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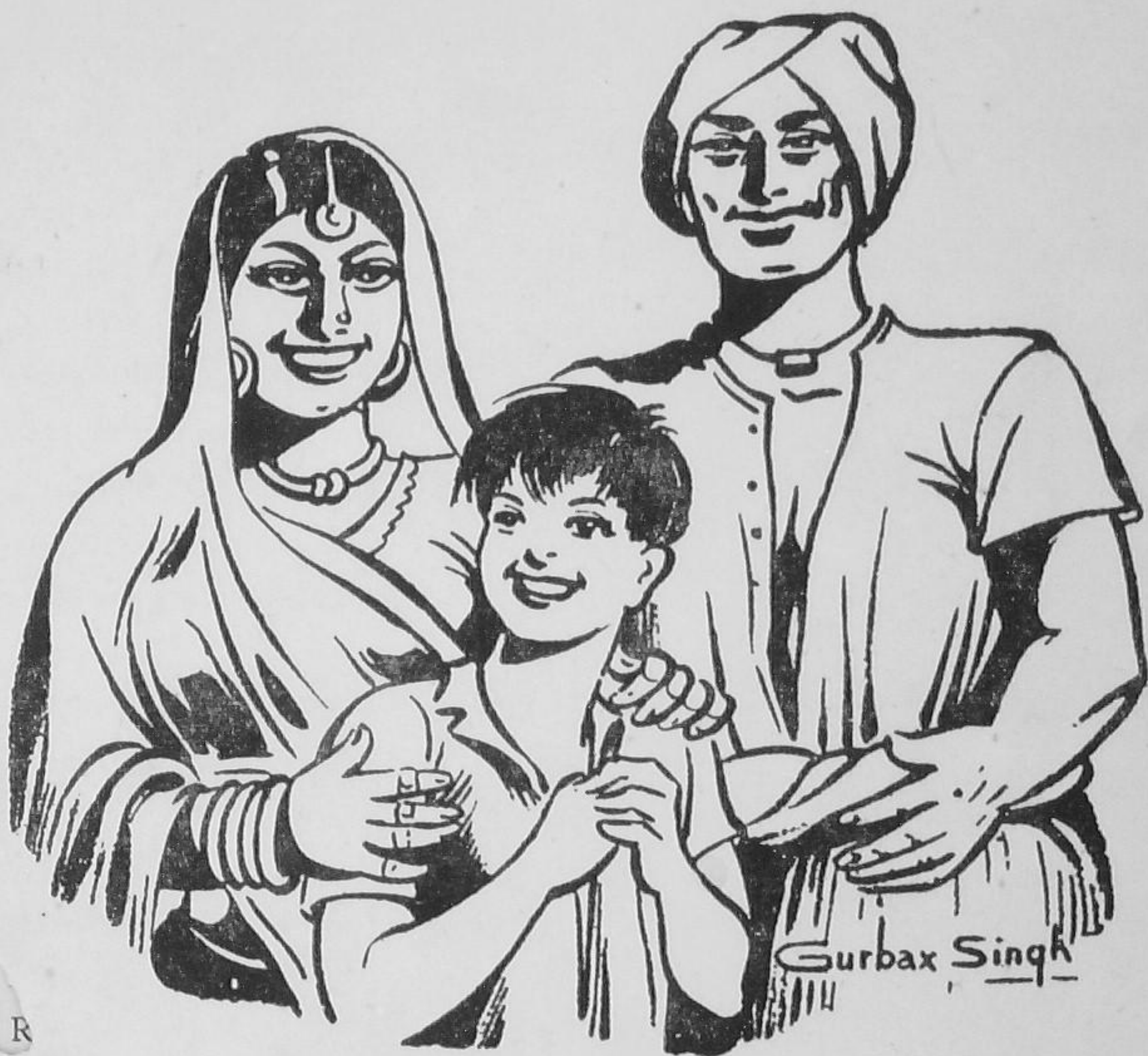
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Manual of Health



Ministry of Community Development
Government of India

MANUAL OF HEALTH



MINISTRY OF COMMUNITY DEVELOPMENT
GOVERNMENT OF INDIA

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PREFACE

This Manual is only a guide and not a text book. It is specially written for the Village Level Worker and other non-medical personnel working in the community development areas of the country. It has a utility even for the health staff. The Manual deals with some of the most common and urgent health problems of rural India and how to solve them. Our villages, where most of our people live, have not received the attention they deserve with regard to provision of Health Services ; in fact, they have been very much neglected. The Community Development Programme is primarily meant for the general improvement of the villager. After all it is he who tills the soil and gives us our bread. It is also a fact that most of the epidemic diseases have rural origin. The villagers' present condition is due to poverty, disease and ignorance. The Community Development Programme is to combat all the three. There is a great deal of ignorance about the causation and transmission of disease among our people both rural and urban. Superstition has been and is still a major factor in their concept of health and disease. To seek the people's intelligent cooperation and participation in the Health Programme, it is essential to educate them in the broad principles of health and causation and prevention of disease. No nation can be healthy unless the people aspire to be healthy. In the improvement of personal health and prevention of disease, every individual has to play his part because it is the individual, who not only harbours the disease-producing germs but actually helps in the transmission of disease to others by his carelessness. Nearly 30 lacs of people die annually in our country from gastro-intestinal diseases like cholera, typhoid group of fevers and dysenteries, as a result of soil pollution resulting in contamination of drinking water supplies and contamination of articles of food by polluted dust and flies due to carelessness and unhygienic habits of our people. It must be emphasized that there can be no real economic or social progress in the community development areas unless health problems are satisfactorily dealt with.

Our chief health problems are provision of safe water supply and hygienic disposal of human waste, control of malaria and other communicable diseases like cholera, typhoid, plague, hook-worm, provision of maternal and child health services, improved housing and health education. A brief description of these problems and some others has been given in this Manual. Unnecessary details have been avoided. Those who are interested in details are requested to consult standard text-books on the subject. The intention is that the Village Level Workers, the Social Workers and others working in the community development areas who come in day-to-day contact with the villagers, should be able to develop some of the health problems as the 'felt-needs' of the people. In addition, the knowledge acquired by reading this Manual will help them to take prompt action in an emergency as a first-aid measure till the arrival

of the health staff. In short, the objective of the Manual is to educate our workers in the field of personal health and improvement of environmental sanitation.

Some of the photographs in this Manual have been borrowed from various health workers and institutions. I am most grateful to them.

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WATER

Water is vitally important for life. It is important next to air. A living being cannot survive without water for more than a few days, though he may live without food for several weeks. Safe and sufficient water is essential for maintenance of health and prevention of disease. Impure water (contaminated) is responsible for a number of gastro-intestinal diseases like cholera, typhoid, dysentery.

Water is an essential component of all tissues, comprising on the average 70% of the total bodily constituents. The metabolic and chemical process taking place in the body require water as a medium. Water is necessary to throw out waste products from the system through such organs as kidneys, bowels, sweat glands and lungs. The excretory process through sweat glands and lungs increase in hot weather and hence people feel more thirsty in summer than in other seasons. Thirst indicates the necessity for replenishing the loss of water or body fluid due to excretory process. Water preserves the fluidity of blood and lymph in the body.

Besides this direct intake, water is also required for many other purposes, without which life would be difficult, though not immediately impossible. These requirements are :—

- (i) *Personal cleanliness*—Washing, bathing, etc.
- (ii) *Domestic purposes*—Cooking, general washing and cleaning.
- (iii) *Municipal purposes*—Watering of roads, streets, flushing drains and sewers, watering of parks and gardens and extinguishing fire. Cleaning of stables and cow houses.
- (iv) *Industrial purposes*—For use in various industries.
- (v) *Cattle*—Cattle too, like men need water. The requirement of water for domestic animals like cows, buffaloes, horses is even greater than that of human beings. Water is required not only for their drinking, but for keeping them clean.

Water for drinking and cooking purposes should be palatable and free from contamination. If drinking water is not palatable, people are likely to use any other kind of water that is available, even if it is not free from contamination.

Characteristics of good water :—It must be pure, clear and sparkling. It should be free from odour and taste. It must not contain any organic matter or disease-producing germs.

Daily requirement of water :—Quantity of water required per head for drinking and domestic purposes is estimated to be 5 gallons at the minimum. The total requirement for all purposes, as mentioned above, would be about 35 gallons per head.

Sources of water

(i) *Sea* :—The main source of water is the sea. After evaporation sea-water comes back to the earth in the form of rain, snow, hail, dew or mist, which collectively provide us with such sources of water-supply as rivers, lakes, wells, springs, etc. By condensation, sea-water can be used for drinking purposes. But it is rarely used in this manner since more natural and economic sources of water are easily available.

(ii) *Rain Water* :—Rain is the primary source of all water, which may be used for human consumption. It is the purest form of water available in nature, though on its contact with earth it gets contaminated. The taste also undergoes a change due to aeration and presence of salts in the earth.

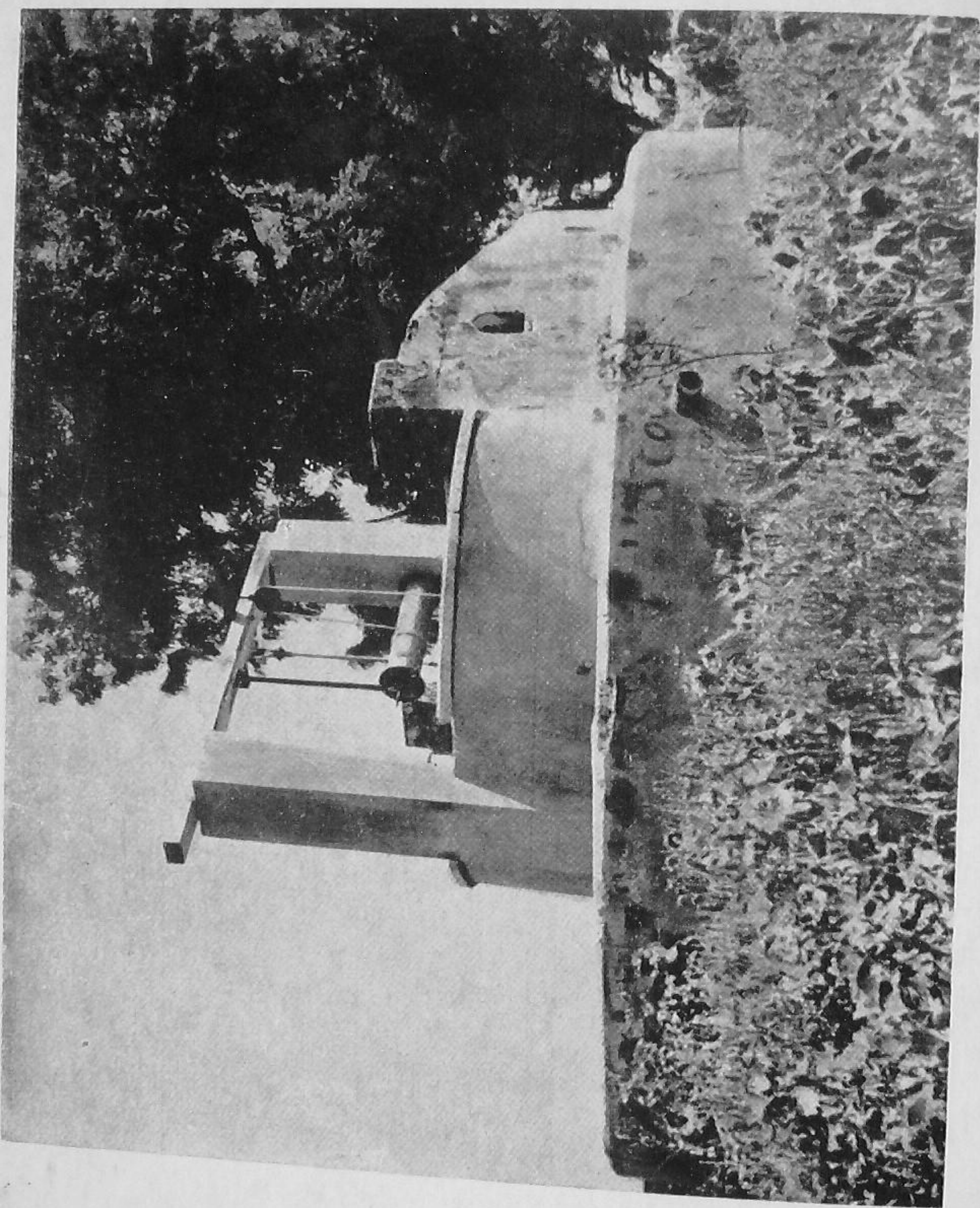
On reaching the earth surface, rain water forms rivers, streams, lakes, etc. It also percolates below the earth. The water so percolated may be tapped through wells or springs.

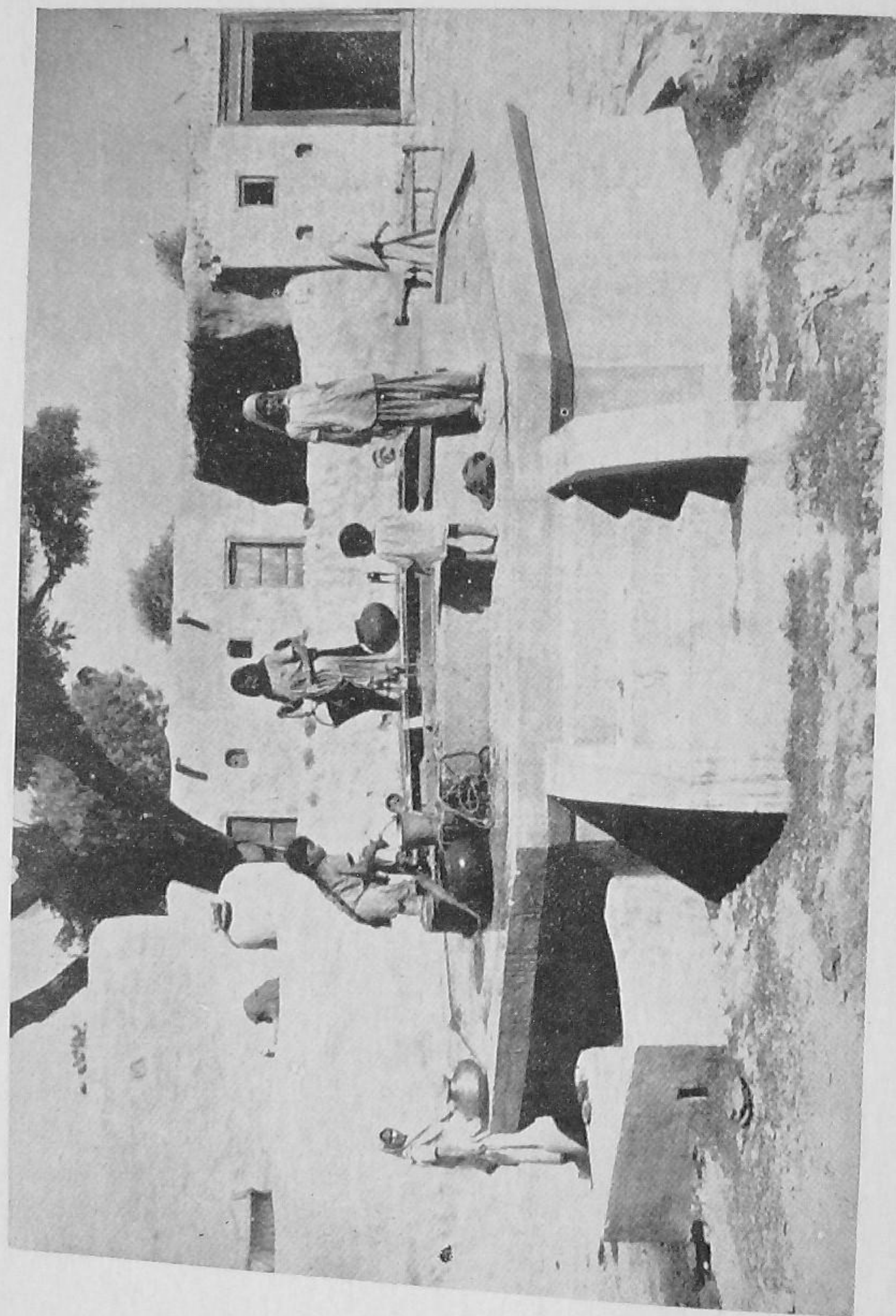
In order to guard against contamination of rain water by men and animals, it is stored in reservoirs located at high level. A regular check of these reservoirs has to be kept and water has to be chlorinated before use.

(iii) *River Water* :—The water of snow-fed rivers at places beyond human habitation is fairly pure and unpolluted, and good potable water may be obtained from them. The large rivers of Northern India are mostly pure near the source but their water gets contaminated when they pass through towns and cities. Rivers are generally used for washing and disposal of sullage and industrial waste. The river water is also polluted by the disposal of dead bodies before cremation. This practice takes a more serious turn when the dead bodies of cholera, smallpox or other infectious diseases' victims are disposed of in these rivers. This is specially true of the Ganges and the Jamuna. This malpractice has been responsible for repeated outbreaks of severe epidemics in villages, towns and cities situated on or near the banks of these rivers.

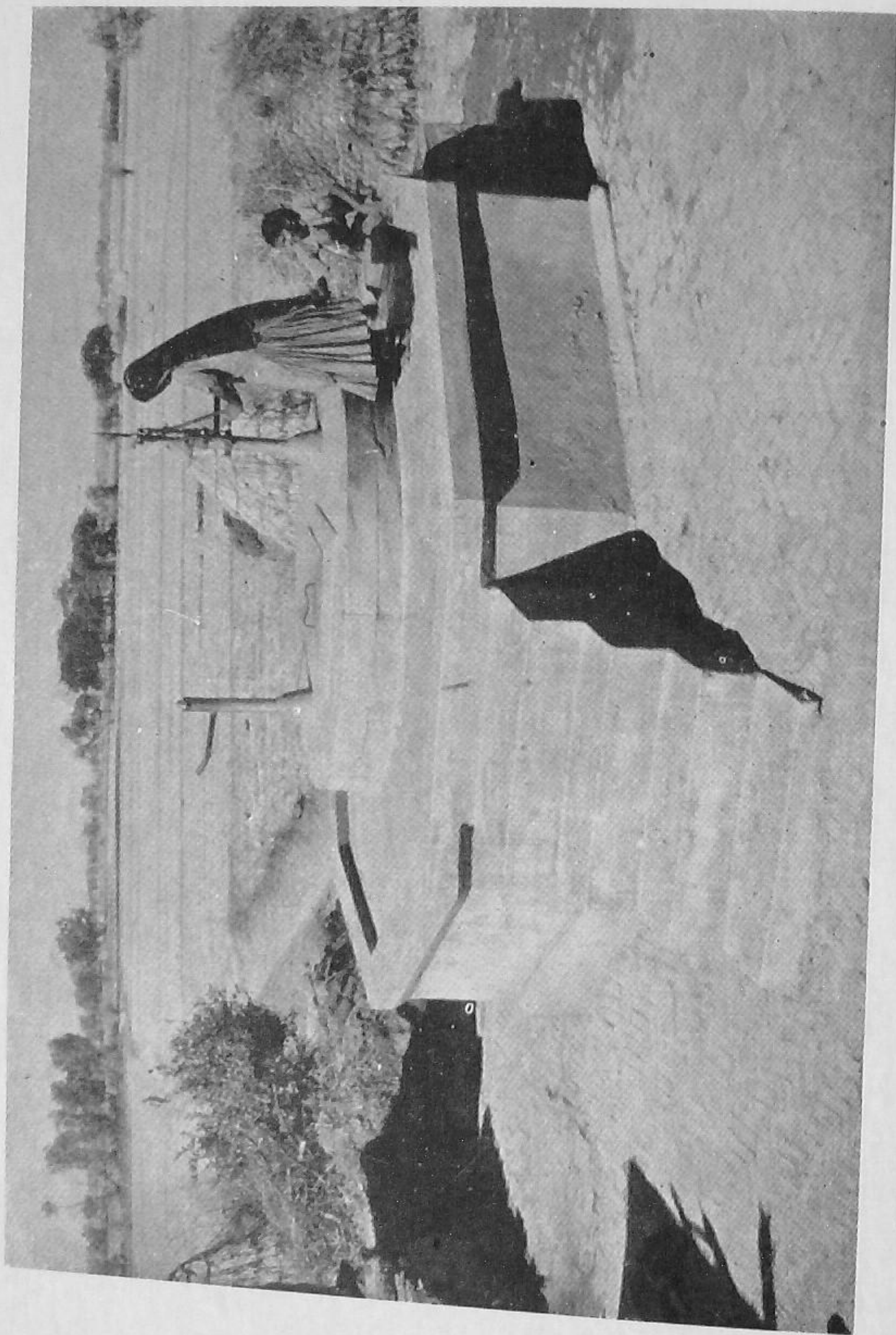
Because of these pollutions it has become imperative to provide filtered and chlorinated water to the people living on or near about the river banks, but the cost is prohibitive. The Government, therefore, is impressing upon the local bodies to take effective steps against the pollution of rivers and canals. Provisions have also been made in the Indian Penal Code, as well as in Municipal Acts, to prevent the pollution of rivers and water courses. If drinking water is drawn from the river, it is better to dig a shallow well near the bank four or five feet deep, so as to form a natural filter. The water will be quite clean but may not be free from disease-producing germs and as such it would be necessary to boil the water and then let it cool in an earthen pot before drinking.

(iv) *Wells* :—Wells form the most common source of water-supply in our villages and towns. In fact, construction of wells for the public use has been considered a religious act of great sanctity in India. Most wells are of shallow or surface type, which tap the sub-soil water and are therefore liable to easy contamination.





An insanitary well



A sanitary well with two hand pumps and a lift in the centre of the cover of the well to facilitate drawing of water if both the hand pumps go out of order.

Sources of contamination of wells—

- (1) Using dirty buckets and ropes for drawing water.
- (2) Bathing by the side of the well.
- (3) Washing of clothes and utensils near the well.
- (4) Surface drainage.
- (5) Defective construction of the well.
- (6) Cracks and fissures in the walls of the well.
- (7) Falling of leaves from the trees.
- (8) Insanitary habits of the people.

Requirements of a good well :

1. It should be located at a high ground and at a distance of at least 30 yards from habitation.
2. It should have a cement concrete lining inside to prevent percolation from the neighbouring area.
3. It should have a cemented parapet about 3 feet above ground level to prevent surface washing entering into it.
4. It should have a cemented platform about 6 feet in width all around with a gentle slope to prevent stagnation of water around the well. The slope should end in a shallow channel all around, emptying itself in a drain which will carry the water away. This drain should be at least 30 yards long and terminate into a soakage pit or may be disposed of into a field or by sub-soil irrigation.
5. No cesspool, open drain or manure pit should be within a radius of 80 to 100 yards of the well. Bathing, washing of clothes, utensils or animals should not be permitted near the well.
6. It should have a suitable cover and to facilitate cleaning, climbing hooks should be fixed in the well during construction. Suitable cover will also prevent breeding of mosquitoes in wells.
7. To prevent people from using their individual utensils and ropes of doubtful cleanliness for drawing water, the well should be fitted with a hand-pump. Unfortunately the hand-pumps are liable to get out of order and as such ready arrangements must be made available to repair these.

(v) *Deep wells* :—These are a good source of water supply provided precaution is taken to prevent the above sources of contamination. The cost of construction of deep wells is fairly high and villagers can seldom afford it.

Note—Wells have an advantage over tanks in that they can be easily cleaned and the water in wells can be easily disinfected when necessary.

(vi) *Tanks and Ponds* :—These are a common source of water supply in the rural area and sometimes they are the only source of water supply. Unfortunately they are easily polluted. People bathe

and wash in these. Cattle and domestic animals are often found wallowing in them. Being at a lower level, they receive all the drainage and surface water from the village. Sometimes jute and bamboo are also steeped in it, which give it a bad smell. Further tanks and ponds are also polluted by floods unless they are properly protected by embankments. If water from a tank must be used for drinking purposes, the following precautions should be taken to prevent pollution :

1. Tanks should be sunk in good soil and good surroundings.
2. Tanks should be well sloped.
3. No sullage or surface drain should enter the tank,
4. No bathing, washing or cleaning of utensils be permitted in or near the tank.
5. No cattle or domestic animals be allowed to enter it.
6. It should be fenced off to prevent entrance of animals.

Tanks in India have a good power of natural purification due to sunshine and heat. If the above precautions are strictly observed, tanks can become good sources of water supply. Water from the tanks should be drawn by hand-pumps. No direct access should be permitted to the tanks.

If the tanks are the only source of water supply, it is better to have separate tanks for drinking water and separate for washing and bathing. Even tanks meant for bathing and washing should be kept as clean as possible for dirty water will not do to wash oneself and one's clothes.

(vii) *Springs*: Spring water flows spontaneously on the surface rising from below. Spring water, therefore, has less chance of contamination and can be protected against pollution by a little care. There should be no leaky cess-pool, stable or privy nearby. To protect from surface washing, there should be a concrete parapet wall around the spring. A drain should be provided around the spring to take away the surface water.

