children who spend much of their time at home. It is therefore the duty of the extension worker to start his community health service from the residential environment.

Here are some of the focus areas in housing promotion for the purpose of upgrading existing housing structures.

- The general compound – Most houses do not have enough compound and that it is not clean
- The floor – Rural houses are made mostly of earthen floor. Moreover the floor is a good breeding media for bacteria and insects like fleas.
- The wall – The wall is made of less durable material and that it is very rough. It usually harbors insects and rodents
- The door – There is usually only one door and the door height is not sufficient
- The windows – The major problem with most rural Ethiopian houses is that there is no window. Due to this there is a great problem of lighting and ventilation. The major reason that rural people do not construct windows may be one or all of the following reasons. (Reasons are variable for different regions in the country)
 - People do not know about the use of sufficient windows
 - People are afraid of thieves
 - People want to arrest smoke in rooms by minimizing window size for the purpose of keeping the family warmer and to kill the mites and other insects in the thatched roofs.

- The Rooms, the kitchen, etc. – The living room size is not sufficient and use the same room for multiple purposes. (Eating, living and sleeping). They also cook in the same room in a very primitive way.
- Living with animals – People tend to live with pets and keep cattle inside the main house for warmth and for fear of thieves.

4.2 Methods of Upgrading

You can take the following measures as a remedy for existing housing structures in rural communities.

Improving the general compound

- Keep vegetation trimmed
- Clear unwanted vegetation
- Clean the compound
- Collect all the waste and bury or burn it.
- Locate the facilities such as latrine, water source, barn, play ground etc. so that one doesn't affect the other.
- Fence it
- Make it attractive by planting trees and flowers in an orderly manner

Improving the floor

- Advise people to wet - clean it at least once a day

Healthy Home Environments

- Advise people to make it smooth with locally available material like cow dung and earth. The smoothing or plastering activity must be more frequent to avoid the breeding of insects, micro –organisms and other vermin. The recommended interval is one week.
- Improve the foundation to avoid dampness and rodent infestation

Upgrading the wall

- Plaster the wall with locally available materials
- Maintain all the cracks and crevices to avoid infestation of insects
- Support it with durable materials (if needed) so that it doesn't collapse easily by winds and other natural or man-made phenomena.

The door

- Reinforce the door with lumber and boards. This will help to keep the house stronger and at the same time to enable public health and other social workers to put labels on the door.
- Encourage people to have at least two doors on opposite sides to facilitate ventilation and to serve as an emergency exit in times of disasters like fire.

The windows

- Increase the size of windows

- Arrange windows in a cross ventilation system

The room

- Divide the existing room by partitioning it with locally available materials
- Encourage people to have a separate cattle shed
- Advise people to have a separate kitchen and store outside of the living room.
- Demonstrate the construction of improved stove and chimney and encourage the community's cooking system.

4.3 Steps for housing promotion in a community.

Study your community

- Know the population characteristics
- Learn how the community is organized and identify formal and informal community leaders
- Record the type and number of houses and classify them by as good, fair or bad
- Learn about the customs and traditions of building the houses
- Identify the local materials for the construction of houses
- Estimate the average cost of a house in that locality
- Identify the major problems of housing in that locality

Identify governmental and non-governmental organizations that may support your program

Introduce yourself and your program to:

- To administrative office
- To professional health workers and community health agents.
- To local community leaders and well known personalities
- To governmental and non-governmental agencies in the area.

Draw your plan of action and get its approval from local community council.

- Prepare weekly, monthly or yearly work schedule as appropriate

Conduct training

- Training community members, health workers and community health agents who could be potential supporters of the program.

Create co-ordination mechanism with governmental and non-governmental agencies and civic associations who are potential supporters of the package program

- Administration: those who will give administrative support

Healthy Home Environments

- Agriculture: those who can provide the assistance of the agricultural extension workers.
- Education: to give training about healthful housing to teachers and students.
- Civic association: women's youth etc. to establish co-ordination mechanism

Involve health institutions and health workers of the area.

- Motivate, educate and organize the community in order to bring about behavioral change.
- At household level, at religious meetings at "EDIR" meetings give information about the benefit of constructing a healthful house and its need

Educational topics to be taught regarding healthy home environment may include:

- The relationship of housing to health and well being of man.
- Show here the diagram of a model house with partitions for different functions
- Benefits of properly partitioned house suitable for various services

Organize volunteers for the construction and or upgrading of individual housing units

- Make regular visits to these households

Healthy Home Environments

- Give them technical support to construct or upgrade a healthy housing unit
- Let these people demonstrate to other neighbors for possible reproduction of the technology.