Impurities in Water

Water in an absolutely pure state is not available in nature. But from the hygienic point of view, water is said to be pure and suitable if it is free from disease producing germs.

Water is generally contaminated with sewage matter containing bacteria. This leads to spread of water-borne diseases like cholera, typhoid and dysentery.

In addition to bacterial impurities, there may be other impurities as well, like :—

I. *Suspended impurities* :—Suspended impurities may be inorganic like that of sand and silt, or organic derived from vegetable or animal sources.

2. *Dissolved impurities* :—Water may also contain dissolved impurities in the form of gas as sulphurated hydrogen ; or salts like chlorides, calcium, magnesium sulphate, iron and lead.

Chemical and physical impurities are not so dangerous as human pollutions. Chemical and physical impurities are at time so great that they render the water unfit for human consumption by affecting its colour, odour and taste.

Vegetable impurities give rise to intestinal troubles like diarrhoea. Bowel irritations and diarrhoea are also caused by suspended mineral impurities.

Hard waters, due to excess of salt solution in it, become unsuitable for washing or domestic use.

Methods of Purification of Water

The following methods are used for the purification of water :—

1. *Natural Method* :—Natural method of water purification consists of (i) storage, (ii) aëration, (iii) sedimentation and (iv) exposure to sunlight.

(i) *Storage* :—When water is stored in a lake or a reservoir, disease-producing bacteria die a natural death, for water so stored fails to provide the bacteria with the natural media in which they grow. Within seven days of storage, there is a considerable reduction in the pathogenic organisms ; and with one month of storage all bacteria die leaving the water safe for drinking purposes.

(ii) *Aeration* :—The aerobic bacteria and aquatic plants give off oxygen, oxidising the organic material of sewage which, otherwise, provides food to pathogenic bacteria. Pathogenic germs, consequently, meet a natural death on the oxidation of waste products in the water.

(iii) *Sedimentation* :—With the process of storage, the inorganic matter with the entangled disease-producing germs, settles down. The process of sedimentation is an important method of water purification. The process takes place in tanks, lakes and rivers.

(iv) *Sunshine* :—Sunshine through its ultra-violet rays and heat has a germicidal action on the surface of the water.

We, however, can hardly depend exclusively on the natural agencies for the purification of water. This can be done more effectively and at the same time more quickly by artificial methods.

2. *Artificial Methods* :—Artificial methods are (a) physical, (b) chemical and (c) by mechanical filtration.

(a) The chief physical method of purification is by means of boiling.

Boiling :—It is an easy domestic method. It can easily be used in homes to render a doubtful or positively impure water quite safe for drinking purposes. Boiling kills all the germs ; in addition it removes temporary hardness of water. It is a simple method of

preventing water-borne diseases like cholera, typhoid, dysentery, guinea-worm, etc. Villagers should be encouraged to adopt this method.

(b) The chemical methods of purification are :—

(i) *Chlorine* :—Various substances are recommended but chlorine in the form of bleaching powder is both effective and popular. To disinfect a village well, only $\frac{1}{2}$ to 1 oz. of bleaching powder is needed, the usual chemical strength employed being one to one million parts of water. Bleaching powder is dissolved in water in a bucket and then poured into the well. Water is safe to drink after one hour as it takes that much time to sterilise the water by this method. Sterilisation of well-water by this method is of not much use if the water in the well is muddy and turbid.

(ii) *Potassium Permanganate* :—Potassium permanganate destroys organic matter which provides food to the bacteria, and thereby it kills disease-producing germs. Take a handful of potassium permanganate crystals and dissolve them in a bucket full of water. This solution is then poured into the well and the water stirred. This disinfection should be carried out late in the evening so that water is ready for drinking early in the morning. It takes 4 to 6 hours to sterilise the water by this method. It should be explained to the people using the well that the pink colour in the water which they draw in the morning is quite safe and has no ill effect of any kind.

(c) *Methods of filtration* :—Filtration is employed for the purification of water on a large scale.

(i) *Slow sand filtration* :—Filtration by this method is done by letting water pass through a settling tank having its base at a higher level than the filter bed. Filter bed consists of sand and gravel. Water is passed through it after sedimentation. The real filtration work is done by the 'Vital layer' consisting of vegetable organisms which form a jelly like zoogeleal mass upon the upper layer of the filter bed, and in the interstices in the sand. This vital layer is formed after 3 days and therefore the water which passes through the filter during the first 3 days is not considered safe. This layer becomes very thick after 2 to 3 months and the process of filtration becomes slow. At this stage it is necessary to stop the inflow of water and when the top layer of sand is dry it should be scraped to a depth of $\frac{1}{2}$ inch or so and replaced by fresh sand. This process may take 3 to 4 weeks. When set, the water is permitted to flow into the filter bed and allowed to go waste during the first 3 days. By this time a new vital layer is formed and the filtered water can be used for drinking purposes. The process of scraping the vital layer and replacing it should be done every two or three months.

(ii) *Rapid or Mechanical filtration* :—It works at a rate of 50-60 times greater speed than the slow sand filter. After allowing the process of sedimentation in the settling tanks, the water is mixed with alum and is passed through a gravity filter or pressure filter as the mechanism is. In this filter, alum blocks take the place of the

vital layer of the slow sand filter. The construction of the mechanical filter requires less land than the slow sand filter. These filters have to be cleaned once a day by reversing the flow of water from below upward and allowing the filter bed to resettle. The whole process takes an hour or so and the filter bed is ready for action.

Note :—It must be emphasized that water after filtration by any of the methods noted above must be chlorinated to make it safe for drinking.

(iii) *Domestic filters* :—Water is passed through porcelain candle for filtration. The popularly used filters are : (a) The Pasteur-Chamberlain filter, and (b) Berkefeld filter, but these are of doubtful utility. Besides, the candles have to be washed, scraped and boiled every three to four days to make the process of filtration effective.

AIR AND VENTILATION

Air is essential for life and pure air is a most important factor for health. The discomfort of a closed room and still air is known to everybody. In addition to the discomfort, stagnant atmosphere is responsible for the spread of many diseases, due to droplet infections such as common cold, influenza, diphtheria, meningo-coccal meningitis, etc.

Air is a mixture of various gases and when pure, consists of :

| | | |
|-------------------|---------|---|
| Nitrogen | 79 | % |
| Oxygen | 20.9 | % |
| Carbonic acid gas | .04 | % |
| Water vapour | varies. | |

In addition, there is a certain amount of organic matter, ozone, sodium salts and other mineral substances,

Changes in the composition of air take place as a result of respiration of human beings and animals, from the burning of fuel in houses and factories and from the addition of dust. Dust is an important impurity in the atmosphere in the tropical countries and varies in different regions and climates. It is derived from the soil and consists of organic matter, inorganic matter and bacteria.

The problem of dust is very acute in our villages and is responsible for a large number of eye diseases. Dust is also responsible for contamination of articles of food and drink. Everyone must have noticed that a number of small children who play about in the village lanes are covered with dust and these little children without washing their hands properly, eat their food and thus may be swallowing germs of disease along with their food. In view of this, effort is being made by all public health minded people to pave the streets in the villages and also provide adequate drainage.

The main changes in composition of air due to respiration are :—

| | <i>Inspired air</i> | <i>Expired air</i> |
|-------------------|---------------------|--------------------|
| Oxygen | 20.9 % | 16.4 % |
| Nitrogen | 79 % | 79.19 % |
| Carbonic acid gas | .04 % | 4.4 % |

Expired air contains more of carbonic acid gas, less of oxygen it is warmer, saturated with moisture and contains some organic matter and bacteria.

The ill effects produced in a stagnant and over-crowded room are due to lack of air movement, rise of temperature and increase of humidity. In addition, there is rise in the carbonic acid gas and a fall in the oxygen level.

Air stagnation in crowded rooms, ill-ventilated picture-houses, etc. leads to a feeling of fatigue, rapid pulse, giddiness, flushed moist

skin due to strain on the heat regulation centre and the heart, in addition to droplet infection. People living constantly in ill-ventilated houses keep poor health and are pale and anæmic.

Diseases due to impurities of air :

1. Due to bacteria—special kinds of bacteria (germs) in overcrowded rooms may produce diseases like sore throat, common cold, influenza, diphtheria (a serious disease of the throat and upper nasal passages), etc.

2. Due to various forms of dusts inhaled during certain occupations such as working in mines and quarries—these diseases affect the lungs causing phthisis, asthma, etc.

3. Due to inhalation of gases like carbon monoxide, chlorine, sulphurated hydrogen, etc. by those working in factories.

Ventilation :—Ventilation means dilution or removal of stagnant atmosphere. The three essential factors in ventilation are :—

| | | |
|------------------|-----|-------------------|
| (i) Air movement | ... | 3 feet per second |
| (ii) Temperature | ... | about 70° F. |
| (iii) Humidity | ... | about 65%, |

On an average about 3000 c. ft. of air are required per person per hour. Adequate floor space and window space are important factors for proper ventilation. Less floor space leads to overcrowding and favours spread of droplet infection. It also leads to need of changing air very frequently, thus creating draughts. In ordinary houses the floor space should be 150 sq. ft. per person. In infectious diseases hospitals, it should be 144 sq. ft. and for general hospitals 100 sq. ft.

The window space should be at least 1/10th of the floor space.

Systems of ventilation :—There are two systems of ventilation, the natural and the artificial. The artificial system is costly and entails the use of special apparatus like extraction fans, etc. It is not practical for general use in India. The natural system of ventilation is due to three factors :—

- (i) Perflation (i. e., air blowing through a room) and aspiration,
- (ii) Differences in temperature, and
- (iii) Diffusion of gases.

It is helped greatly by proper arrangement of inlets and outlets for air, and by providing adequate open space outside the houses. Each room should have windows which open directly to the outside air. Flues should be provided for removal of smoke. Weather permitting, doors and windows should be kept open. Also people should not sleep with their faces covered. Cross-ventilation means a free passage of air between windows and other openings placed directly opposite each other. In Indian villages, where houses are built back to back and side to side, no cross-ventilation is possible. These should be provided with a skylight so that fresh air may be admitted from the top. These points should be borne in mind during expansion of the existing villages and when planning the construction of new villages.

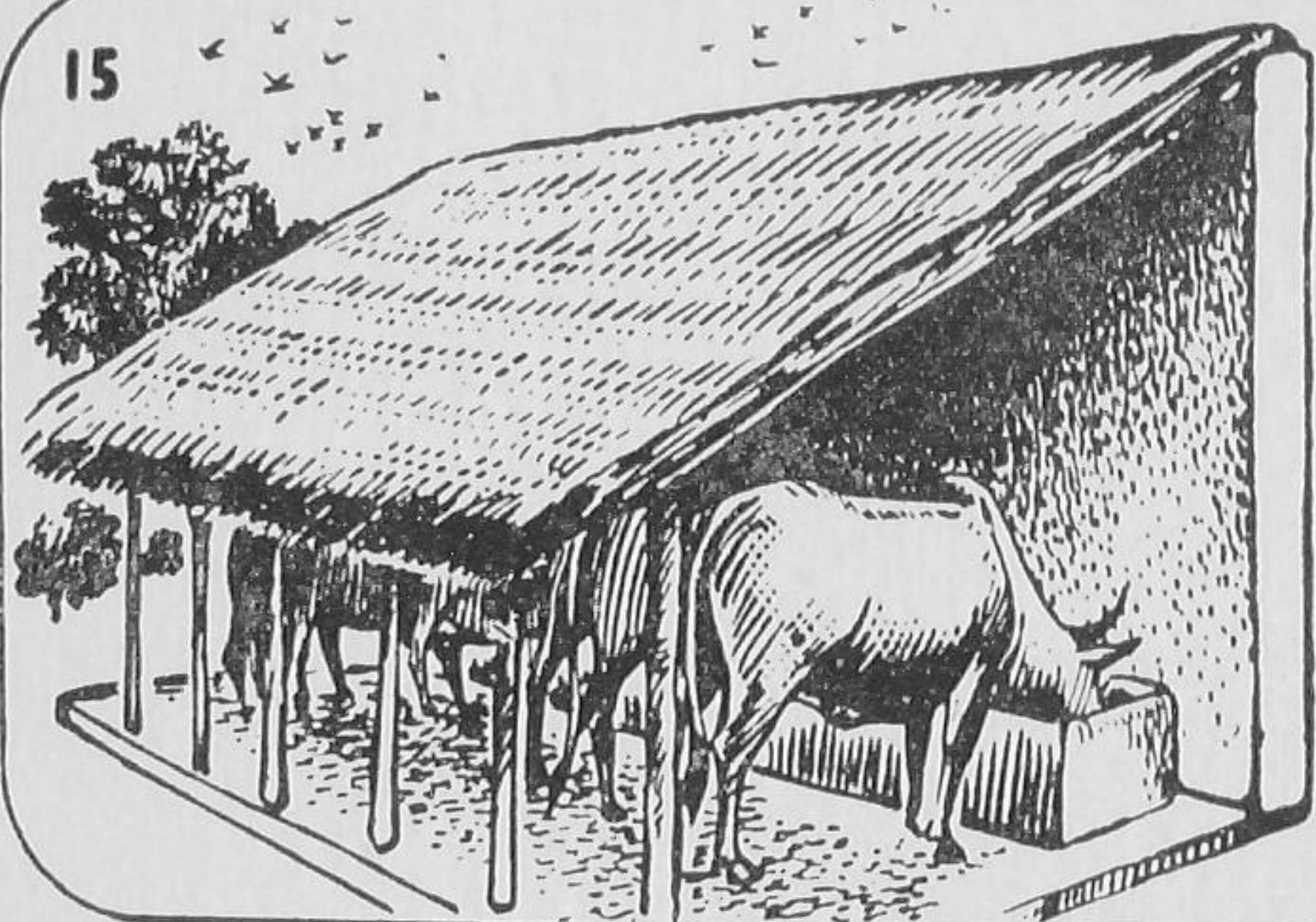
SOIL AND HEALTH

Upper layers of the earth constitute the soil. It is a living force and is continuously giving out air and moisture. It also contains bacteria and nitrifying organisms which help in the disintegration of all organic matter resulting in purification of human and animal excreta and dead bodies that are deposited into the earth. High and dry land is good for health while low lying areas are unhealthy as they accumulate water and are damp on account of high level of sub-soil water. Damp atmosphere in the houses leads to respiratory diseases like sore throat, pneumonia and broncho-pneumonia.

Diseases due to soil pollution :—Soil is being polluted constantly by human beings and animals but fortunately it has the property of purifying itself to some extent. Polluted soil is dangerous to health. Soil polluted with germs of cholera, typhoid, dysentery, etc., is liable to contaminate the sources of drinking water like wells, tanks, ponds, rivers, etc., as the soil gets washed into them. Hook-worm is the most common infection conveyed to human beings through polluted soil. The ovas of this disease are passed with the stools of the people suffering from it and live in the soil even after the stools have dried up. Later when these ovas come in contact with the bare skin of human beings, they penetrate and cause the disease. As such, it is essential to have sanitary latrines, particularly in the rural areas and people should also be warned not to walk bare feet. Ordinary sandals or chappals can protect people from this infection. Other worm infections may also occur. Some other serious diseases like tetanus and anthrax can also result from polluted soil. Spores of tetanus and anthrax bacilli are present in the intestinal discharges of animals especially of cattle and horses. After the discharges are dried up, the spores are found in the dust on roads, streets and fields. These spores are common wherever there is horse traffic or movement of cattle. A large number of people develop tetanus and die every year in India as a result of accidents on streets, roads, and even in the manured fields.

Made Soil :—When low lying areas like tanks, ponds and other depressions in the ground are filled up with household refuse and other rubbish, the resulting site is called 'Made Soil'. Made soil is not a healthy soil as the process of nitrification is going on. The land recovered after filling with this type of soil should not be used for construction of residential houses for 15 years. In the process of filling up, care should be taken not to throw dead animals or faecal matter.

15



**PROVIDING PLANS FOR HOUSING
ANIMALS AWAY FROM THE FAMILY
LIVING SPACE**

HOUSING

Housing is a health problem of the first order and is one of the most important unsolved public health problems. A vast majority of the houses in our villages and towns are woefully deficient in the essential physical and social requirements of a residential house. Overcrowded, structurally unsound, insanitary and infested with vermin, they lack the simplest arrangements for cooking and storage of food and safe water supply for drinking and washing.

The existing housing conditions in our villages are not conducive to healthful living. The houses have been constructed in a haphazard manner without any proper planning. Most of the houses are back to back and side to side which means that the walls at the back and side are common with other houses. Such construction does not permit windows in the walls at the back and the sides of the house. Windows are essential for cross-ventilation so that the air can freely circulate and purify the house. Windows are also necessary to admit sun and light. No provision exists for drainage and latrines. Sullage water from the houses is permitted to flow in the village lanes causing nuisance and smell due to stagnation. The villagers go out into the field and use it as an open latrine. Cattle and other animals are often kept in the same rooms in which the people live themselves. There are hardly any houses with proper arrangement for cooking with the result that the smoke enters in all the rooms causing discolouration and darkening apart from irritation to the eye of the inmates.

"Health means more than just staying alive. Health means vigour and efficiency and satisfaction in living." Winslow.

We are concerned with the provision of homes and neighbourhood that are positively good—a residential environment that permits mental and social well being as well as physical health. Bad housing leads to insanitary conditions and unhealthy habits and destroys incentive towards cleanliness. Insanitary habits are responsible for pollution of homes, streets and sources of water supply from which the people acquire disease by direct contact and as a result of contamination of food by flies and dust. Such insanitary housing conditions are responsible for high infant mortality, particularly due to infantile diarrhoea.

Overcrowding is responsible for a number of communicable diseases such as common cold, influenza, tuberculosis, typhus and other infectious diseases. The danger of infection is always greater in overcrowded and unventilated houses.

Cleanliness of the dwelling depends on such construction as will facilitate cleaning. Provision of adequate daylight in the houses is essential to avoid danger of eye strain and also to facilitate cleanliness. Good visibility is a major factor in stimulating healthy habits

and personal cleanliness. Further it is essential that direct sunlight should enter the house at some hours during the course of the day. Sunlight, particularly through its ultra violet components provides valuable physiological stimulation. Sunlight and fresh air also destroy a large number of disease-producing germs.

To remedy the conditions mentioned above, houses in the villages should be constructed in accordance with an approved plan. Selection of site is also very important. Houses should be built on a dry and preferably on an elevated ground so as to avoid dampness, otherwise it would be necessary to provide a high plinth. Marshy and low lying areas should be avoided as they are liable to flooding which would cause dampness of the houses. A damp house is not good for health. Houses should be constructed in rows and each row should be parallel to the other. Back to back houses should not be permitted and if it is possible, construction of side to side houses should be avoided. There should be a uniform height for all the houses. The lanes between the rows of the houses should be wide enough to permit easy passage for two bullock-carts to cross each other. There should be at least two living rooms of an area of not less than 15x12 feet with a minimum height of 12 feet. There should be cross windows in each room for adequate light and ventilation and the total window space should not be less than $\frac{1}{8}$ th of the area of the room. The house should have a separate room for cooking purposes and this should be fitted with a smoke-flue or a smokeless chulla (see Appendix). There should be a courtyard to permit sunlight and air. On the other side of the living rooms and across the courtyard there should be provision for a bath and a sanitary latrine. Adequate arrangement should be made for disposal of sullage either into the soakage pit or a drain provided in the village lane. Flooring should be of some impervious material. The rooms for cattle must be separate and at a little distance from living rooms. Flooring of the cattle-shed must be of some impervious material like that of bricks and cement or well-rammed earth so that the urine and cow-dung do not soak into the floor and create offensive smell. Places where grain is stored should be ratproof.

On account of the existing pattern of construction of village houses (back to back and side to side), it is most difficult to provide light and ventilation for healthful living. To solve this problem efforts should be made by the village panchayat to acquire those houses that are falling down due to normal wear and tear and these spaces should be used to provide light and ventilation to the surrounding houses. The owner should be persuaded to accept a plot of land elsewhere in the village. Such negotiation will need tactful handling by the panchayat and certain amount of sacrifice by the owner in the larger interest of the community.

*Note :—*For greater details, readers are requested to consult Manual on Rural Housing prepared by the Ministry of Works, Housing and Supply.

PERSONAL HYGIENE

Cleanliness of the body or its different parts is called personal hygiene. Personal cleanliness is considered almost a sacred duty by all the civilized peoples of the world. Hindus have made cleanliness a part and parcel of their religion. According to the laws of Manu, one is not to attend to his daily work without having a proper wash, i.e. attending to his bowels, washing his face, mouth and hands.

Personal cleanliness includes cleanliness of:—

1. Skin 2. Hair 3. Hands 4. Feet 5. Eyes 6. Ears 7. Nose
8. Mouth 9. Bowels 10. Clothing.

1. *Skin*:—The oily secretion and perspiration from the skin should be washed off with soap and water, otherwise they will block the pores of the skin and interfere with the normal functioning of the sweat glands in their excretion of the waste products from the system. Besides, the deposit of dirt on the skin makes the person susceptible to diseases like itch, prickly heat and boils, etc. Special attention should be paid to those parts where perspiration is profuse, e.g. armpits, groin and waist. These parts need to be thoroughly washed and dried at least once a day, otherwise there is always a danger of fungus infections (ringworm, etc.) and infestation with lice apart from production of bad odours.

2. *Care of Hair*:—Hair on the head require to be attended to regularly. It should be washed with soap and water and combed and brushed daily. Negligence leads to the formation of dandruff, which is responsible for baldness in most of the cases. Lice breed in dirty hair, Lice, besides being a nuisance, are also responsible for a very dangerous disease like typhus.

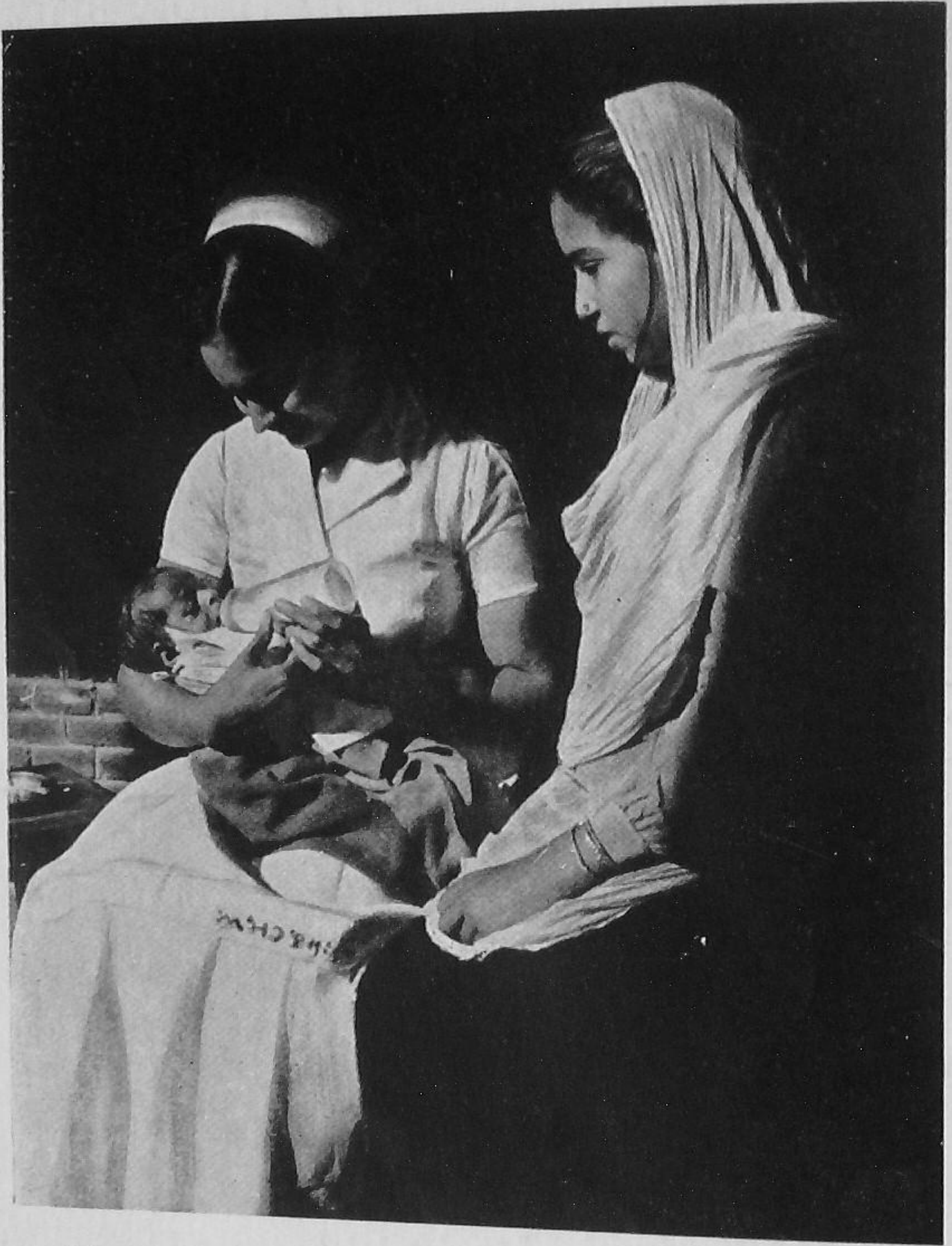
Shaving by barbers should be avoided unless adequate arrangements exist for proper disinfection of all the implements used for shaving. Infected razors, blades and brushes are responsible for the spread of many skin infections, like ringworm, barber's rash and other serious skin diseases. To prevent infection, it is necessary to boil these articles and those that cannot be boiled should be passed through a flame.

Since skin diseases are contagious, other people's towels, shaving sets, combs or soaps, etc. should not be used. Combs and brushes should be frequently washed, cleaned and dried.

3. *Care of Hands*:—Hands should be washed before and after eating. Hands need to be washed with great care after going to the lavatory, otherwise faecal matter which may have been deposited under the nails will be a causative factor for gastrointestinal diseases like typhoid, dysentery, etc. We eat our food with hands and as such infection can easily be carried to our mouths

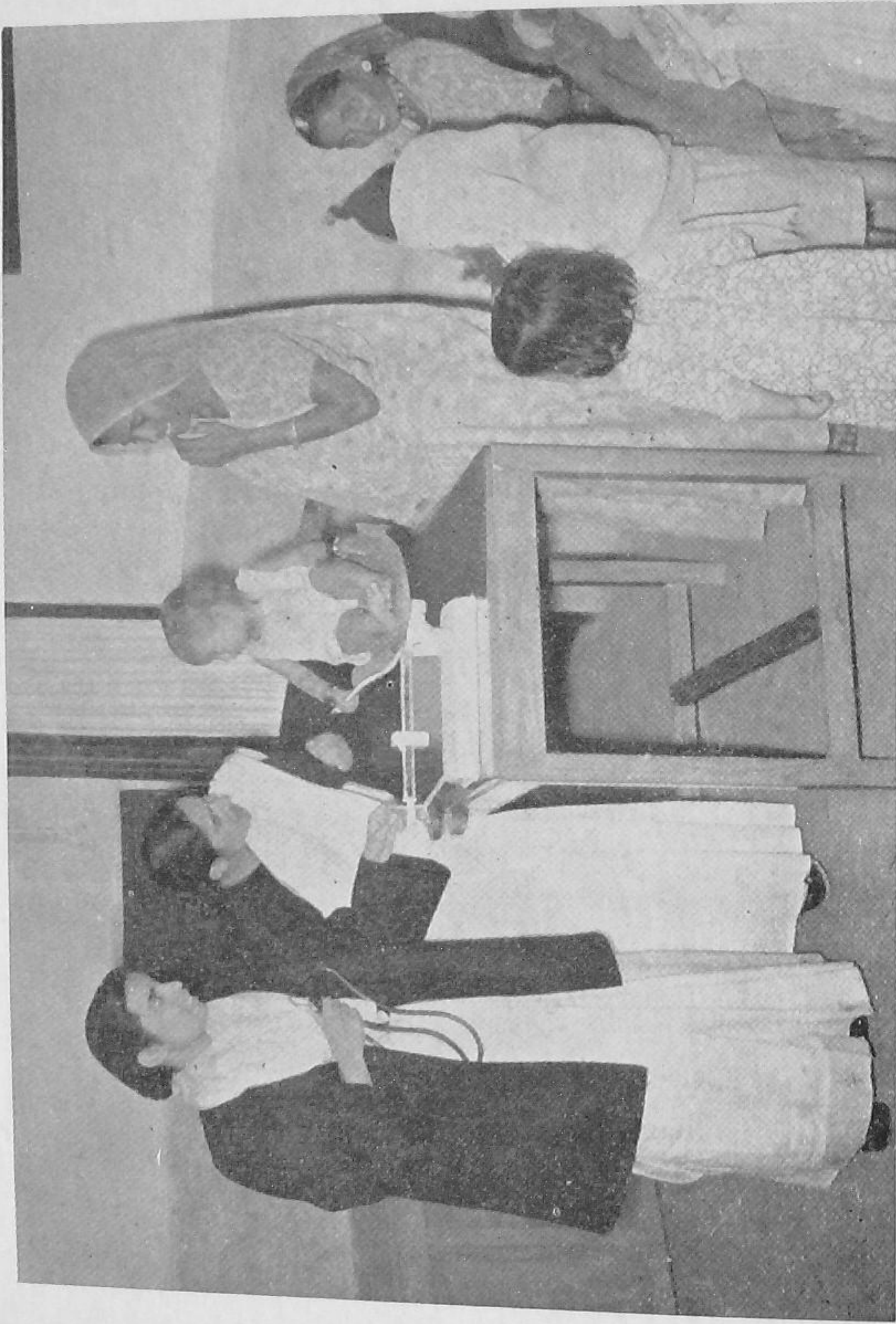
not available, one should take care to cover the fæces with sufficient earth to prevent access to flies.

10. *Clothing*:—Clothing should suit the weather. It should be light and easily washable. Tight clothes should be avoided as they interfere with the circulation of blood and free movement of the muscles, including those of the respiration. Night dress should be light and loose. Under-clothes and socks should be frequently and regularly aired and washed.



Mother being taught the use of feeding bottle to supplement
the inadequacy of breast milk

1875



Baby is being weighed

MATERNITY AND CHILD WELFARE

Maternity and child health services form the basic foundation of healthful living and should be an integrated part of the total health programme of the community. The enormous loss of life and morbidity among pregnant women and children demand special consideration and high priority. About 126 infants die every year out of 1000 recorded deaths; this is in addition to the loss due to abortions and miscarriages. Out of this, about 45 per cent die during the first month of life; as such, care of infants under one year of age, is the most fundamental and important of all public health problems. At no other period of life is the death rate so high and at no other period is the morbidity so readily preventable. Take the case of pregnant women. On a conservative estimate, about 2 lakh women die annually from causes associated with child bearing; in addition 10 times this number is left with impaired health and disability and lowered efficiency. Apart from the suffering and loss, that these figures reveal, the adverse effects produced on the home-life by illness of the mother or her death at a comparatively early age can hardly be estimated particularly from the point of view of the health and well-being of the surviving children. Poverty, ignorance, superstition and social customs, apart from lack of adequate medical facilities during ante-natal, natal and post-natal care of the mother and the child, are chiefly responsible for this state of affairs. A good deal of this mortality, morbidity and human suffering can be reduced if concerted action is taken by the people and the health authorities. The most effective and the most important part of the community's welfare are its plans for the promotion of health of this particular group of people. In the circumstances explained above, it is essential that care of the mother and child must receive the highest priority in any programme for the development of a healthy community.

The health of the mother and the health of the child are so closely related as to be inseparable. In the pre-natal stage and during confinement, the health of the child and even its existence are largely influenced by the health of the mother. Later too, it is the mother's watchful care that wards off the adverse effect of an alien environment to which the child has to adjust itself and if sickness or ignorance of mother-craft prevents her from exercising the requisite care over her baby, the latter must, in majority of cases, suffer the consequences of such neglect.

Causes of Maternal Deaths :—The chief cause of maternal deaths is due to sepsis caused by the introduction of germs from outside into the genitals by the dirty fingers of an untrained *dai* and by using dirty rags to wipe the blood, etc., from the genitals after the birth. In addition excessive bleeding after delivery (post-partum hæmorrhages) and certain toxins circulating in the system as a result

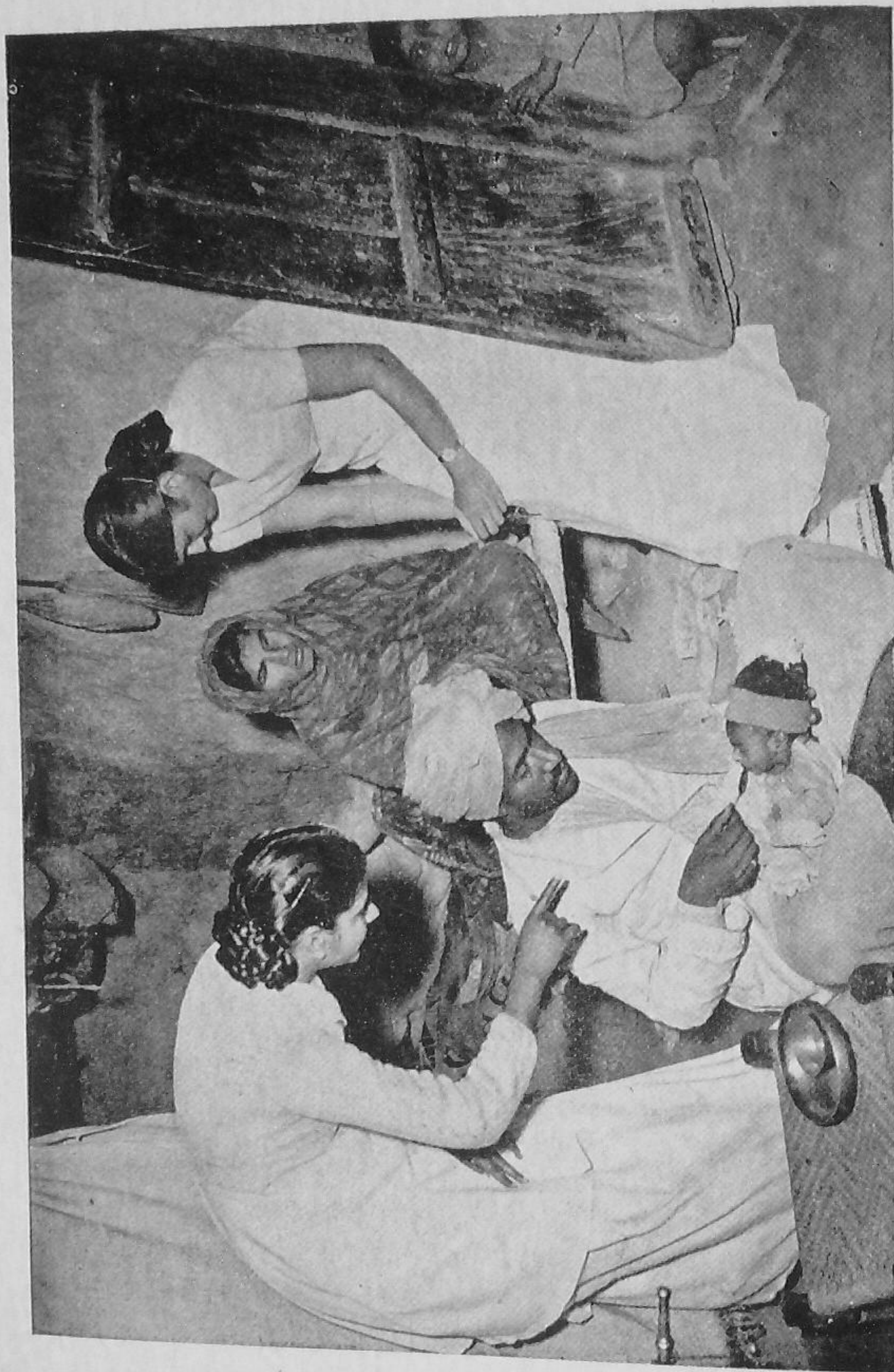
of pregnancy (toxæmia of pregnancy) are also responsible for a large number of deaths of the mothers. Delay and difficult labour involving interference and injury facilitate invasion by germs. Unhygienic environments and unclean habits of the people are the pre-disposing factors. Some of the causes mentioned above can be remedied to a large degree by the provision and use of adequate facilities for ante-natal examination; in fact, adequate ante-natal care, clean midwifery and sound after-care can reduce these deaths considerably.

Causes of Infant Deaths:—Prematurity, under-nourishment of the mother, venereal diseases and ignorance of the mother are some of the important causes of the death of the infants. The diseases with which these infants suffer and die are those affecting the respiratory system (pneumonia and broncho-pneumonia) and gastrointestinal diseases (diarrhoea, dysentery, etc.). These diseases are generally due to the ignorance on the part of the mother as to how to manage the infants. Of course, unhygienic environments and faulty feeding habits help the incidence of such diseases.

The solution of the above problem lies in the development of maternal and child welfare services as a part of the overall health programme of every department of health in India and particularly in the rural areas where such services are practically non-existent. The Community Projects Administration has indicated a draft outline for the development of such services as part of the Health Centres to be established in all the Development Blocks and National Extension Service Blocks. From these centres, services will radiate into the homes of the people in addition to those given at the centres. Apart from the thorough and frequent medical examinations of the expectant mother, she will be given talks and demonstrations on personal and environmental hygiene, mother-craft, etc. Group talks will be given to mothers on how to prepare ordinary baby foods and invalid food and how to take care of the baby in case of minor ailments. Health education of the mother is of great importance if we have to seek her intelligent co-operation.

The expectant mother should attend the Maternity and Child Welfare Centre soon after she becomes pregnant and at least, before the end of third month. She should be examined again about the 32nd and 36th week of pregnancy. In addition, she should attend the centre whenever she feels ill or is worried about her health; in case the mother is too ill to come to the centre, the Health Visitor should be asked to visit her at her home. After the birth, the mother should be encouraged to bring the child to the centre every month for a check-up during the first year of life or whenever the child is not well and later on, every third or fourth month during the second, third, fourth and fifth year of life.

These Maternity and Child Welfare Centres are staffed by Health Visitors, Midwives and trained *dais* under the overall supervision of a qualified lady doctor. The Health Visitor has to carry out home visits to make personal contacts and advise the mothers about the health of the family and improvement of environmental



Father being taught to look after the baby during mother's illness



Home Nursing

sanitation. During the ante-natal period, i.e., before the birth of a baby, a mother needs :—

- (i) Thorough medical examination.
- (ii) Nourishing diet with plenty of milk.
- (iii) Personal cleanliness and regularity of bowel movement.
- (iv) Avoidance of hard work and fatigue.

Maternity and Child Welfare Centres and Health Unit should be centrally located so that these are easily accessible to the mother and also for the domiciliary assistance which is to be rendered by the Health Visitor, Midwife or trained Dai as the case may be. Whenever funds are available, these centres should be properly designed and planned to suit the local requirements, otherwise some suitable premises should be rented for these services. The centres should have the necessary furniture and be well-equipped with medicines and surgical appliances essential for a thorough medical examination and for giving adequate medical care.

Family Planning

It is a technique which enables parents to space out their children and limit their number. They can have children only when they can afford to feed, clothe and educate them. This technique also helps in the development of better health for mothers and children.

Advantages of Family Planning :

1. *Healthier mothers* :—It helps mothers to regain their health and strength between pregnancies. It enables women with serious diseases to postpone pregnancies that might further endanger their health or lives.

It eliminates the motive for induced abortion. Each year thousands of married women die, or permanently injured or made sterile by induced abortions. If they were provided with scientific birth-control methods, the number of such abortions would be greatly reduced.

2. *Healthier babies* :—It helps to insure good health for babies. Certain studies have indicated that babies born two or three years apart have a better chance of life and health.

3. *Happier families* :—It makes every child a wanted child. Parents can plan the size of their families and the spacing of their children. Psychiatrists know that the birth of the unwanted child is a threat to the emotional stability of the family which may leave permanent mark on both parents and children.

Method of birth control :—Parents may be requested to consult their physician or the staff of the Maternity and Child Welfare Centre who will give them the necessary advice. The ideal method should be harmless, reliable and acceptable. It should be simple in application

and care, readily available, convenient, inexpensive and aesthetically pleasant.

Population and birth control :--The birth control knowledge and technique is essential today for the sake of national and international welfare and world peace. World population is increasing and world resources and food supplies are continually diminishing. Modern medicines and Public Health are gradually reducing death rate. It is not possible to have death control without some form of birth control.

There is increasing medical awareness that Family Planning and child spacing are necessary for physical well-being of the mother and the child ; for preservation of health and life. It is essential for the removal of fear and anxiety for an unwanted child. It is necessary for the emotional security of the couple and the children and for the stability of the home and family life. Finally birth control helps to maintain a balance between human fertility and soil fertility.



First-aid during Home visit



FOOD AND NUTRITION

Nutrition is the science which deals (a) with the physiological needs of the body in terms of specific nutrients; proteins, fats, carbohydrates, vitamins and mineral salts; and (b) with the pathological effects produced by failure to meet these requirements.

Food :—Food is a substance which when taken into the body is able to build or repair tissues, protect against ill-health (disease) and supply material for production of heat and energy and maintenance of health. Correct and adequate diet (balanced diet) is essential for the physical and mental development of the people. Food substances essential for maintenance of efficient nutrition and health are :—

1. Proteins,
2. Fats,
3. Carbohydrates,
4. Vitamins,
5. Mineral salts.

1. *Proteins* (flesh forming foods) are the most important of the food factors and are essential for building and repairing of muscles and tissues. They are found both in animal and vegetable foods. Proteins from animal sources are better than those derived from vegetable sources. During pregnancy women need high protein diet for the growth of the fetus and also during nursing of the baby. On account of rapid growth children require more proteins. Persons recovering from illness also need a high protein diet.

Sources :—(a) *Animal proteins* :—Milk and milk products, eggs, meat, liver, fish, kidneys, etc.

(b) *Vegetable proteins* :—Pulses, peas, beans, lentils, soya-beans, etc. Both kinds of proteins are present in green leafy vegetables but in small amounts. A diet composed of both animal and vegetable proteins is best. A long continued deficiency in proteins in diet will impair physical and mental development of the individual.

2. *Fats* :—These are foods which produce energy and heat in the body. Animal fats are a great source of vitamins A and D.

Sources :—(a) *Animal fats* such as butter, ghee, cream, meat fat and (b) *Vegetable fats* such as gingily oil, mustard oil or other vegetable oils.

Too much fat in the diet tends to reduce appetite and may cause indigestion. Animal fats are better than the vegetable fats

because they contain vitamins A and D which are essential for growth.

3. *Carbohydrates*:—They are the body's chief source of energy and heat. They are easily assimilated. They are of two kinds:—

(a) Starchy foods such as wheat, rice, maida and other cereal foods, potatoes, root vegetables, etc., (b) sugary foods such as fruits, honey, dates, raisins and other dried fruits, sugar-cane and sugar made from it.

In a summary form, common sources of proteins, fats, carbohydrates, along with their functions in the body are given in the following table:—

| | Sources | Functions |
|---------------|--|---|
| Proteins | Meat, eggs, milk, fish, wheat, corn, soyabeans, pulses, lentils. | 1. To provide material for growth, and wear and tear of tissues. 2. To provide energy. |
| Fats | Animal and vegetable oil, ghee, meat, milk and milk products, cheese, nuts, cocoanuts, soya-beans. | 1. To produce heat and energy. 2. To mechanically protect tissues from injury. 3. To give shape to the body by filling up of hollows. |
| Carbohydrates | Cereals, root vegetables, fruits, sugarcane, beet-root. | 1. To provide energy and heat. 2. Important factor in the maintenance of body heat. |

4. *Vitamins*:—These are accessory substances present in most foods in minute quantities. They bring about proper growth and repair of the body and preserve our health. Vitamins are produced only in plants from which they pass directly with vegetable food and indirectly with animal food into the system.

They are classified under various letters of alphabet and named A, B complex, C, D, E, K and others which are under investigation. Vitamins are further classified into (a) water soluble and (b) fat soluble. Some of the vitamins are damaged or destroyed if food is cooked in open vessels permitting oxidation by air. Vitamins B, complex, C and E are destroyed if baking powder is used during the process of cooking.

Vitamin A :—Vitamin A promotes growth and is anti-infective. It helps the proper growth of the body. It helps to prevent infection of the eye, nose, throat and chest. It is present in milk, curds, cream, butter, ghee, egg yolk, liver, fish oils, red palm oil, pulses, grains, green and yellow vegetables, e.g. carrots, tomatoes, spinach, lettuce and other fresh green leafy vegetables.

Deficiency of Vitamin A leads to :—

1. Improper growth.
2. Increased susceptibility to bacterial infection.
3. Eye diseases like night-blindness, etc.
4. Respiratory infection like common colds, bronchitis, etc.

Vitamin B complex : This group of vitamins contains a large variety of substances all of which are present in yeast extract. Of these vitamins B₁ and B₂ are very important.

Vitamin B₁ (anti-beriberi vitamin) :—It is present in rice polishings, wheat embryo, outer layer of cereals, yeast, etc. It is essential for proper functioning of nervous system and heart.

Deficiency of vitamin B₁ leads to a disease called Beriberi. This disease is characterized in the beginning with nausea, vomiting, diarrhoea and later there is inflammation of nerves in the legs and arms accompanied by shortness of breath, palpitation, tenderness of calf muscles and oedema of legs.

Vitamin B₂ complex—It is composed of various factors responsible for proper growth and for prevention of certain diseases like Pellagra.

Pellagra :—This disease occurs in maize-eaters. The disease is characterized by buccal and gastro-intestinal disturbances (diarrhoea) and a symmetrical discolouration affecting the areas of skin exposed to sun's rays or to friction. The chief symptoms are inflammation and ulcers on the tongue; inflammation of mucous membrane of the mouth and paralysis of limbs. Even insanity may appear in later stages.

Vitamin C (anti-scorbutic vitamin) :—It promotes and helps in the ripening of red and white blood cells. It helps in healing of wounds. In combination with Vitamin D, it regulates calcium metabolism. It is present in fresh uncooked vegetables, particularly of leafy type, fresh fruit juices, tomatoes, cabbages, turnips, oranges, lemons, amla, guava and sprouted pulses. Vitamin C is destroyed by heat in the presence of air. Heating of vegetables a second time destroys it.

To get vitamin C in adequate amount, it is essential to eat daily some seasonal (cheap) fruit or uncooked green vegetables like tomatoes, lettuce, carrot, amla, guava, banana, orange, etc. Sprouted cereals, beans, peas and other pulses should be eaten raw.

Deficiency of Vitamin C leads to a disease called Scurvy. This disease is characterised by debility, sponginess of the gums, ulceration of the mouth, tendency of bleeding, painful and swollen joints. The disease can occur in children as well as in adults.

Vitamin D (anti-rachitic):—This vitamin is an essential factor for the calcification of bones and formation of good teeth. This helps in prevention of rickets in children and osteomalacia in adults. It is present in milk, butter, egg yolk, fish oil (cod, halibut and shark liver oils), ghee. It can be manufactured in our bodies by exposure to sun's rays.

Deficiency of Vitamin D leads to rickets and decayed teeth.

Rickets—It is a disease of nutrition occurring in early childhood. It affects the growth of bones and causes catarrh of the respiratory system. There is delayed dentition and softening of the bones leading to various deformities like bow legs, knock-knees, pigeon chest, etc.

Vitamin E:—This vitamin is necessary for procreating good progeny. It is present in green leafy vegetables, wheat germ oil, maize, oats, peas, pulses and other cereals.

Deficiency of Vitamin E leads to death of the fetus in uterus and sterility of male and female.

Vitamin K (anti-coagulation vitamin).—It is essential for normal coagulation of blood. It is present in green leaves, spinach, cauliflower, cabbage, carrot tops, oats, wheat, soyabean oil.

Deficiency of Vitamin K leads to hæmorrhages in the skin, bleeding from nose, passing of blood in stools and urine.

5. *Mineral salts*:—These form $\frac{1}{20}$ th of the body weight and are essential for maintenance of body in healthy state. Some of the common ones are iron, calcium, phosphorus, sulphur, iodine.