Evaluate your program.



Conclusion

Housing in Ethiopia, as in many other countries in the world, has its traditional way of construction. Understanding the culture of people and of the construction materials and design will help health and development workers to single out the problems and identify appropriate ways of improving the structures.

Housing is more than just the physical structure. It involves all the necessary services, facilities, equipment and devices needed for the physical mental and social well being of the inhabitants. The term residential environment better describes housing.

Most housing in Ethiopia, especially in urban areas, is considered as slum. The absence of or failure to enforce suitable zoning, building, sanitary and health regulations leads to the development of *shanty towns* – meaning poor housing areas. If in these areas we continue to construct cheap and poor quality dwellings, then we are increasing the future slum areas. Planners and environmental health workers should be aware about the consequences of slum areas and prevent their growth in new settlement areas.

Healthy Home Environments

Emphasis should be given to upgrade the existing traditional houses of Ethiopia by introducing acceptable sized windows, partitioning, plastering of walls and floor, keeping the cleanliness and health education.



Glossary

Adobe - a house, a shelter of an Asian origin

Air pollution - Community air pollution is generally regarded as the presence in the “ambient” atmosphere of substances put there by the activities of humans in concentration sufficient to interfere directly or indirectly with ones comfort safety or health or with the full use of ones property

Artificial ventilation - Forced introduction of clean air into buildings or the use of mechanical ventilators

Blighted area - a blighted area is an area of no growth in which buildings are permitted to deteriorate.

Biomass fuel - fuel which is mainly derived from cow dung and wood.

Dampness - the ability of a ground surface to absorb moisture

Egress - an access to and from a room, means of exit and entrance.

Environment - the surrounding in which we live

Housing - *“The physical structure that man uses for shelter and the environs of that structure including all necessary services, facilities equipment and devices needed or desired for the physical and mental health and social well-being of the family and the individual”.*

Indoor air pollution - air pollution in homes, mainly due to cooking and heating by using biomass fuel

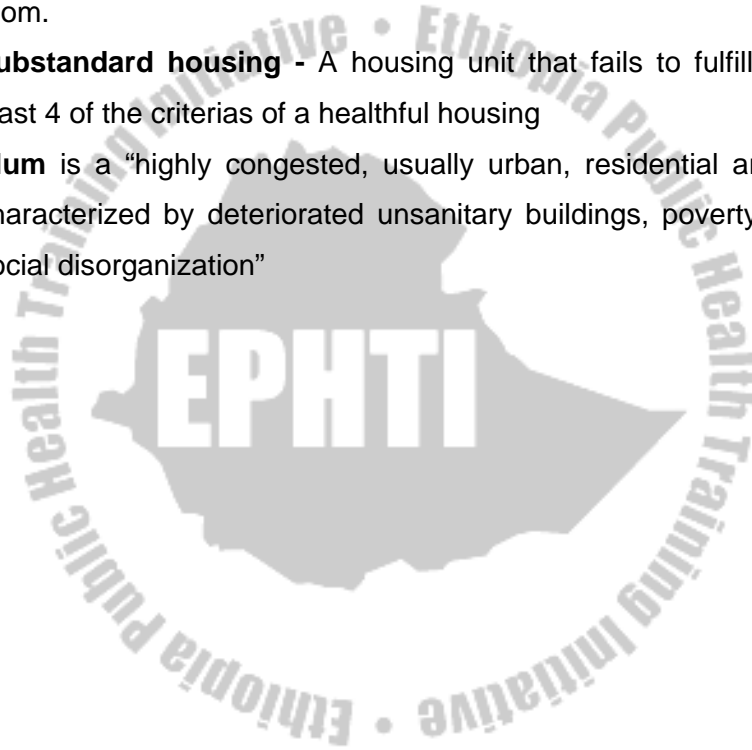
Illumination - the provision of light to a living or working room.

Natural ventilation - the introduction of clean air into a room through windows and doors naturally

Rat proofing - Sealing or arranging barriers on building structures so that rats and mice will not get access to the room.

Substandard housing - A housing unit that fails to fulfill at least 4 of the criterias of a healthful housing

Slum is a “highly congested, usually urban, residential area characterized by deteriorated unsanitary buildings, poverty & social disorganization”



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