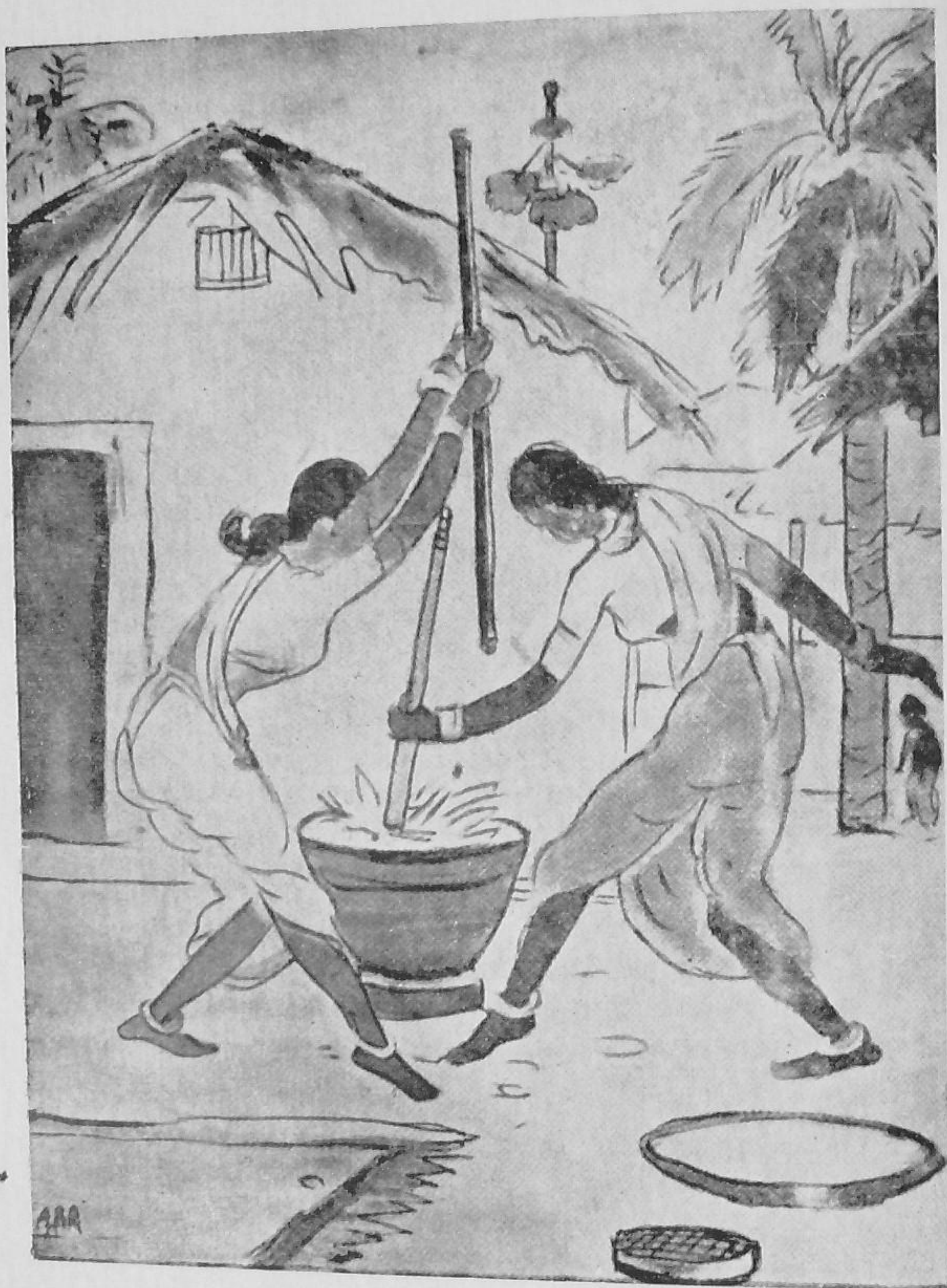
Functions in the body :

- (i) To stimulate digestive secretions.
- (ii) To maintain tone of muscles.
- (iii) To help the general growth of the body.

Calcium and phosphorus are essential for building of bones and teeth. Iron is required for the blood. Iodine is used for prevention of goitre (enlarged thyroid).

Sources:—These salts are present in food, particularly in the outer layers i.e. in the bran of the grain and seeds, and in the skins of fruits and tubers. They are lost when we throw these portions away. Salts are further lost by throwing away the water in which the food-stuffs are cooked.





Hand-pounding of rice

Mineral salts and their chief sources

| <i>Minerals</i> | <i>Sources</i> |
|-----------------|--|
| Iron | Maize, wheat, nuts, bajra, liver, heart muscle, eggs, oats, pulses, soyabeans, peas, spinach, lettuce. |
| Calcium | Milk, ragi, leafy vegetables, cauliflower, dried figs. |
| Phosphorus | Eggs, peas, milk, fish, meat, liver, cereals, walnuts. |
| Sulphur | Cabbage, yolk of an egg, drum sticks, milk. |
| Iodine | Sea-fish, sea-salt, sea-fish-liver oil. |

Food adjuncts (condiments, spices etc.) :—These are also necessary to make food palatable, excite gastric juice and create desire for food. They contain some quantity of vitamins and mineral salts.

Common items of food

Cereals :—Cereals contain nutritive material condensed in small bulk. Proteins, carbohydrates and fats are present in varying proportions. They also contain vitamins and mineral salts. One particular cereal may be superior in one nutritive ingredient and lack in another. Therefore a mixture of cereals in the diet is preferable to a diet consisting of a single cereal only. Wheat and rice are the most common cereals consumed in India.

Wheat :—Wheat is the most useful of all cereals. It is first ground into atta and then converted into chapaties, puries, bread, etc. Bran (chokatt) should not be thrown away but should be mixed with the atta as it contains vitamins and minerals.

Rice :—It is rich in starch but poorest in proteins, fat, mineral salts and vitamins. Parboiled or converted rice provides just enough vitamins for the needs of the body; but when polished, rice loses most of the vitamin content. One should therefore use home pounded rice in preference to polished or milled rice.

Maize (Makkai) :—It is not as good as wheat but is richer in fats than all other cereals except oats. It is deficient in vitamins and the amount of essential mineral salts is very small. An exclusive diet of maize has been suggested as a possible cause for a disease known as Pellagra.

Bajra and Juar :—These are also used in some parts of the country. The nutritive value of these foodgrains is midway between wheat and rice.

Pulses :—They are used in India in the form of 'dals'. They are rich in proteins but the proteins are not of the same high biological value as the animal proteins. Pulses such as peas, beans, lentils and gram have body-building value and therefore useful for supplementing the meat ration.

Value of Pulses :—

1. Good sources of proteins.
2. Rich in mineral salts like lime, phosphorus and iron.
3. Can be stored for a long time.
4. Contain Vitamins A and B and if allowed to germinate, Vitamin C.
5. Comparatively cheap and easily available.

*Vegetables :—*They supply essential vitamins and mineral salts. Green vegetables are essential for health. An attempt should be made to consume daily a certain amount of raw vegetables like lettuce, tomatoes, carrots, and other seasonal vegetables.

Uses of vegetables :—

1. Maintain strength and health.
2. Strengthen our resistance to illness.
3. Build solid bones and teeth in children.
4. Prevent constipation by supplying roughage to the intestines.

There are two kinds of vegetables :—

- (a) Leafy—cabbage, spinach, lettuce, amaranth, etc.
- (b) Non-leafy—potatoes, carrots, cauliflower, lady's-fingers, tomatoes, turnip, amla, beetroot, etc.

The leafy vegetables contain comparatively more vitamins and mineral salts than non-leafy ones. Seasonal leafy vegetables should be eaten daily at least 4 oz per head per day.

*Sugar-cane juice :—*It contains more than 18% of natural sugar, Vitamins B and C. It is specially rich in organic salt, calcium and iron, etc. It should be given a high place among the many drinks that are consumed by the people.

*Fruits :—*Banana, dates, figs, grapes, mangoes, oranges are most nutritive. They contain a high percentage of sugar. Certain fruits are extremely rich in Vitamin C and mineral salts e. g. oranges, tomatoes, guava, etc. Fruits have laxative properties due to stimulating effects of cellulose.

*Nuts :—*Nuts provide proteins of good quality. They contain fairly high percentage of fats. Nuts are good sources of Vitamin B, complex and small amount of minerals like calcium, phosphorus, iron, and copper, etc. Commonly used nuts are almonds, cashew-nuts, ground-nuts, walnuts, pistachio, coconut and peanuts.

ANIMAL FOODS.—*Eggs*—are rich in essential nutritive substances. They contain high class proteins, mineral salts and vitamins. Eggs are easily digested and therefore useful for growing children and convalescents.

Fish:—Fish contains proteins of high class variety. It is a rich source of Vitamins A and D. It is the best source of iodine and some amount of calcium.

Meat:—Meat contains high class proteins and an appreciable amount of Vitamin B. It is rich in phosphorus but poor in calcium. Liver is a rich source of iron and possesses high vitamin content.

Milk and Milk Products

Milk is an ideal food and contains all the proximate principles of a well-balanced diet. It contains proteins, fat, carbohydrates, vitamins and mineral salts. Protein of milk is of highest biological value essential for health and of special value to vegetarians. Fat is present in an emulsified form and therefore easily digestible. Milk is rich in minerals, chiefly calcium, potassium, phosphorus and sodium. It has a low iron content. Milk contains all the vitamins.

Milk-borne diseases:—Milk should not be taken raw as there are chances of getting gastro-intestinal diseases and even tuberculosis. Gastro-intestinal diseases like typhoid, paratyphoid, dysentery and cholera are due to adulteration of milk with contaminated water. For this reason milk should always be boiled before consumption.

Butter:—It contains Vitamins A and D. It is most easily digested of all fats.

Curd (Dahi):—It is more easily digested than raw or boiled milk. It is an important food in this country and has a high nutritive value. It contains all the constituents of milk and can be kept for a longer time than milk.

Skimmed milk:—Skimmed milk retains 55% of the nutritive value of whole milk in the form of proteins, sugar and mineral salts. It is a useful body-builder and promotes growth. It is also cheap. It contains all the essential nutrients present in whole milk except fat, Vitamins A & D. Drink skimmed milk, if you cannot afford pure milk.

Protective foods:—Food stuffs rich in vitamins and mineral salts are known as protective foods because they protect against deficiency diseases and bodily weakness. They help to build up one's health and maintain it. Examples of protective foods are milk, eggs, meat, fish, fruits and fresh vegetables especially of the green leafy type.

Nutritional requirements of a diet:—This requirement is measured in terms of calories (heat units). A calorie is the amount of heat required in raising one kilogram (seer) of water to one degree centigrade. The requirement of calories varies according to the energy consumed i.e. a person doing hard manual labour needs more than an office worker and a sportsman needs more than a student who is interested in reading only. The carbohydrates and fats in diet supply this energy requirement. Proteins, vitamins and salts should also be suitably included in the diet.

Balanced diet :—This term is applied to a diet that complies with the following specifications :—

1. It must supply adequate heat and energy.
2. It must contain the essential nutrients (proteins, carbohydrates, fats, and vitamins and mineral salts in adequate proportions).
3. It should conform to customs whether of family, community or race.

A balanced diet is essential for growth and normal development particularly for growing children, expectant and nursing mothers. It has far-reaching influence upon the development of the individual and the whole race.

How food is wasted

1. Cereals lose their nutritive value by milling and polishing. When rice is milled it loses its outer layer (germ and pericarp). These (outer layers) contain more proteins, mineral salts and vitamins than the starchy inner parts of the grain (endosperm). Therefore home-husked rice is better than milled or polished rice.

2. By excessive cooking or cooking in open vessels. Ordinary cooking causes little loss of proteins, fats and carbohydrates in cereals, pulses and meat. In the case of vegetables, some protein is lost in boiling particularly when salt is used in cooking. Too much washing of foodstuff leads to loss of minerals and vitamins of B group.

3. By using baking powder—this promotes vitamin destruction.

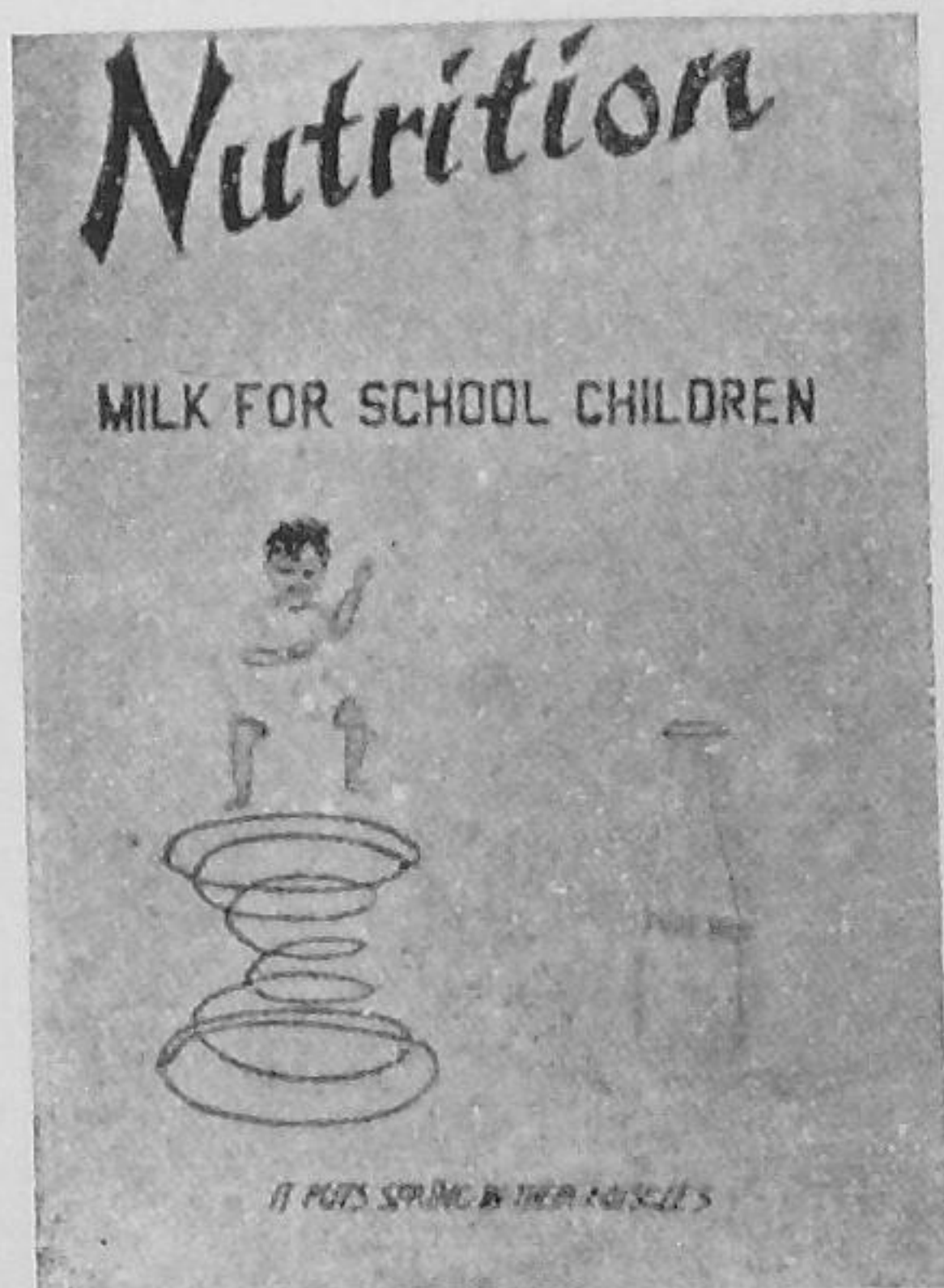
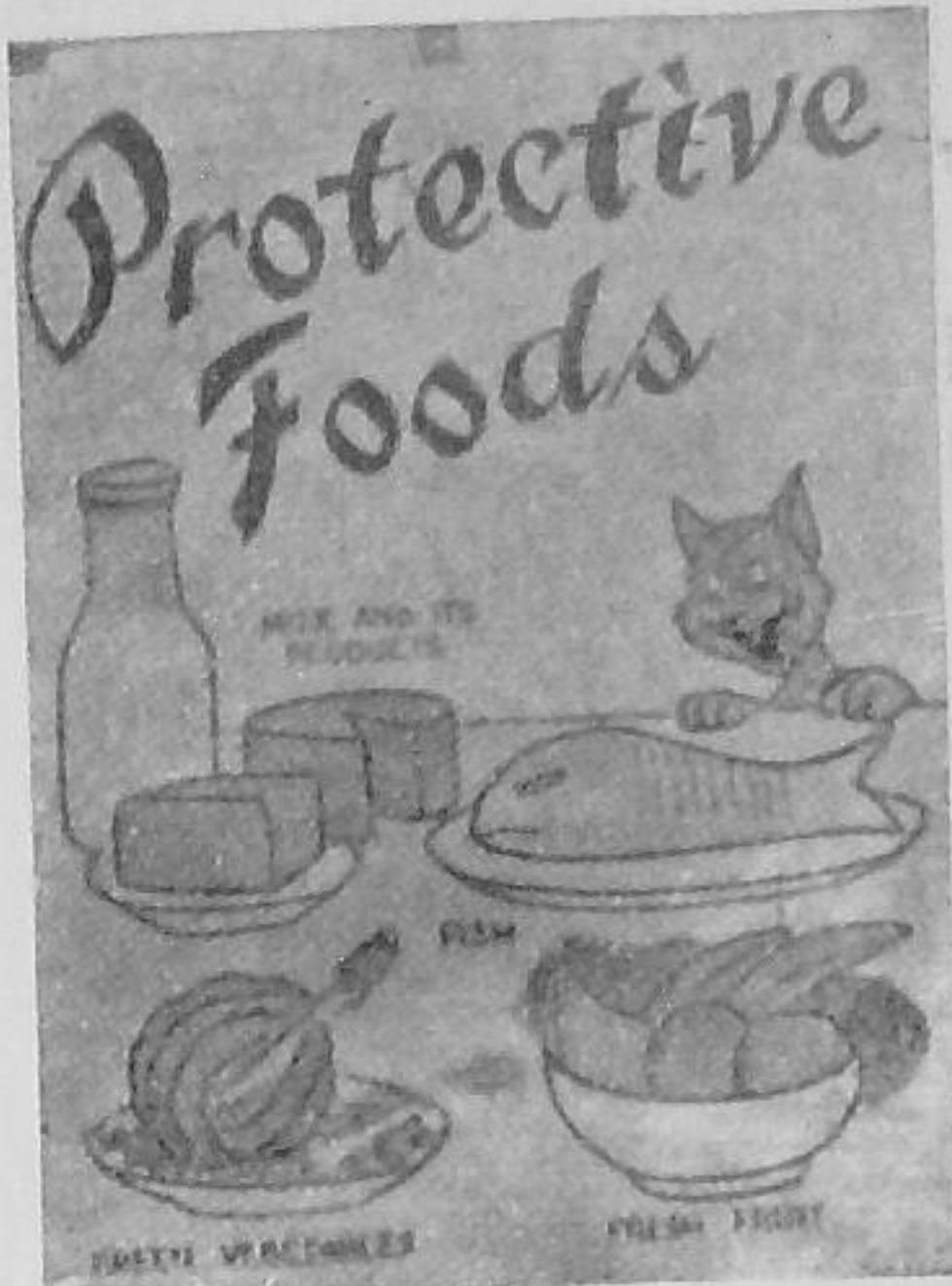
4. By throwing away the water in which rice or vegetables have been cooked. This water contains nutritive values. Water sufficient for cooking should be added in cooking vegetables so that no surplus water is left.

5. By excessive peeling and by removing edible skin—By doing so, essential parts that contain vitamin and roughage are thrown away.

6. Destruction of rodents and insects—Rodents are responsible for the damage of over a million tons of foodgrains annually and a similar amount is lost due to the action of insects and bad storage. This should be prevented by proper storing of food.

Cooking of food :—Cooking plays an important role in the science of nutrition.

Human digestive apparatus being finer than those of animals must have the raw food-stuffs made tender and soft and thus easier for mastication by suitable preparations. Moreover, art of cooking aims at making the food more digestible retaining at the same time all the nutrients and making them pleasing to the senses of taste, flavour and look respectively. The development of the latter leads to the proper flow of digestive juices aiding digestion. Bacterial flora are killed and the food-stuffs are rendered safe.



*Milk gives strength and energy, and
helps in the development
of children.*

How Food is Wasted



"An
unbalanced
Diet."





DEMONSTRATING METHODS OF COOKING
FOODS TO SAVE FUEL AND FOOD VALUES

In cooking one should avoid destruction or loss of minerals or vitamins. Example—rice is cooked in such a way as all the water used in cooking gets absorbed and nothing is left over and lost. Vitamins are lost by oxidation in open pans or if baking soda is added to the water in which vegetables are boiled. Best way of ensuring this, is by cooking food in steamers, (any patent cooker) the advantage being that several foods can be cooked by steam at the same time saving thereby time, fuel and valuable nutrients.

Frequent heating of cooked food should be avoided as each heating renders some of the vitamins inert.

Important vitamins and minerals lie just under the skin of the vegetables and hence they may either be cooked with their skins on or in preparing them, before cooking, they should not be peeled thickly otherwise vitamins and minerals will be lost.

RURAL SANITATION

As the emphasis is on greater production, the health programme for the rural areas assumes a corresponding importance. This inevitably leads to an emphasis on the prevention of disease and promotion of health.

The requirements for healthful living in the rural areas are—

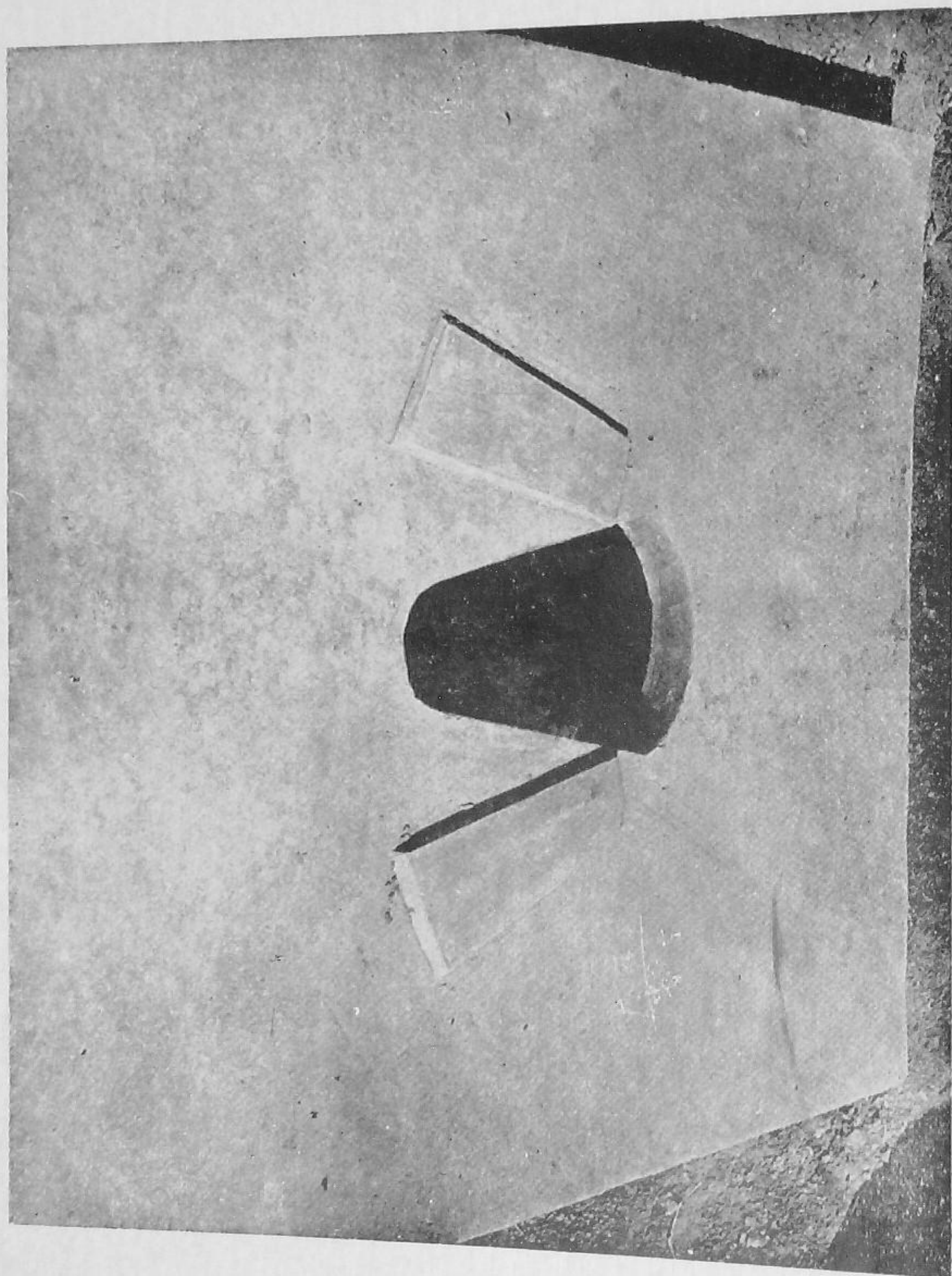
- (a) Provision of safe water supply and adequate drainage.
- (b) Provision of sanitary latrines and hygienic disposal of human and animal waste and refuse.
- (c) Control of communicable diseases with priority for malaria.
- (d) Provision of medical care and maternity and child welfare services.
- (e) Health education.
- (f) Improved housing.

(a) **Provision of safe water supply and adequate drainage :**

Water is essential for survival of human beings, animals and plants. It is also easily contaminated and as such, is responsible for a number of diseases—cholera, typhoid, dysentery, etc. In view of this, every thing must be done to make safe water supply available for the villagers. The chief sources of water supply in the villages are tanks and shallow wells, sometimes streams. Unfortunately these sources are easily polluted by—

- (i) Unhygienic habits of the people.
- (ii) Washing soiled clothes and dirty utensils in or near the sources of water supply.

Practically every village has a village tank which receives all the surface water either by rain or sullage from the houses. Village tanks are promiscuously used for bathing, washing clothes and drinking and cooking purposes. Many village tanks are also used by cattle. Buffaloes are often seen wallowing in them. It is essential to have a sanitary well in every village as described in the chapter on water supply. If the population of the village is more than a thousand and funds are available, it would be an ideal thing to have a pump fitted in the well with an electric or diesel engine so that water can be pumped up into an overhead tank and then distributed by a number of taps to the villagers. It would be necessary to provide taps and shower baths for men and animals separately. Arrangements should be made to provide platforms for washing of clothes and cleaning of dirty utensils, etc.



Squatting Slab for a Bore-hole latrine

Disposal of sullage :—In majority of our villages and most of our towns, there is no arrangement for the hygienic disposal of sullage. Even in those towns which have some kind of conservancy system,

very little attention is paid to the disposal of sullage. In the villages all the household water as a result of washing, bathing, cleaning, etc., finds its way into the village lanes which may have only a kuchha drain that finally empties itself into the village pond or a cesspool. The drains if any, are badly constructed without any gradient and their sides have no proper slopes. Animals and bullock-carts pass over them and cause further damage. During the rains all the filth of the lanes and the earth is washed into the drains which often get blocked and create a nuisance by overflowing. These drains, cesspools and ponds become breeding places for mosquitoes and often give out offensive smell. Even in large towns where masonry drains have been provided in the streets and lanes, the sullage collects and stagnates on the outskirts of the town for lack of satisfactory disposal.

Method of disposal :—In a village with a population of a couple of thousands, the installation of water carriage system will be an ideal method but it involves high initial cost and annual maintenance charges. For the average village it would be best to pave the streets with bricks. The paving should slope on either sides near the houses ending into shallow drains. The sullage from each house should find its way into these drains, and be carried outside the village where the sullage should be disposed of by sub-soil irrigation. If the houses in the village are scattered, it would be necessary to provide soakage pit for each individual house, if the nature of the soil permits. It would be necessary to put a handful of dry grass near the mouth of the soakage pit to act as a strainer and hold back fatty particles in the sullage. The dry grass can be removed every day and dumped into manure pits. Separation of fatty particles from the sullage is necessary for efficient working of the soakage pits.

The soakage pit can be constructed by digging an area of 4 feet square with a depth of 5 feet. The earth at the bottom should be loosened and the pit filled with broken bricks or large stones and covered with a piece of matting or shrubs. The top may be plastered with earth. After the soakage pit has been in action for some time, the sullage water begins to overflow; this is an indication that the pit must be renovated. This is carried out by digging up the pit and refilling it with clean broken bricks and stones.

(b) Provision of sanitary latrines and hygienic disposal of human and animal waste and refuse.

Our rural areas are conspicuous by the absence of sanitary latrines and urinals. This has resulted in soil pollution which has led to contamination of water supply, breeding of flies and dissemination of most of the gastro-intestinal diseases. Apart from the diseases cited in the chapter on 'Water', hook-worm infection is very prevalent amongst villagers. To remedy this, it is necessary to provide cheap type of latrine, which can be constructed with local material and local labour. The latrines should be of the type that

there is no need of collection and disposal of human excreta and there should be no smell and no chances of fly-breeding. Some of the sanitary latrines recommended for the rural area are :

1. *Dug-well latrines with a squatting plate containing water seal :*

This latrine can easily be dug by local labour and a squatting plate with water seal can be cast locally. It would be necessary to provide some cheap type of superstructure for privacy and against protection from sun and rain. This superstructure can be constructed with bamboos and matting or bamboos and gunny cloth. If space permits, ordinary mud walls can be constructed.

2. *Bored-hole latrines* :—These can easily be bored by an "Augur" unless the soil is rocky. The length of the bore is 18 to 20 feet unless one strikes water before this. The diameter of the bore is about 18". The upper 2 feet must be supported by some means to prevent the earth from caving in. A squatting plate is placed on the top of the hole and a superstructure erected for privacy. The bore must be filled up when the level of excreta reaches within 3 feet of the ground level. A fresh bore can be dug and the squatting plate removed and placed on the new bore. It should be located at least 50 feet away from the source of water supply such as wells and tanks.

Note :—Detailed description and the specifications of Dug-well and Bored-hole latrines are given in the Appendix.

3. *Trench latrines* :—In some rural areas, the soil is rocky and it is difficult to construct dug-well or bored-hole latrines. For such areas, trench latrines have been found useful. These latrines are constructed by digging a trench 12 feet in length and about 3 feet in depth. The width should not be more than 12". The trench can be partitioned into four parts by means of some old gunny cloth or matting and the same material can be used for screening the whole latrine. People using it should sit across the trench by putting one foot on either side. The trench should receive all the faecal matter, urine and water. Certain amount of earth should be kept beside the trench so that the user can throw some earth to cover up the faeces after use. When the trench is filled within 6" of the surface, it should be closed and sprinkled with lime and new one dug for use.

4. *Dehati Tatti* (Rural latrine) :—Dig a pit $3\frac{1}{2}$ ft. \times $3\frac{1}{2}$ ft. and 5 ft. deep on the higher side of the courtyard. Pave the walls of the pit with bricks (sun-baked oven-baked). Oven-baked bricks should have spaces between them while the others should be placed very close together ; this is to help in the soakage of liquid material. An open network of bamboos with strong bamboos at the corners can be substituted for brick lining ; the object is that the walls of the pit should not sag. Further an earthen bund should be constructed around the pit to keep the rain water from flowing in.

The pit should be covered. This cover should be strong and flyproof. There should be an opening in the cover wide enough for

the persons to sit and defecate. This opening should have a lid fixed with hinges to make it flyproof. On one side of the covering of the pit, there should be a vent pipe with a cowl on the top to permit the escape of foul gases. This can be a bamboo or an earthenware pipe. A superstructure may be constructed over the latrine for privacy. This latrine will last for ten years for a family of five persons.

Those who wish to take advantage of the manure value of human excreta should make two such latrines, because the pit will get filled up soon. In this case, every time after use the faeces should be covered with household refuse. The pit will fill up quickly but it will make good manure. When one foot of space is left from the surface, the pit should be filled in with earth. This can be excavated after six months and used as manure. In the meantime, the other pit may be used.

Disposal of dry refuse:—Refuse from the kitchens such as vegetable peelings and skins of fruits, sweepings from the houses consisting of pieces of straw, paper, etc., should be collected and deposited in the manure pit. After depositing, a layer of earth may be thrown on this to prevent fly-breeding. When the manure-pit is filled, it should be covered with earth and allowed to remain there for a period of six months to one year, after which it may be dug up and the contents used as manure in the field.

Cow-dung and horse litter can easily be disposed of by depositing these in manure-pits and covering with a layer of earth or these be utilized in making compost. At present all the cow-dung is utilized for making cow-dung cakes and used as fuel. This not only creates smoke which acts as irritant to the eyes of the inmates but is also a definite waste of a good quality of manure. In addition cow-dung cakes are very good breeding places for flies, which are excellent mechanical carriers of disease.

(c) Control of communicable diseases with priority for malaria

Malaria is enemy No. 1 of our rural population. Nearly one million people die by this disease every year and many are left in a dilapidated state of health and become victims of other diseases. Large tracks of land have been left uncultivated on account of this disease and in some places a good crop has not been harvested. Malaria is transmitted through the bite of an infected female anopheline mosquito. A nation-wide malaria control programme has been organized and it is proposed to protect 125 million people by the end of March 1956 and the remaining 75 million in the next Plan Period.

The other communicable diseases prevalent in the rural areas are smallpox, cholera and plague.

Smallpox:—The best method of prevention of smallpox is to have all the new-born children vaccinated during the first six months of their lives and again after a period of 5 years. If we can achieve this, we would be able to control smallpox to a great extent.

Cholera:—There are large number of deaths due to cholera every year in the rural areas of our country. These deaths can be prevented if adequate provision is made for the supply of safe water and for hygienic disposal of human excreta. Till then it is necessary to prevent the pollution of sources of water supply in the villages and to take steps to protect articles of food from contamination by flies and dust. An additional safeguard is to boil the drinking water and then put it into an earthen pot to cool. Boiling destroys all disease-producing germs. Anti-cholera inoculation is of great value in the control of this disease during the cholera season.

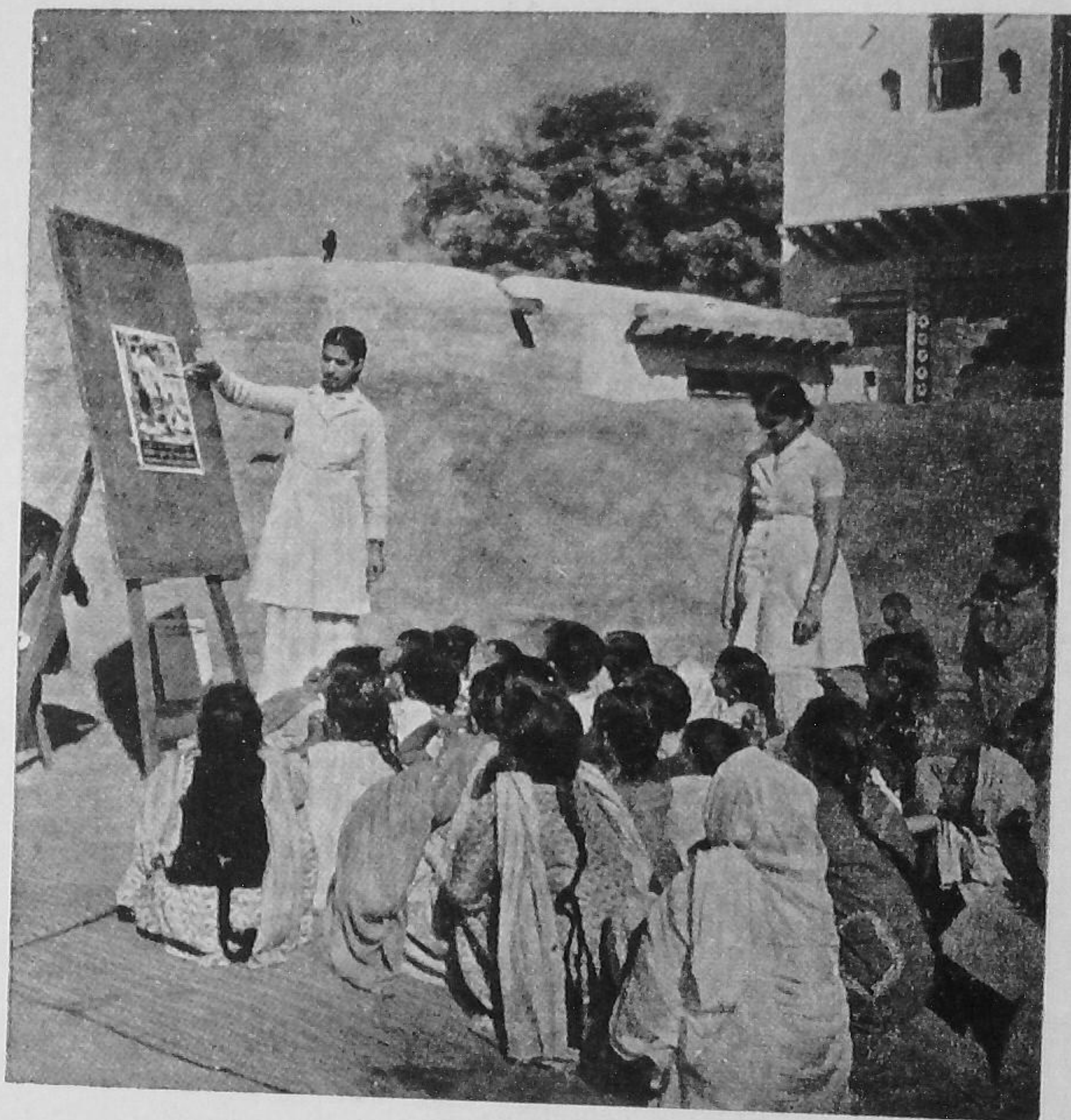
Plague:—It is present in some rural areas all the year round and in other areas it appears in a sporadic or epidemic form. Rats are responsible for the spread of plague but the disease is actually transmitted by the bite of an infected rat-flea. Rats live and breed near human habitation in insanitary surroundings and eat the food which is consumed by the local inhabitants. In the circumstances, efforts must be made to keep the houses and the surroundings in clean condition and to protect the food and foodgrains so that the rats cannot get access to these. Of recent years spraying of 5% D.D.T. suspension in the homes and into the rat-burrows has greatly helped in the control of plague because D.D.T. kills the rat-fleas. Anti-plague inoculation has a definite value as a protective measure and people should be encouraged to take it when cases of plague occur.

(d) Provision of medical care and maternity and child welfare services :

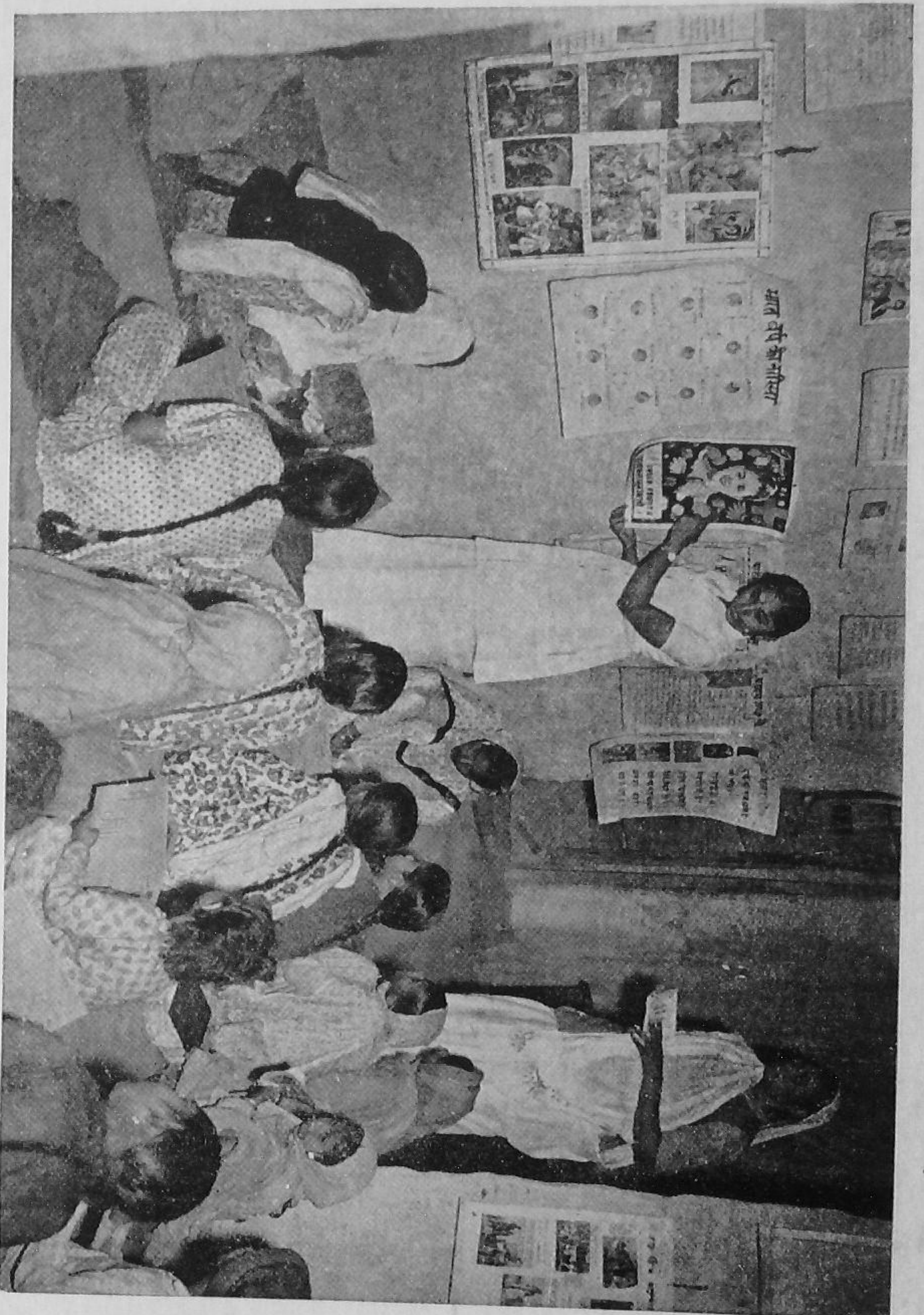
These services are practically non-existing in the rural areas. Since the independence of our country, rural dispensaries, static and mobile, are being provided by a number of States to solve this problem. The maternal mortality and infant mortality in our country are very high. About 50% of the people die before they reach the age of 10. Out of these, 40% of deaths occur during the first year of life; as such, it is essential that health needs of this group of people must have the highest priority in any health programme of the community. Most of these deaths can be prevented by giving adequate ante-natal, natal and post-natal care to the mothers and by setting up well-baby clinics. For this purpose, it will be necessary to set up a number of maternity and child welfare centres which should be manned by trained staff, i.e., lady health visitors, midwives and dais. In addition, arrangements will have to be made for removal of abnormal and serious cases to the nearest hospital. To meet these needs of the rural population, Community Projects Administration has taken steps in collaboration with the State Governments to set up health units in the rural areas.

Dais in the villages are mostly untrained and steps will have to be taken to give them short courses of training in domiciliary midwifery.

(e) Health education—The education of the people in a community, in personal and community hygiene, is the primary public health function. Mass education in regard to specific procedure



Health Education



Health Education

has become, in fact, one of the many phases of public health work. The people must be thoroughly convinced that the proposed project is for their benefit. Success of any method of public health work depends on the enlightenment and interest of the people. As such, it is the responsibility of the health department and the social worker to make the knowledge about the prevention of disease and promotion of health, available to the average man in a form which he can understand and can incorporate into his daily life.

The fullest use should be made of the primary schools as means of imparting health education to students and also to stimulate a lively interest in healthy living both personal and communal in their neighbourhood. Stress must be laid on inculcation of hygienic habits in students.

Rural health centres, health organisations and maternity and child welfare centres should be utilised for carrying on health education programme. Assistance and cooperation of voluntary and social organisations should also be sought for the development of this programme.

(f) Improved housing—The creation and maintenance of as healthy an environment as possible in the home of the people as well as in places where they congregate for work, amusement or recreation is essential. The house should be so constructed that there is plenty of light and air in all the rooms. Arrangements must be made for separate room for animals. It is essential to construct smokeless chulla or provide an efficient smoke-flue so that the house is always kept clear of smoke which is irritant to the eyes and darkens and discolours the inside of the house. Arrangements will have to be made for the storage of foodgrains in such a way that it is free from damage by rodents and vermins.

COMMUNICABLE DISEASES

Diseases which are transmitted from one person to another are called communicable diseases. These diseases are caused by micro-organisms, protozoa and fungi. In the spread of communicable diseases, man is the chief culprit and the reservoir host. If he took care that all the discharges from his body were safely disposed of and further if he protected himself from the bites of insects and observed rules of hygienic habits and personal hygiene, communicable diseases could be controlled to a great extent. Micro-organisms (germs) leave the body of the person who is suffering or has suffered from a particular disease in his discharges (sputum, fæces and urine) and unless safely disposed of are liable to infect others during the process of—

(a) *Inhalation* :— The micro-organisms are found in the air and any one breathing that air is liable to develop these diseases.

(b) *Ingestion* :— By swallowing articles of food and drink that have become contaminated directly or indirectly with micro-organisms of communicable diseases. For example, source of water supply can be contaminated directly by the stools or urine of a person suffering from cholera, typhoid, dysentery, etc. and by disposing of stools or urine into or near the source of water supply. Indirect contamination takes place by washing clothes soiled by the discharges of such patients in or near a source of water supply or mechanically by flies or dust loaded with micro-organisms settling on articles of food and drink.

(c) *Through the skin* :—This is generally through the bite of an infected insect or animal.

(a) *Diseases transmitted through inhalation* :—The micro-organisms of these diseases are present in the throat and the respiratory passages of the individuals and are thrown out in droplets through coughing, sneezing, laughing and spitting, hence the term droplet infection is used for such diseases. Most common examples of such diseases are :—

- | | |
|----------------|--------------------|
| 1. Common cold | 7. Chickenpox |
| 2. Sore throat | 8. Mumps |
| 3. Influenza | 9. Polio |
| 4. Diphtheria | 10. Whooping cough |
| 5. Meningitis | 11. Pneumonia |
| 6. Smallpox | 12. Tuberculosis |

(b) *Diseases transmitted through ingestion* :—In this group, the micro-organisms enter through the elementary tract by ingestion of infected food-stuff. Most common examples of such diseases are cholera, typhoid group of fevers and dysentery.

(c) *Through the skin* :—Infection is conveyed through the bite of infected mosquitoes, fleas, lice, ticks, etc. These diseases are known as insect-borne diseases. Insects play a very important part in transmission of certain diseases. They are intimately connected with human existence. They live on our body, on our clothes and in and around our houses. The most common diseases which are carried by insects in India are malaria, dengue, filariasis, plague, typhus, relapsing fever, sandfly fever, kala azar and oriental sore. Insects may carry disease mechanically also, the chief example is that of house-flies; they sit on human excreta and other filth and then go and contaminate other food-stuffs by simply sitting on them. In other cases, the parasite of a disease undergoes multiplication and development in the body of the insect—typical example of this method of transmission is malaria where the parasite of malaria after it has been sucked with the blood of a person suffering from malaria undergoes a process of development in the stomach of a female anopheline mosquito.

Sometimes animals like dogs, jackals and cats are also responsible for transmitting diseases to human beings through their licks and bites. The most common disease is rabies in the rural areas and is responsible for a large number of deaths every year.

Contagious diseases :—There are certain diseases in which the infection is transmitted by direct contact between persons. Important examples of diseases due to this method are syphilis, gonorrhœa, leprosy, yaws and scabies.

Before describing some salient features of some of the common diseases mentioned in the above groups, it will be helpful to know something about the common principles involved in the control of communicable diseases. This will help the field workers to take immediate action pending the arrival of the health staff.

These principles are :—

Notification :—As soon as a case of infectious disease is diagnosed or suspected, the matter should be reported to the health authorities immediately. In every State in India, it is obligatory to notify cases of certain communicable diseases.

Object of notification :—It helps the Health authorities (i) to institute investigation into the cause of the disease; and (ii) to adopt control measures to prevent the spread of the disease.

Isolation :—It means the separation for the period of communicability of infection of the patient from other persons in such a way as will prevent the direct or indirect conveyance of infective agents to other susceptible persons.

Quarantine :—This means limitation of the freedom of movements of a person or persons exposed to infection for a period of time

equal to the longest incubation period of the disease. But the degree of the limitation of movements depends on the susceptibility of the individual.

Surveillance—means close supervision of contacts without restricting the movements.

Immunisation :—This means the protection of the contacts of the patient. This is carried out by giving vaccination and inoculation.

Disinfection :—It means the killing of pathogenic organisms and their spores by chemical means.

General measures :—

- (a) Health education of the masses.
- (b) Improvement of environmental sanitation.
- (c) Control of insects, rodents, etc.

A brief account of some of the common infectious diseases and methods of control is given in the following pages.

MALARIA

It is a specific infective fever caused by the human malarial parasite. There are three common species of human malarial parasites. The disease is transmitted from man to man by the bite of some species of anopheline mosquitoes. The parasite attacks the red blood cells in the human beings. The fever is characterised by sudden onset of chilliness (rigors), which may be so acute as to cause shivering followed after a couple of hours by high fever, headache, nausea and vomiting. The fever comes down suddenly accompanied by profuse sweating after a couple of hours. If untreated, the above symptoms may reappear on alternate days or every 4th day or on irregular days according to the species of malarial parasites with which the patient is infected. After a few attacks, there is enlargement of the spleen and sometimes of the liver. The patient becomes anaemic and weak and susceptible to other infections. Even in some treated cases, there is a chance of relapse after a couple of months or even after a year. Sometimes symptoms vary; in fact malaria can simulate symptoms of many other diseases. Correct diagnosis can only be established by the finding of the malaria parasite in the blood film of the patient.

Malaria is chiefly a disease of the rural areas. It is present throughout the year but has an increased seasonal incidence generally after the rainy season because the collections of water facilitate the breeding of mosquitoes. Sometimes malaria appears in an epidemic form i.e. large number of cases occur at the same time. Malaria is a serious health problem. It kills a greater number of people every year in India than any other single disease. Repeated attacks cause deterioration in the physical and mental health of the individual and lower the resistance to other diseases.

Source of infection :—It is the blood of the infected human beings.

Route of infection :—Infection is carried by the bite of an infected female anopheline mosquito. The mosquito is infected by sucking the blood of a person containing the malaria parasites. The parasite undergoes development in the body of the mosquito and it takes 10 to 12 days for the development of infective forms (sporozoites) of the malarial parasite. This means that female anopheline mosquito can transmit malaria 10 to 12 days after sucking the blood of an infected person. It is interesting to note that the parasite has no effect on the mosquito itself. After the parasites are introduced in the human body by the bite of an infected female mosquito, they undergo another cycle of development before an attack of fever comes on. It takes at least 10 to 12 days for the individual bitten by the infected female anopheline mosquito to develop an attack of fever. This is called the incubation period. From the above description, it is clear that there are two phases in the development of the malaria parasites—(i) in the human beings

(sexual phase); and (ii) in the mosquito (sexual phase). Advantage is taken of these phases in the control of malaria i.e. either by destroying infected mosquitoes within 10 days of sucking the blood of an infected person or by destroying the parasite in the human beings so that the female mosquito does not become infected.

Conditions Necessary for Transmission

(i) The presence of individuals with a sufficient number of mature sexual forms (male and female) of malaria parasite in their blood.

(ii) The presence of female anopheline mosquitoes in sufficient number to transmit malaria.

(iii) The presence of susceptible individuals.

Preventive Measures and Method of Control

Before taking up the question of the control of malaria, it is necessary to know something about the life cycle of mosquitoes. Mosquitoes breed in various kinds of water collections—slow running streams, irrigation canals, pools in the river bed, tanks, burrow-pits, holes in rocks and trees, wells, cisterns, fire buckets, rain-water gutters, leaking hydrants, chatties, fountains, dumps, drains, gulley traps, etc. They lay their eggs on the surface of water and larvae or wrigglers hatch out within about 18 to 24 hours. The larvae swim about freely and feed on organic matter. Under suitable conditions, they develop into pupae (a stage in the development) and into adult mosquitoes in about a week's time.

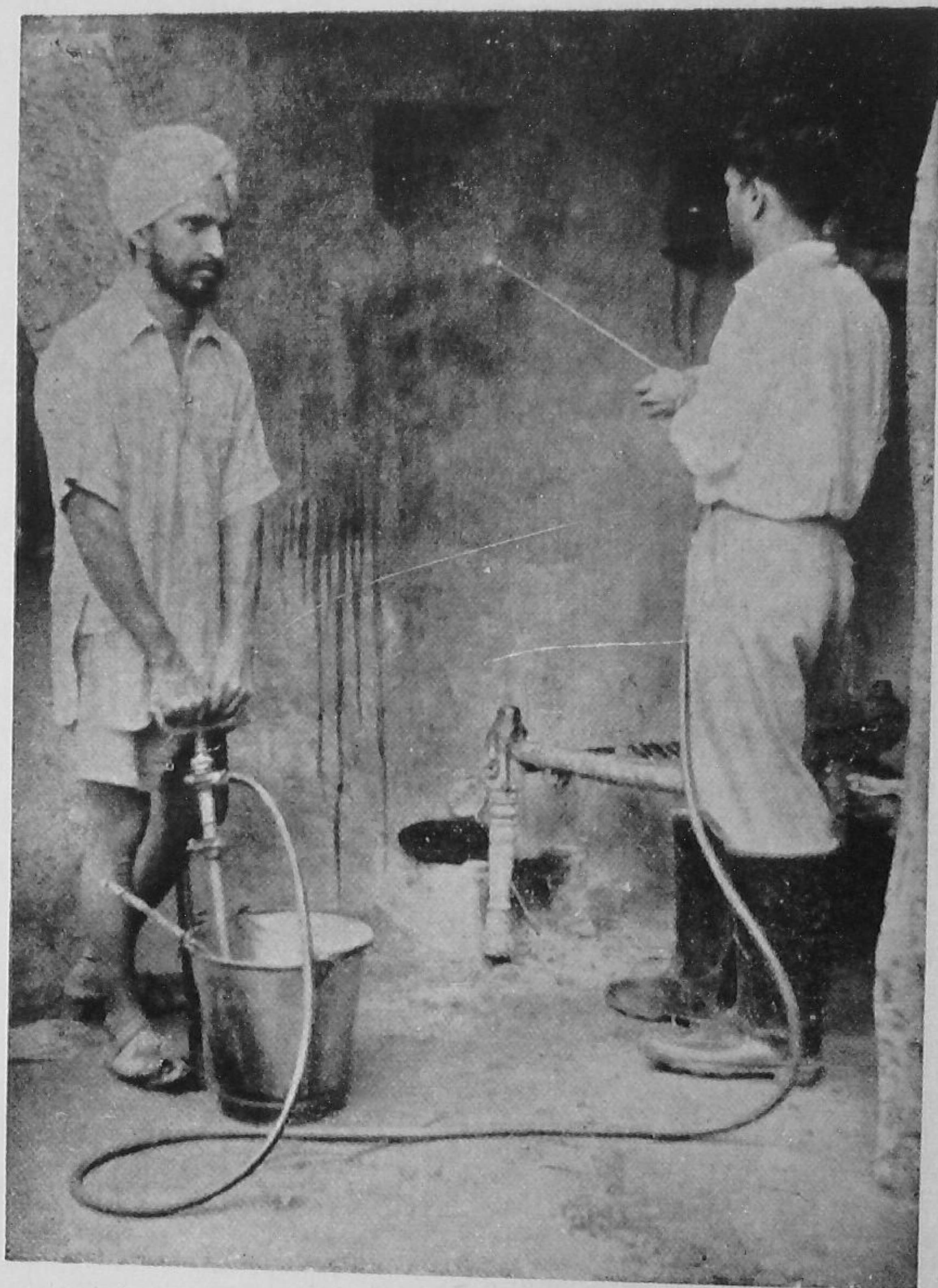
Method of Control

(i) Destruction of those species of anopheline mosquitoes which transmit malaria.

(ii) Complete protection of individuals against the bite of anopheline mosquitoes.

(iii) Destruction of malaria parasite in the blood of infected persons.

It is known from experience that it is difficult to fulfil all the above control measures but a great deal can be done to reduce the incidence of disease to such an extent that it is no longer a health problem. The guiding principle, on which modern malaria control is based, is to break the chain of malarial infection. In the present National Malaria Control Programme, efforts are being made to destroy the infected mosquitoes before they become infection i.e. within 10 days after their sucking infected blood. This is being carried out by spraying 5% residual D.D.T. suspension on the inside and outside of the house where malaria is present and is a problem. It has been roughly estimated that nearly 200 million people, mostly living in rural areas, need protection against malaria. According to the present Plan, it is proposed to protect 125 million people by the end of March, 1956 (end of First Plan period) and the remaining 75 million during the Second Plan period.



Spraying D. D. T.

Mosquitoes can be controlled by eliminating the breeding places and by killing them during their different stages of development by the use of larvicides and insecticides, but as the different collections of water are so enormous and so widespread, it is not possible to eliminate the breeding places or to tackle the problem economically by use of larvicides. As such, recourse has been taken to the method of residual insecticidal spraying to kill the adult mosquitoes.

(ii) Protection of the individual—

(a) Individuals can use mosquito-nets in malarial regions. This is an expensive type of protection as majority of our people in the rural areas cannot afford to have mosquito-nets.

(b) Use of repellents—These are chemicals which due to their smell repel the mosquitoes from coming near the body. These are also expensive apart from the fact that the effect wears off in a couple of hours.

(iii) Destruction of malaria parasite in the blood of infected persons—

This is done by administering drugs that would kill the malaria parasites in the human body so that there are no parasites to infect the female anopheline mosquitoes when they suck the blood.

Prophylactic drugs :—Some drugs can be taken weekly on a fixed day—these drugs are capable of destroying the parasites in the human blood before they produce an attack of fever.

Suppressive drugs :—These drugs do not prevent persons acquiring malaria infection as do the prophylactic drugs. They keep the number of parasites in the body at such a low level that clinical symptoms of infection are suppressed i.e. there is no chilliness, fever and shivering, etc. The object of this drug is to keep the man in perfect condition to perform his duties in spite of being infected.

Education of the people :—The people should be told about the causation of malaria and the life history of the anopheline mosquito. This is necessary to seek their intelligent co-operation in malaria control.

FILARIASIS

It is a disease of insidious onset. In early stages, the infected person may show inflammation of the lymphatic glands accompanied by swelling of the affected limb or organs. Repeated attacks result in permanent swelling of the affected parts. There is overgrowth of the skin and subcutaneous tissues and the affected parts become huge and heavy—that is why this disease is called elephantiasis. The disease mostly affects the legs, arms, scrotum, female genitals and breasts. It may be mentioned that infected persons may not show any symptoms for a long time.

Causative agent:—It is a worm (nematode) called *Wuchereria bancrofti* or *malayi*. These are commonly called *Filaria bancrofti* or *malayi*. These are thread-like worms with a twisted or a spiral tail. They live in the blood vessels, lymphatics and tissues of the infected persons. The female worm produces a large number of small worms called *microfilariae*. They are very small and can easily pass through the blood capillaries. These baby worms are sucked up by the female mosquito when she bites the infected person. The baby worms appear in the blood stream at night. These baby filaria (*microfilariae*) pierce the wall of the stomach of the mosquito and lodge in the thoracic viscera where further development takes place. After two weeks the female is ready to infect the person she bites.

Source of infection:—The blood of an infected person.

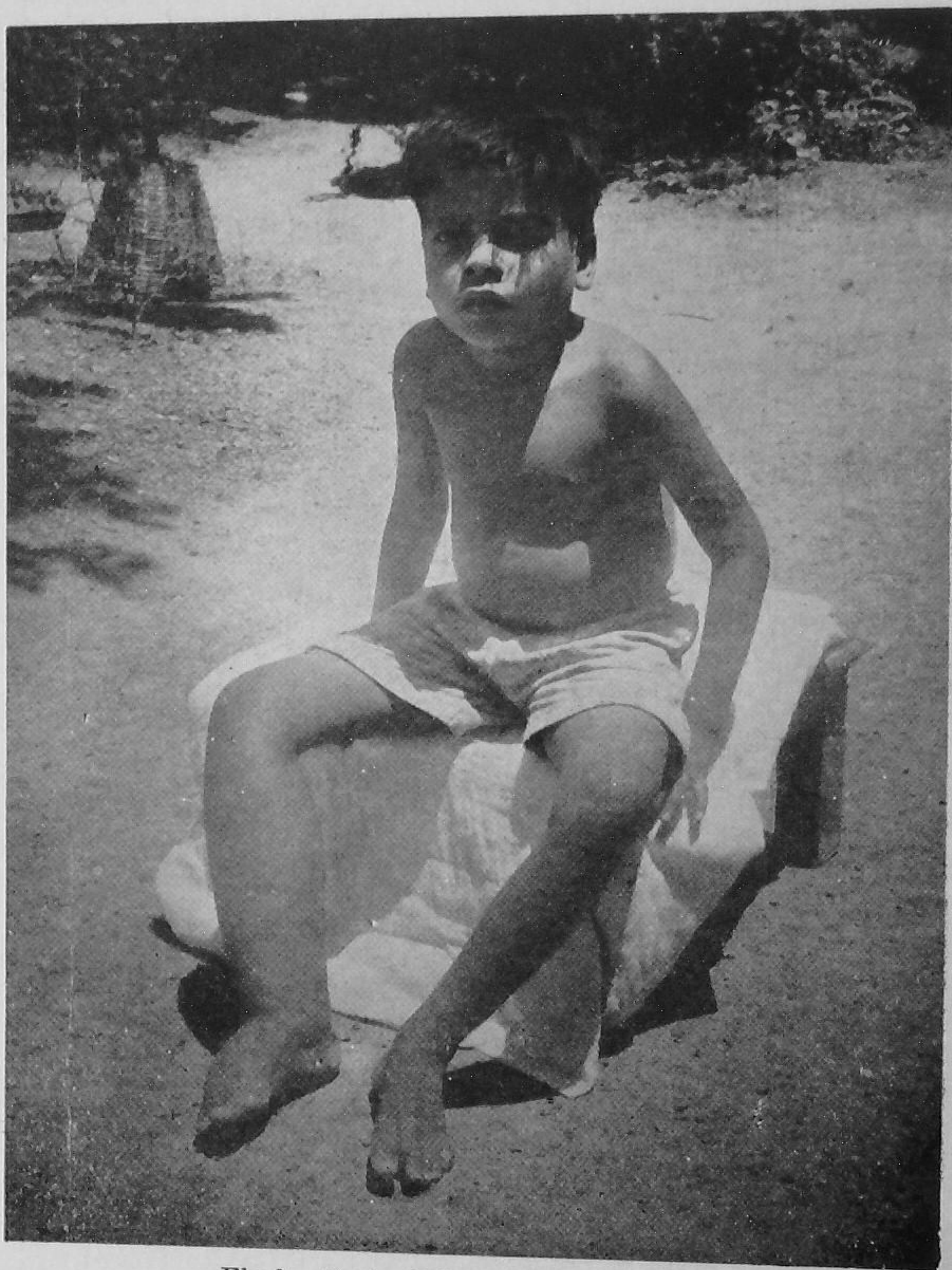
Mode of transmission:—Through the bite of a female *Culex* mosquito.

Incubation period—varies from a couple of months to a couple of years.

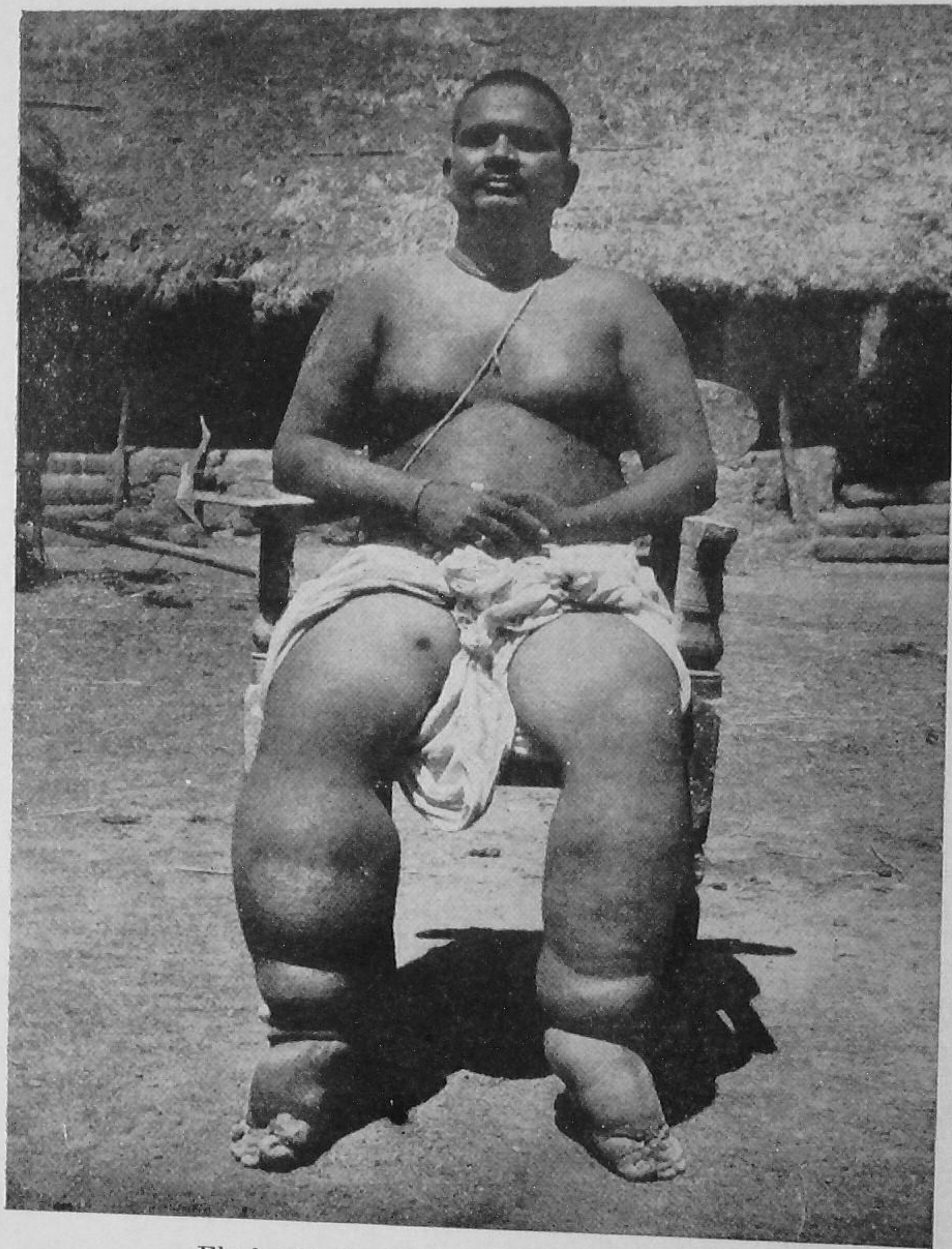
Period of communicability:—The female mosquito becomes infective in 10 to 14 days after sucking the blood of the infected person. As long as a person has *microfilariae* in his blood he will remain infective.

Preventive measures:

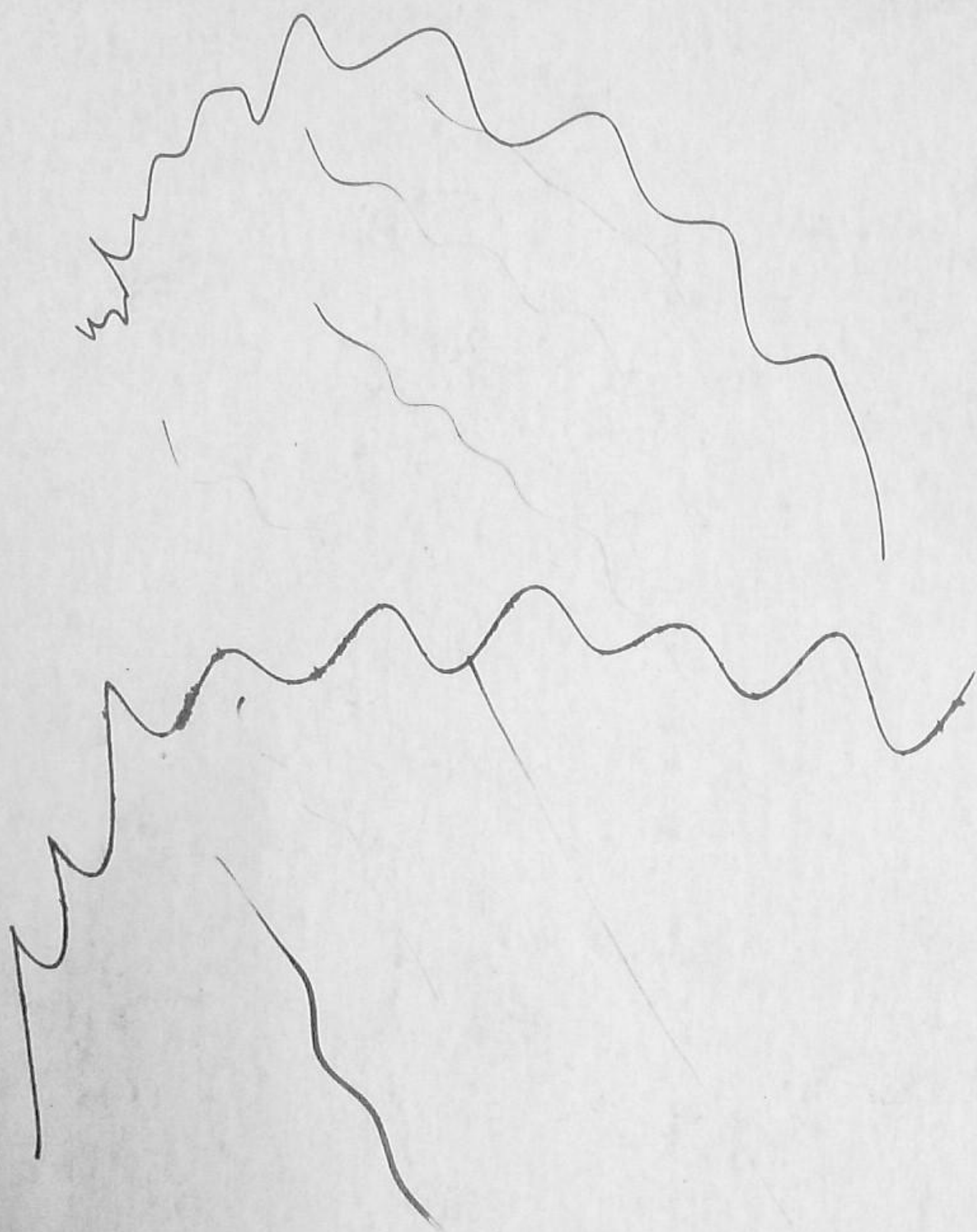
1. Recognition of the disease in early stages by the presence of clinical manifestations (signs and symptoms) and later by demonstration of *microfilariae* in the blood of persons.
2. Mass anti-parasitic therapy (treatment) to render infected persons non-infective.
3. Investigation of source of infection and conducting surveys of incidence in an endemic area.
4. Anti-mosquito measures as in malaria.
5. Protection of the infected persons from the bite of mosquitoes.
6. Education of the people regarding the mode of transmission of this disease and methods of mosquito control.

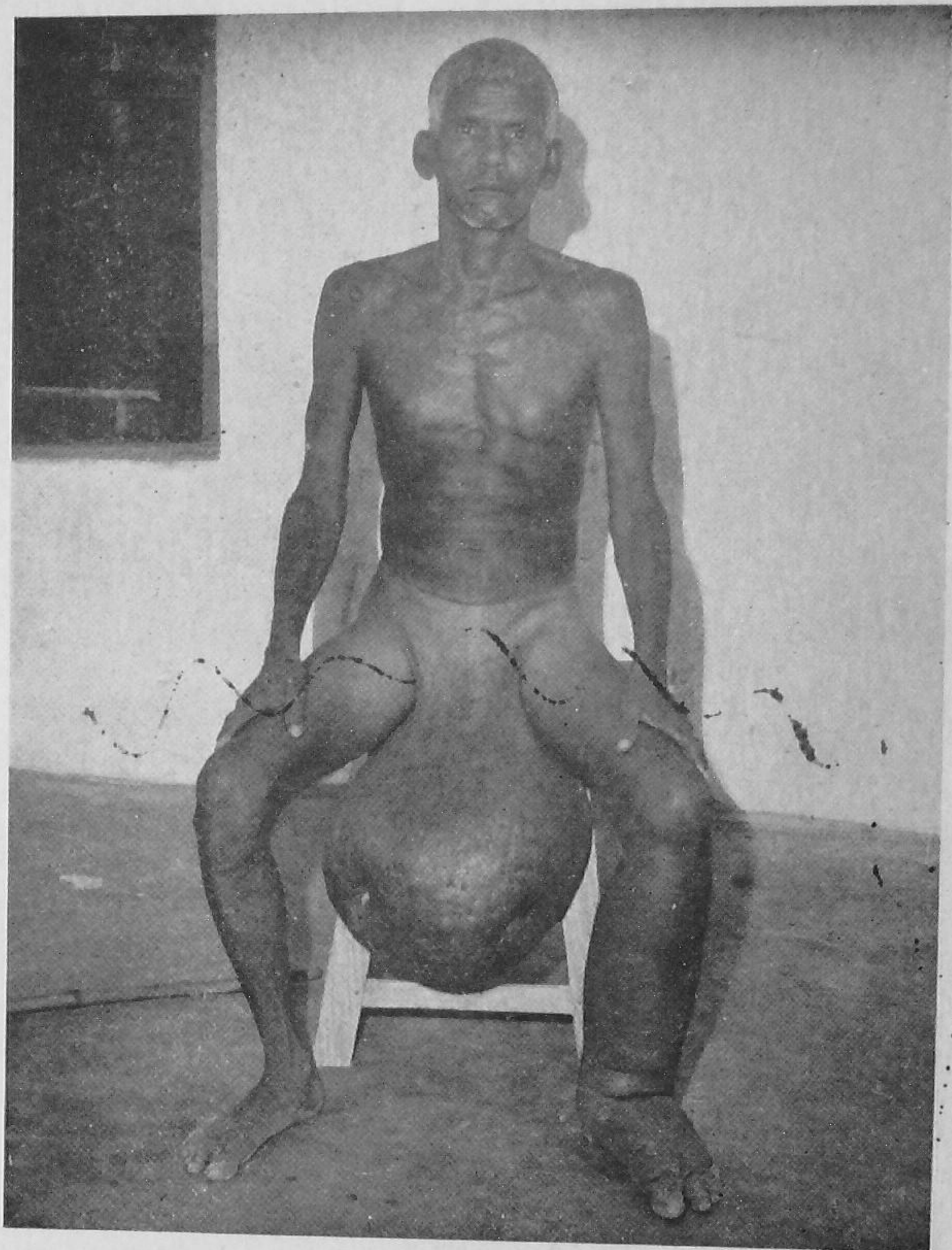


Elephantiasis of the legs (Early stage)



Elephantiasis of the legs (Advanced stage)





Elephantiasis of the Scrotum

SMALLPOX

It is an acute infectious disease characterised by sudden onset of high fever accompanied by acute headache and attended by the appearance of a characteristic eruption of the skin on the 4th day of the illness. To begin with, the eruption is macular and later changes into papules, vesicles, pustules and finally into the scabs. The eruption is symmetrical and generalized and is profuse on extensor surfaces exposed to irritation. The rash appears first on the face and spreads to the forearm and hands. Smallpox varies in severity from mild disease to a hæmorrhagic one.

Causative agent :—Virus of smallpox—Virus is a very minute diseases-producing germ which cannot be seen even by the microscope and it is so minute that it can pass through a filter and therefore it is called filterable virus.

Source of infection :—Man is the only reservoir of infection. The patient is the chief source of infection, even before the appearance of the rash. Mild cases occur in those who have partially been protected by vaccination. Unfortunately on account of religious sentiments in our country, it is considered that the onset of smallpox is due to a visit from the goddess Mata and as such cases are kept hidden and not notified to the health authorities; these cases are important means of the dissemination of the disease.

Route of transmission :—These may be by direct contact with the patient or by droplet method. Of these droplet route is most common. The infection can be conveyed by air to some distance from where the patient is. The virus of smallpox is present in the discharges from the lesion on the skin, mucous membrane and in the scabs.

Incubation period :—It is generally 12 days and in some cases it may be a few days earlier and in other a few days later.

Period of communicability :—The disease is communicable from the appearance of the very first symptoms till the disappearance of all the scabs. All persons are susceptible to this disease. People who have recovered from an attack of smallpox develop an immunity and second attacks are rare.

Action on the occurrence of the disease :—As soon as a case is diagnosed or suspected it should be notified to the health authorities. The patient should be isolated immediately, preferably in a hospital. All utensils and linen, etc., must be kept separate and disinfected by boiling.

Contacts :—All contacts, close or remote, who have not been successfully vaccinated during the past two years should be vaccinated

immediately. Every contact not successfully vaccinated should be quarantined for a period of about 16 days.

Immunisation :—Vaccination is the most important preventive measure against smallpox. In comparison, all other preventive measures become insignificant and on the outbreak of a case or an epidemic every person in the house and in the neighbourhood and those who visit the neighbourhood or the patient should be vaccinated immediately.

Disinfection :—After death, removal or cure of the patient, the house and its contents should be thoroughly disinfected. All articles, of clothing, bed linen, etc., should be exposed to sunlight, if there are no arrangements for disinfection by steam. Room should be disinfected with 5% solution of Formalin. The walls should be sprayed from below upward. All articles in the room should be so arranged that they are exposed to Formalin spray. All boxes, drawers, cupboards, etc., should be opened and their contents laid on the floor. Before spraying, doors and windows should be shut and after spraying the room should be sealed for 6 hours. After the expiry of this time, the room should be opened and doors and windows should be kept widely open. Before occupation, the room should be freely exposed to air and sunlight. In the villages where it may not be possible to have the rooms and huts sprayed, it would be advisable to put the cots, bedding and clothing, etc., out in the sun. If the hut is of a type that it has little value, it can be burnt down.

General measures :—Apart from measures suggested above, it is necessary to improve the general sanitation of the environment and special steps should be taken against the flies because they can mechanically carry disease from one person to another. To control smallpox in our country, the ideal method would be to conduct health education on a mass scale and let every one know what is smallpox, how it is caused and how can it be prevented. The chief method of prevention is vaccination. Every new-born child should be vaccinated before it reaches the age of six months and the same child should be re-vaccinated after every 3 years. It is further recommended that whenever there is an epidemic, it would be better to get oneself vaccinated again because it is not known when one may begin to develop susceptibility. Among those who have had successful vaccination in the childhood and have had the second vaccination again, the incidence of this disease is practically nil. Vaccination is carried out free by the health authorities throughout India. In every district there are vaccinators specially appointed by the local governments. Advantage should be taken of this free service. The mortality among the unvaccinated is very high and amongst those who survive from an attack of smallpox, apart from disfigurement, there is a risk of blindness in one or both the eyes.



Vaccination

CHOLERA

It is an acute infectious disease characterised by watery colourless stools, vomiting and symptoms due to loss of fluid which are collapse, cramps and suppression of urine. This disease is mostly prevalent in the rural areas and is common in summer months. With the onset of monsoons, there is a general decline in the incidence of cases. But the outbreak of cholera may occur in any part of the country at any time of the year. In certain parts of India, some cases of cholera are occurring throughout the year.

Source of infection :—The organism responsible for the disease is called Vibrio-cholarea which is present in the watery stools and the vomit of the patient.

Route of transmission :—Infection by V. cholarea is invariably by ingestion. The common vehicle of infection is water. Owing to the insanitary habits of the people, the surface water—rivers, lakes, tanks etc., are polluted by human faeces. Further washing of soiled clothes of the patients near the sources of water also contaminates the water. Milk may also carry germs of cholera if adulterated with polluted water. Flies act as mechanical carriers of cholera germs, and infect articles of food and drink. The chief source, however, is polluted water.

Incubation period :—The interval between the time of acquiring the infection and the appearance of signs or symptoms of the disease is called the incubation period. In case of cholera, it varies from 2 hours to 5 days but it is usually three days.

Preventive measures :—Immediately a case of cholera is diagnosed or is suspected, a notification should be sent to the health authorities. The patient should be isolated pending his admission in a hospital. If there is no hospital nearby then the patient should be kept in a separate room or in a verandah. All discharges of the patient—vomit, faeces and urine should be collected in a receptacle and thoroughly disinfected by addition of chlorinated lime or quicklime. The soiled linen should be dipped in 5% cresol solution and then allowed to dry. If cresol solution is not available, the soiled linen should be soaked in cold water and then boiled. Utensils used by the patient should be kept separate and should be boiled after use.

Anti-fly measures :—Great care should be taken that no flies have access to the room in which the patient is kept or sit on the discharges and soiled linen of the patient.

Immunisation :—All those who come in contact with the patient and those who live in the neighbourhood or visit the patient or the neighbourhood should be given one c.c. of anti-cholera inoculation

immediately. The immunity acquired by this inoculation lasts for about 6 months.

Protection of water and articles of food and drink :—If the source of water is a well, the well should be thoroughly disinfected by the health authorities. Disinfection of tanks and the wells is the most important function of the health authorities and should be carried out thoroughly by chlorination. The house-holder should be instructed to boil water and milk before drinking. All food should be protected against flies.

Education of the public :—Public should be told about the causation of the disease and instructed to observe healthy habits and personal cleanliness.

If cholera breaks out in an epidemic form i.e. there are a large number of cases, it would be necessary to carry out mass anti-cholera inoculation and sterilisation of drinking water wells in addition to other control measures mentioned above. Raw and overripe fruit should not be eaten as it may cause diarrhoea and make the person susceptible to cholera. The sale of cut fruit, which is exposed to flies and dust should be prohibited. All cases of diarrhoea during the epidemic should be properly attended to.

TYPHOID AND PARATYPHOID GROUP OF FEVERS

Fevers of this group are characterised by slow pulse and temperature of varying degree. The temperature is continuous, rising in ladder-like manner during the first week and lasting from 2 to 3 weeks depending upon the severity of the infection. Cases of typhoid group of fevers may occur in any part of India but the incidence of the disease is greatest in those areas of the country where there is complete lack of safe water supply and adequate disposal of human excreta combined with insanitary habits of the local population.

Source of infection :—Fæces and urine of the individual and of the carriers are the main source of infection. Carrier is a person who harbours the germs of the disease without suffering from symptoms. A fair percentage of patients who recover from the attacks of typhoid or paratyphoid fevers become and stay carriers for a very long time and are often sources of spread of the disease. The causative organism is typhoid or paratyphoid bacilli.

Route of infection :—The route of infection is similar to that of cholera. It is acquired by drinking contaminated water, consumption of food-stuffs which have been contaminated by flies and dust or by carriers. The principal vehicle for spread of this disease is contaminated water, milk and milk products especially ice cream. Insanitary habits of the people who pass stools and urine near rivers and tanks or other sources of water supply are important factors in spread of the disease. The infection can be communicated to those who are looking after the patient, if they do not take proper precautions after handling the patient or his excreta.

Incubation period :—It is usually from 5 to 14 days but it may be longer depending upon the resistance of the individual.

Action on the occurrence of the disease and preventive measures :

These are the same as in cholera and consist of :

- (i) notification of the case to the health authorities ;
- (ii) isolation of the patient and separation of his utensils and bed linen ;
- (iii) immunisation of the contacts by anti-typhoid and anti-paratyphoid vaccine. The immunity lasts for about 18 months if two doses of 0.5 c.c. and one c.c. are given at an interval of one week ;
- (iv) disinfection of patient's discharges i.e. stools, urine, and bed linen and utensils (as in cholera) ;
- (v) general measure of protection and purification of water supply, boiling of milk and water before consumption, protection of food-stuffs against contamination by flies and dust.

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- (v) general measure of protection and purification of water supply, boiling of milk and water before consumption, protection of food-stuffs against contamination by flies and dust.

Preventive inoculation with anti-typhoid and anti-paratyphoid vaccine (called T.A.B. vaccine) should be given to the contacts of the patient. The most important factor in prevention is to search for carriers and missed and mild cases.

ANCYLOSTOMIASIS (Hook-worm)

This disease is characterised by infestation of the small intestine of human beings by an adult blood sucking worm called *Ancylostoma*, commonly known as 'Hook-worm'. This disease is often accompanied by anæmia of varying severity and lowers the vitality and efficiency of the individual. In children, the disease causes physical and mental retardation. The disease is accompanied by abdominal pain and indigestion. The skin is pale and dry. The patient often feels depressed. In cases of severe infection, there may be œdema in the legs and even in the hands. The disease can be diagnosed only by examination of the stools and detection of the ova. The disease is widely prevalent all over India.

Source of infection :—The chief source of hook-worm infection is the fæces of the infected persons which results in contamination of soil. Ovas are passed in the stools and develop into larvae. A good few lakh of ovas (eggs) are passed in a single stool by a person suffering with high degree of infestation. Even after the stools have dried up, these larvae are still viable. When these larvae come in contact with the bare skin of the human beings, they penetrate the skin and travel via lymphatics and blood vessels and finally to small intestine where they develop into adult worms. The larvae of hook-worm can remain alive in moist soil for several weeks under favourable conditions. The time the larvae enter the man's body until the female begins to lay eggs is about 6 weeks. This is one of the commonest diseases in rural areas as a result of soil pollution and lack of sanitary latrines.

Preventive measures

(i) Diagnosis and treatment of persons suffering from hook-worm.

(ii) Prevention of soil pollution :—This disease is a result of careless and filthy habits of the people to go and pass stools in the open fields which results in soil pollution. People should be educated as to the causation and method of transmission of disease. For the prevention of soil pollution, it will be necessary to provide sanitary latrines. The latrines should be easily accessible and constructed separately, for men and women. Latrines should be of such a pattern that there is no need for collection, storage and disposal of human excreta. Septic tank latrines, dug-well or bored-hole latrines may be constructed. As the infective larvae penetrate generally through the bare skin of the feet, people should be asked to wear shoes, chappals or sandals and not to go about bare feet. In short, provision of sanitary latrines in the rural areas and health education of the people and their co-operation in the use of such facilities is the only method for the control of hook-worm disease.

PLAGUE

Plague is an acute infectious disease with a high mortality rate. It occurs in three forms i.e. bubonic, pneumonic and septicæmic. Of these forms, bubonic is the most common and is characterised by high fever, headache, lethargy and inflammation of the lymphatic glands specially of the groin and sometimes there are subcutaneous hæmorrhages. Pneumonic plague clinically resembles an acute case of pneumonia and is often fatal. Septicæmic plague does not show any signs of local infections and ends in death in a couple of days. It must be emphasized that primarily plague is a disease of rats. It is present throughout the year in some parts of India and in other parts a few cases occur now and then. Sometimes it assumes the form of an epidemic when large number of cases occur.

Source of infection :—Bubonic plague is present in rats all the time and as such rats act as reservoir of infection in India. That is why it is often said, 'No rats—no plague'. This disease is caused by a plague bacillus (*Pastourella pestis*). In pneumonic type of plague, man is the reservoir of infection and the disease is caused through droplet infection (coughing and spitting) because the bacilli are present in the sputum of the patient.

Route of transmission :—The infection is transmitted by rat-fleas from rat to rat and from rat to man. The fleas become infected after sucking the blood from a plague-infected rat. After the death of the rat, the fleas leave the rat and infect other rats. So the process goes on and when rats die off and other rats are not easily available, the infected fleas attack human beings and transmit the disease to them. This is why one usually finds large number of dead rats before plague spreads to human beings. It may be stressed that bubonic plague is not directly communicable from one person to another.

Incubation period :—It is about 4 days, may be longer up to a week.

ACTION ON THE OCCURRENCE OF THE DISEASE :

Notification :—As soon as the disease is diagnosed or suspected, information should be sent to the health authorities.

Isolation :—Patient should be isolated and all soiled articles of linen, clothing, etc. with the discharges of the buboes should be soaked in 5% cresol solution and dried in the sun because discharges from the buboes contain plague bacilli. If disinfectant cresol solution is not available, the soiled linen should be soaked in cold water and boiled.

Immunisation :—Those living with the patient in the same house and others who are coming in contact with the patient should be given a prophylactic dose of anti-plague vaccine. If a number of scattered cases have occurred in the village, it would be necessary to carry out mass anti-plague inoculation.

Contacts should be kept under supervision for a period of 10 days to know if they are going to develop the disease and on the appearance of the first symptoms, effective control measures must be taken.

Quarantine :—When plague appears in a village, the movement and communications between the village and other villages in the neighbourhood should be restricted. This is to prevent the spread of plague infection as human beings and merchandise may carry infected rat-fleas to other areas.

Disinfection :—If the patient has been removed to a hospital or after his death or cure, the house occupied by the patient should be thoroughly disinfected, the object behind this disinfection is to destroy all the infected rat-fleas. The room should be emptied, furniture and infected clothing, bed, linen, etc. should be exposed to sunlight for the whole day. If there is a hospital nearby with facilities for disinfection, then the clothing and bed linen, etc., should be sent to the hospital for steam disinfection. The rooms, the floors and the walls should be sprayed with 5% D.D.T. suspension. Particular care should be taken for cracks and crevices in the floors, walls and rat burrows. If the roof is of thatch, it is necessary to spray the roof also. If D.D.T. is not available, disinfection can be carried out by burning straw. Four inches of thick layer of straw is spread on the floor and lighted. The flame which will rise out of this will effectively destroy all the fleas in the room.

General measures :—General sanitation of the village must be improved as the rats live and breed in insanitary surroundings. All places for storing of grains should be made ratproof and other articles of food should be stored in such a way that the rats do not get access to them. Anti-rat and anti-flea measures should be instituted.

Anti-rat measures :—

- (a) Trapping
- (b) Poisoning
- (c) Fumigation

(a) The health authorities should take adequate steps to provide rat traps and arrange for collection and destruction of rats.

(b) *Poisoning* :—A number of poisonous baits are available for destroying rats. The best is barium carbonate. One pound of barium carbonate is mixed with three pounds of flour, made from the grain which is the staple food of the people in the village. The mixture is made into a dough and then rolled into pills. The above quantity will be enough to make over 2000 pills. It is absolutely necessary that hands and dishes used for making the dough should be scrupulously cleaned to avoid imparting extraneous taste and odour to the baits. Poisonous baits should be made fresh every day and unconsumed baits collected and destroyed. The baits should be laid in the evening near the walls and rat burrows. It is absolutely essential to take care that children and domestic animals do not swallow them. For the successful operation, it would be necessary

to see that no source of drinking water is available to rats within the house. After swallowing the baits, the rats feel thirsty and must leave the house in search of water outside and thus die outside the house.

*Note :—*As destruction of rats does not destroy rat-fleas, which is the chief transmitting agent of plague, destruction of rats should not be carried out during the plague epidemic, otherwise the infected fleas will leave the dead rat and suck human beings for their blood meal and thus spread infection further.

(c) *Fumigation :—*This is the best method of rat destruction as it destroys both the rats and the fleas. Cyanogen gas is used for fumigation. Fumigation by Cyanogen gas is to be carried out by specially trained staff who know how to avoid an accident and take other precautions because this gas is fatal to human beings also.

*Anti-flea measures :—*The best anti-flea measure is spraying of 5% D.D.T. emulsion on the floors, walls and rat burrows and thatched roofs. During the epidemic, apart from other measures mentioned above it would be advisable to dust 5% D.D.T. powder on the skin of persons and on the inner surfaces of the underclothing.

RABIES

It is an acute infectious disease of animals, chiefly canine and man is secondarily infected. The disease, commonly known in man is Hydrophobia. The word hydrophobia means fear of water. It is invariably a fatal disease in man. The disease begins with a sense of fear, headache and sensory changes. This is followed—in a couple of days by paralysis of muscles used in swallowing—any effort in swallowing water brings on a spasm, hence the word hydrophobia. These symptoms are followed by delirium convulsions terminating in death due to respiratory paralysis.

Causative agent :—The virus of rabies.

Source of infection—For human beings, the source is chiefly from bites and licks of rabid dogs and occasionally by the bite of jackals. The virus of rabies is present in the saliva of the rabid animals. The animals acquire infection from other rabid animals. The rabid animal dies in 3 to 4 days—this period may extend to a maximum of 10 days.

Route of transmission :—This is from saliva of rabid dog and jackal transmitted by bites or licks on a broken skin. All human beings are susceptible to this infection.

Action to prevent disease :—Immediately a person is bitten the wound should be thoroughly washed with soap and water and should be dried and cauterized by pure carbolic acid, silver nitrate, strong solution of potassium permanganate or nitric acid. If none of these is available, any suitable piece of iron heated to a dull red heat may be used to cauterize the wound.

If the bite is due to a dog, it is necessary to tie the dog and if it does not show any signs of rabies and is alive upto the period of 10 days, it should be released. The conclusion is that the dog is not rabid. If the dog develops signs of rabies and dies within 10 days, then it is absolutely essential that the bitten person should take anti-rabic treatment without delay. If it was stray dog and it is not possible to catch it and keep it under supervision for 10 days, it will be safer to take the anti-rabic treatment.

If a human being is bitten by a jackal, it is almost certain that the animal must be rabid because normally jackals do not attack human beings, and immediately, steps should be taken to get anti-rabic treatment. The Government of India have opened Pasteur Institutes at Kasauli, Calcutta, Shillong, Coonoor and Bombay where anti-rabic vaccine is manufactured and supplied to hospitals and dispensaries all over India.

Facilities for anti-rabic treatment :—Every State Government has provided facilities for anti-rabic treatment.

TUBERCULOSIS

Tuberculosis is a contagious disease characterized by gradual onset, with low temperature, loss of weight, night sweats, feeling of tiredness and coughing. Tuberculosis is a socio-economic disease. It is more prevalent among the people who are living in overcrowded and badly ventilated houses and have poor resistance on account of under-nutrition. Tuberculosis is primarily an urban disease i.e. it is more prevalent in towns and cities.

Tuberculosis may be considered under two headings :—

- (i) Pulmonary tuberculosis and
- (ii) Non-pulmonary tuberculosis which affects other tissues of the body like glands and bones, etc.

The common form is the pulmonary and as such, a description of this disease and its preventive measures would be described here.

Source of infection :—The disease is caused by the invasion of the lung by tuberculosis bacilli. These bacilli are present in the sputum of the person suffering from pulmonary tuberculosis. They are fairly resistant to heat and desiccation but are easily killed by sunlight.

Route of transmission :—It may be by direct or indirect contact with the infected person. The tuberculosis bacilli are present in the discharges of the respiratory track and are inhaled by those who come in direct contact with the infected person. The disease can also be transmitted by the use of contaminated utensils used by the patient. Flies also play some part in the mechanical transmission of this disease, when they sit on the sputum containing the bacilli and later go and sit on clean foodstuff. Infection generally takes place as a result of continued and intimate contact with the persons suffering from tuberculosis. Drinking of raw milk from tuberculous cattle is also responsible in some cases but as most of the milk is boiled before drinking in our country, the incidence of tuberculosis from this source is practically negligible.

Incubation period :—This varies according to the virulence of the tuberculosis bacilli introduced into the body, the number of bacilli gaining access to the body, the age of the person and the resistance of the person.

Preventive measures :—Early diagnosis and isolation of the patient, are the primary steps in the control of tuberculosis. The patient's utensils should be kept separate and boiled after use. Handkerchief and other clothing with which he may wipe his mouth after coughing should be boiled thoroughly. He should be instructed not to spit on the floor or, on the walls. He should be given an empty cigarette tin or some other similar container to be used as a

spittoon. The spittoon or the other receptacle should contain 5% carbolic acid solution which will destroy tuberculosis bacilli. If the carbolic acid is not available, the sputum should be collected as mentioned above and with the addition of life water, the container should be put on fire so as to boil the sputum. This method will also destroy the germs. The patient's co-operation is absolutely essential in the control of this infection. Windows and doors of the room, in which the patient is kept, should be kept open day and night.

Contacts :—All those living in the same house and others who have been associated with the case should be tested with B.C.G. and X-Ray examination of chest carried out. This is necessary to detect an early case.

Immunisation :—All children and young adults upto the age of 20 should be tested with B.C.G. and those who are susceptible should be given B.C.G. vaccination. This vaccination improves the resistance of the individual to fight infection. This vaccination is now being carried out in practically all the States in India free of charge.

General measures :—These consist in improvement of the environmental and socio-economic conditions of the people. Overcrowding should be prevented. Construction of a house should be such that there is plenty of light and air in all the living rooms. Health education of the people should be carried out regarding the method of transmission of this disease. People should be warned against the dangers of promiscuous spitting as this habit spreads the disease. The use of common smoking pipe (Hukka) should not be permitted. With the satisfactory completion of the community development programme, people will have better standard of living with increase in their purchasing power and will be able to improve their nutrition and general standard of living.

LEPROSY

It is a chronic infectious disease and can be communicated by prolonged and intimate contact with the person suffering from leprosy. The disease is characterised by various types of skin lesions varying from a macule to nodules (lepromas). Nerves may also become affected causing sensory disturbances i.e. anæsthesia, hyperæsthesia, 'pins and needles', neuralgic pains, pruritis, etc. and often resulting in trophic changes in the skin and causing muscular atrophy, palsies and deformities. The disease may attack mucous membrane, cartilage, bones and internal organs like liver, spleen, testis, etc. There are two main types of leprosy-neural and lepromatous. These types differ in degree of infectivity; lepromatous type is more infectious than neural.

There are no definite figures available about the total number of persons suffering from leprosy in India but judging by some surveys that have been carried out, it can be safely be estimated that about 10 lakh people are suffering from leprosy. To get an accurate idea about this problem, the Central Ministry of Health have initiated a leprosy control programme on an All-India basis. The State Governments are carrying out surveys and will adopt control methods if these have not been started already.

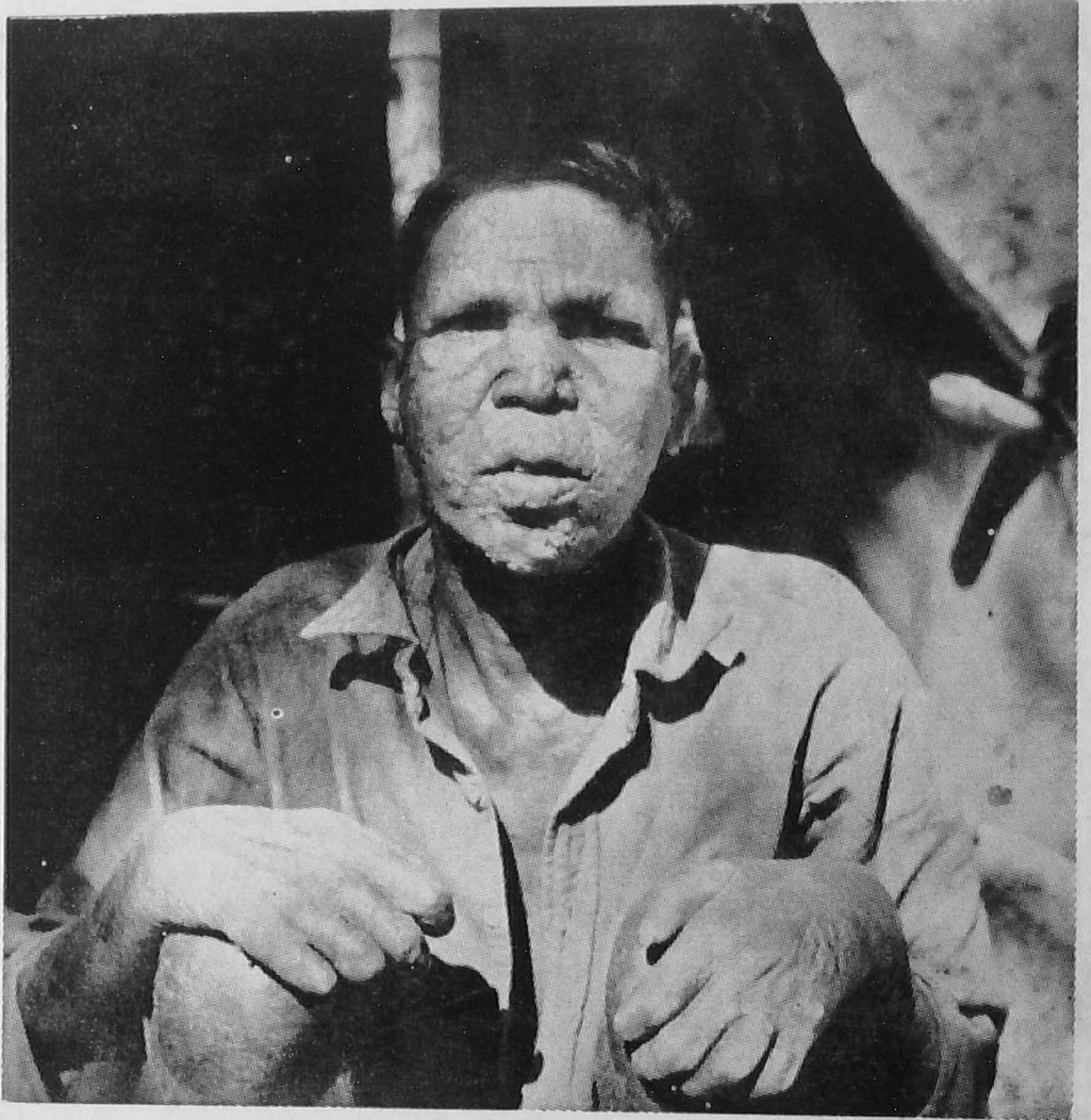
Leprosy is not a hereditary disease. Children born of parents suffering from leprosy do not have leprosy at birth. If children born from leper parents are taken away immediately after birth and looked after by healthy people and not allowed to come in contact with leper patients, they will not develop leprosy. Children and young people are liable to develop this disease more readily if brought in contact with infectious cases for a prolonged period.

Causative Agent :—The disease is caused by leprosy bacillus (*Mycobacterium leprae*). These bacilli (germs) enter the body and multiply and cause disease.

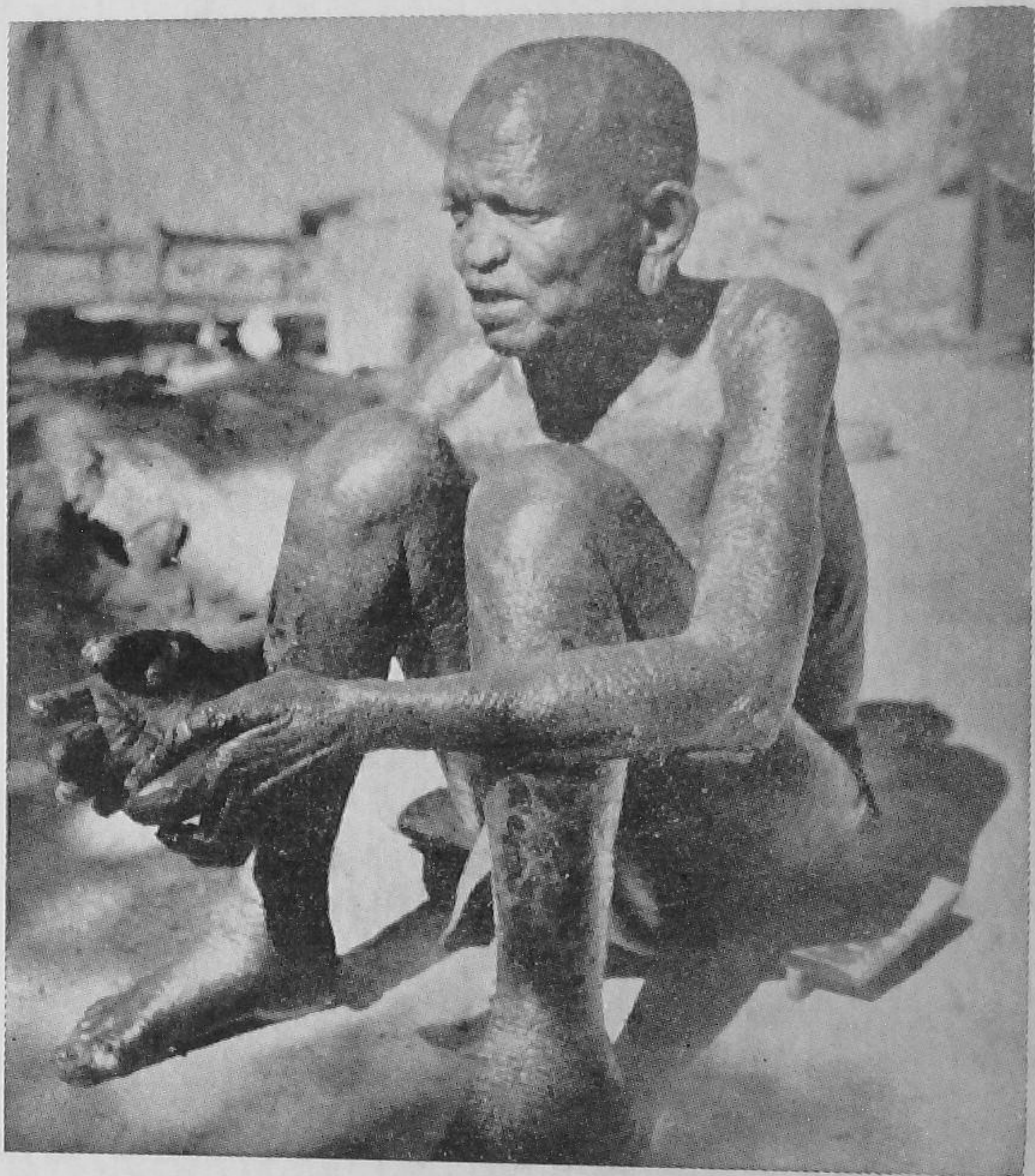
Source of Infection :—The bacilli are generally found in the discharges from the lesions. These bacilli are also found in the nasal mucus in the early cases.

Route of Transmission :—The bacilli are discharged from the nose, throat and skin lesions of the infected persons. These bacilli are transmitted to other persons particularly children after intimate and prolonged contact with the patients. Some believe that the infection may be transmitted through cuts, scratches and abrasions in the skin and mucous membrane.

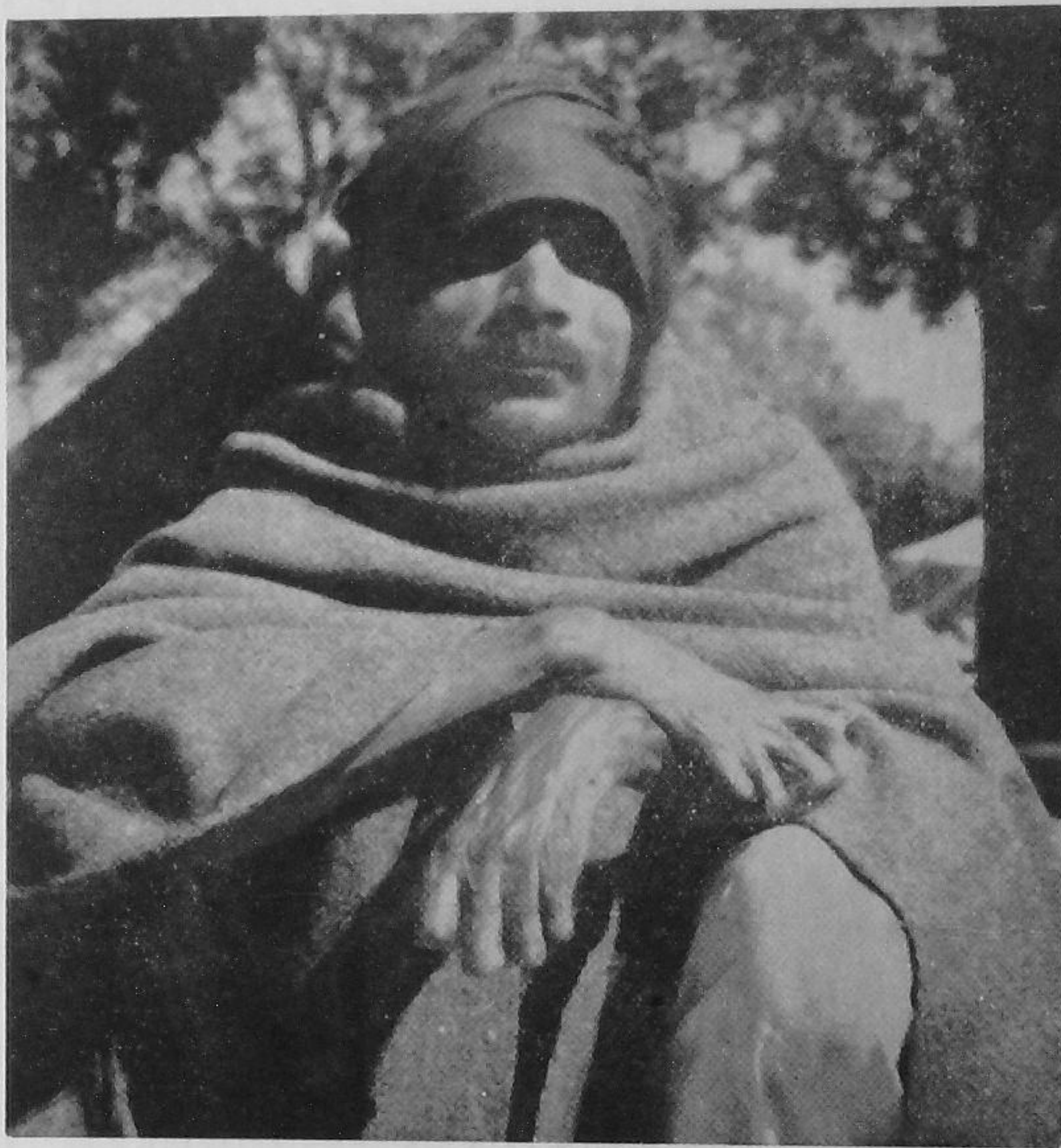
Incubation period :—It has not been definitely determined but it varies from a year to several years.



Leprosy
(Lepromatus type showing thickening of the skin and nodules
on the face)



Leprosy
(Lepromatous type)



Leprosy—resulting in deformities of the hands



Preventive measures :—Early diagnosis and isolation of the patient and treatment is very essential. After diagnosis the doctor will be able to advise about the method of isolation as to whether the patient should be isolated in the home or in an institution. Isolation does not mean that the patient should be confined to bed or hut ; all that is required is that he should not mix with other people till he is certified by the doctor as 'Non-infective'.

Patient's bedding, clothes, towels, utensils and other articles that may come in contact with the patient and discharges from the lesions should not be used by other people.

Contacts :—As soon as a case is diagnosed, the contacts should be thoroughly examined. If this examination does not reveal signs of the disease, it should be repeated after an interval of a year or so to make sure that he has not acquired infection.

Immunisation :—There is no prophylactic immunisation against this disease but research work is going on in this subject.

General measures :—Every effort should be made to improve the general sanitation of the village where leprosy is a problem. Scrupulous cleanliness of the person and the home will help in the prevention of this disease.

People should be educated about the causation and the mode of spread of the disease. They should be told that there is nothing to be terrified on seeing these patients. It must be made very clear that this disease can be cured in early stages so that cases should not be hidden. In our country good many of the lepers are begging in the streets ; they should be removed to institutions where they will be well cared for. Arrangements exist in these institutions not only for treatment but also facilities have been provided for work and recreation.

Improvement in the general economic and social conditions which is the objective of the Community Development Programme will play a substantial part in the eradication of this disease. Better nutrition will increase the resistance of the people to infection and better housing will reduce overcrowding and lesson the chances of contact with infectious cases.

In the community development areas leper patients should be encouraged to report to the medical officer incharge of the Primary Health Centre where facilities for consultation and treatment have been provided.

YAWS

It is a highly contagious disease. Primary lesion may appear like a papule and later develop into a fungating granulomatous eruption. The initial lesion generally starts on an existing sore. The lesions are on the exposed part of the body usually on legs, ankles and feet—but any part of the body can be affected. Sometimes the disease may appear in the form of light-coloured furfuraceous desquamation as if the skin has been dusted with flour. Later papules appear from these furfuraceous patches. These papules are present at the angles of the mouth in the axilla, on the buttocks and around the anus. In the late stages called tertiary stage, the ulceration may go deeper involving the bones.

Yaws is neither hereditary nor congenital. A pregnant woman suffering from yaws does not give birth to a child suffering from yaws.

The problem of yaws is limited to a few States, majority of cases are found in Andhra, Hyderabad, Madhya Pradesh and Orissa. The disease is mostly restricted to the low-lying areas at the foot of hills and in the jungles. It is common among the hill tribals and aboriginals living in deep rural areas.

Causative Agent :—The disease is caused by cork-screw like bacilli (*Treponema pertenue*).

Source of infection :—These bacilli are found in the discharges of the lesions of the skin and mucous membranes.

Method of transmission :—Infection is conveyed by direct contact with the lesions of the person suffering from this disease. Sometimes flies act as mechanical carriers and convey infection from the discharges of the persons suffering from this disease to the wounds, sores or exposed abrasions of other people. Simple contact with the skin is not enough for infection to take place; breach of the surface is essential for the development of infection.

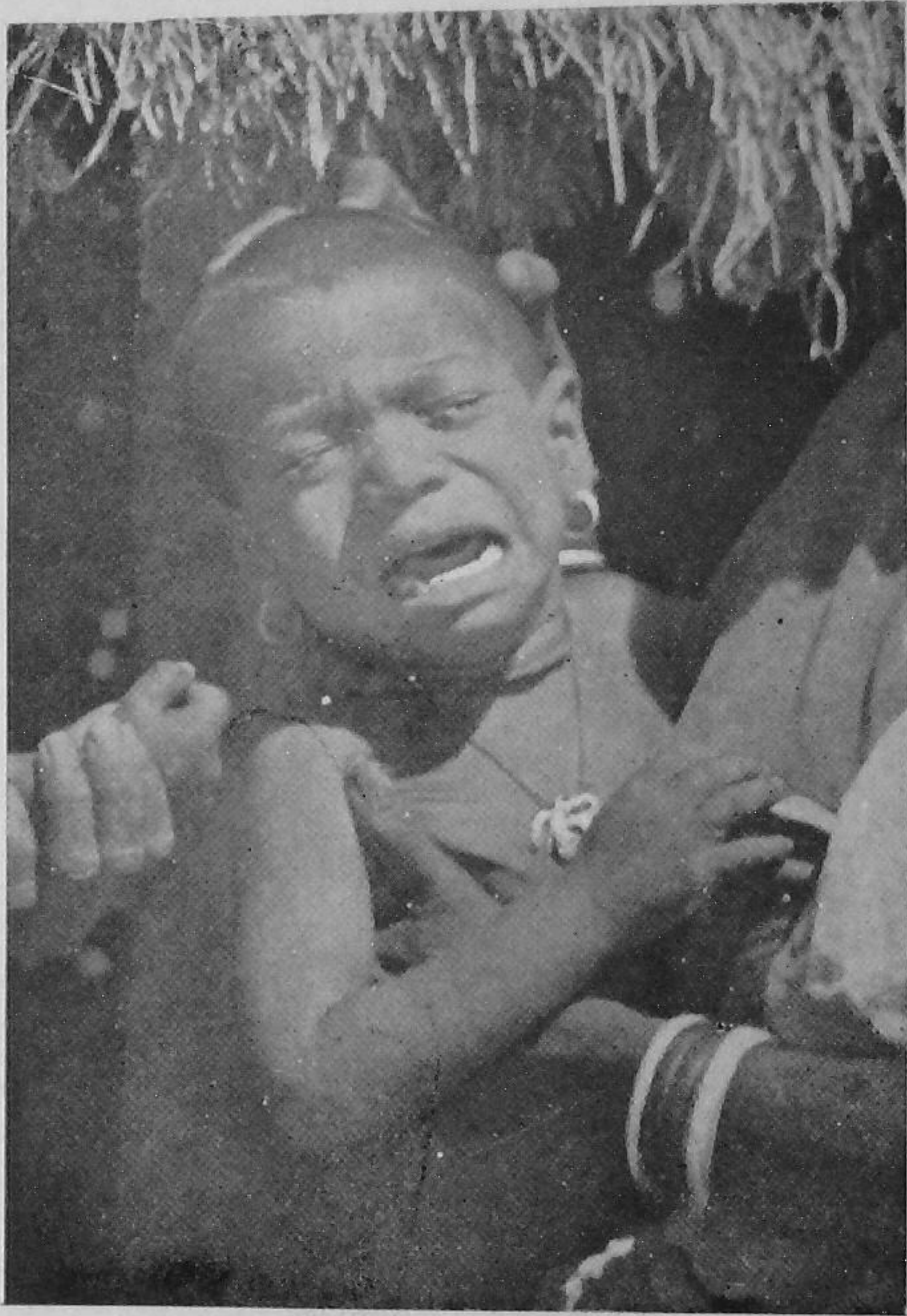
Incubation period :—It is 3 to 4 months or even may be longer.

General preventive measures :—Early diagnosis and prompt treatment of the patient.

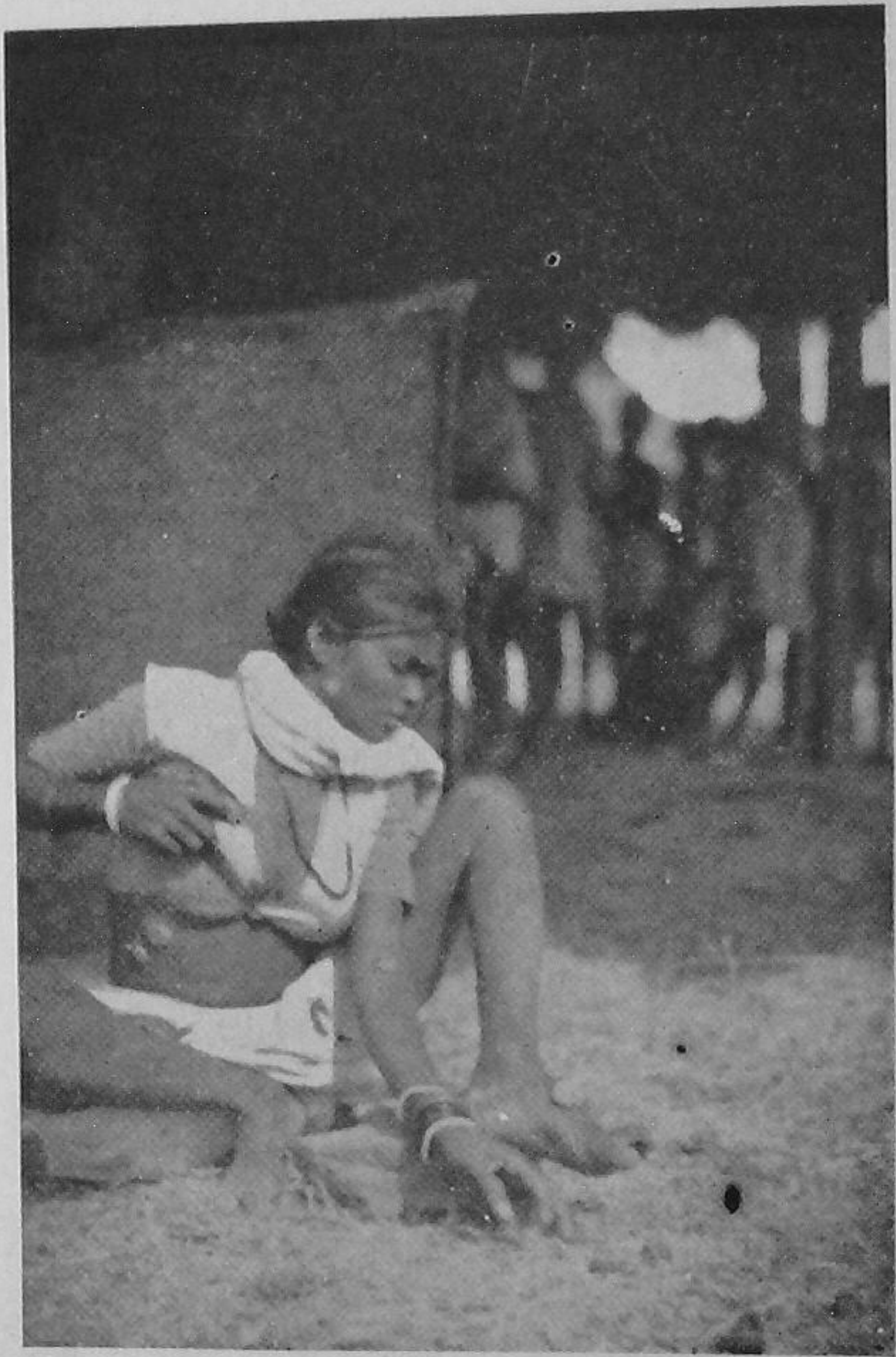
Contacts :—Examination of the contacts and treatment, if necessary. Contact means a member or members of the house-hold living with the patient.



Facial lesions (Yaws) (Before treatment)

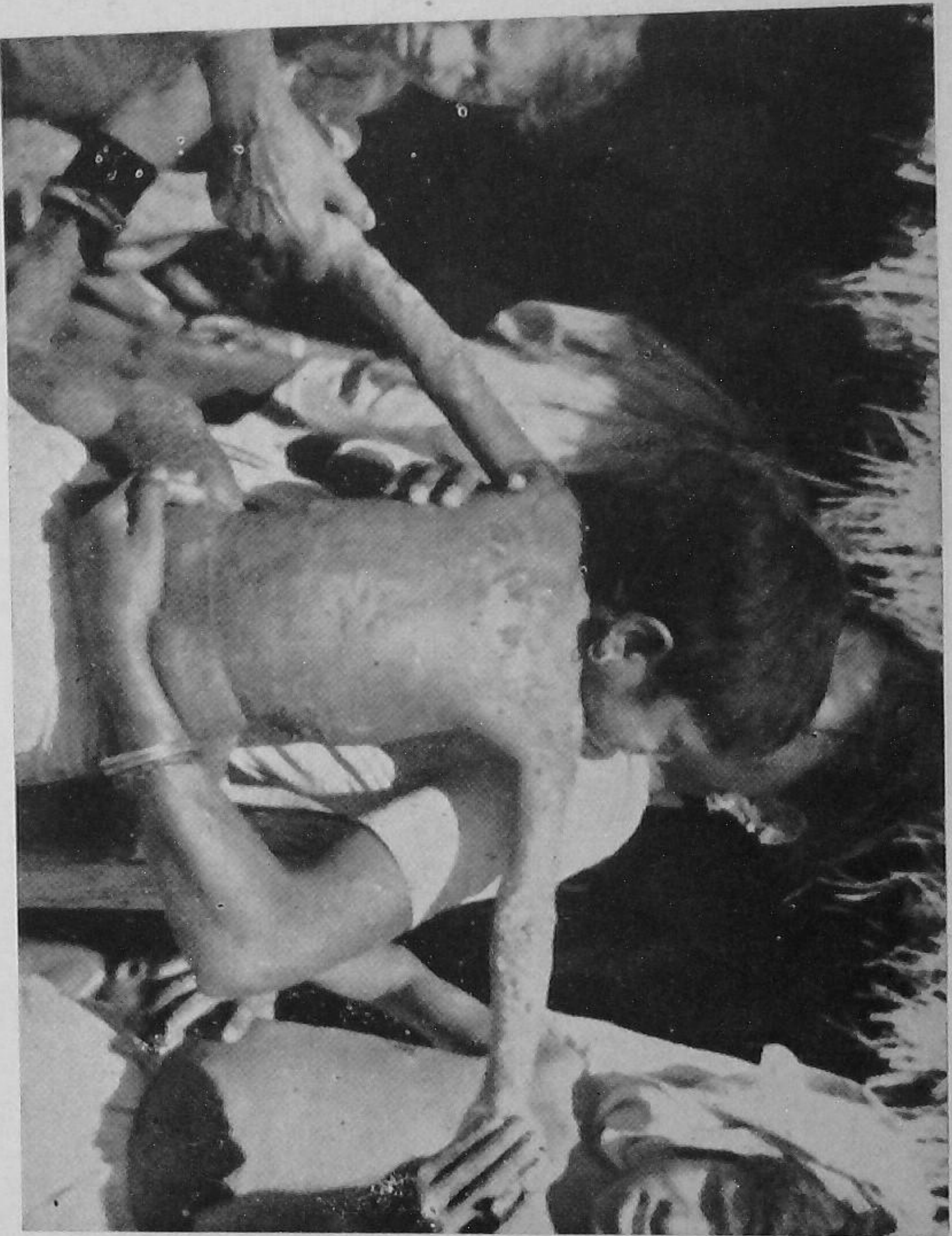


After treatment

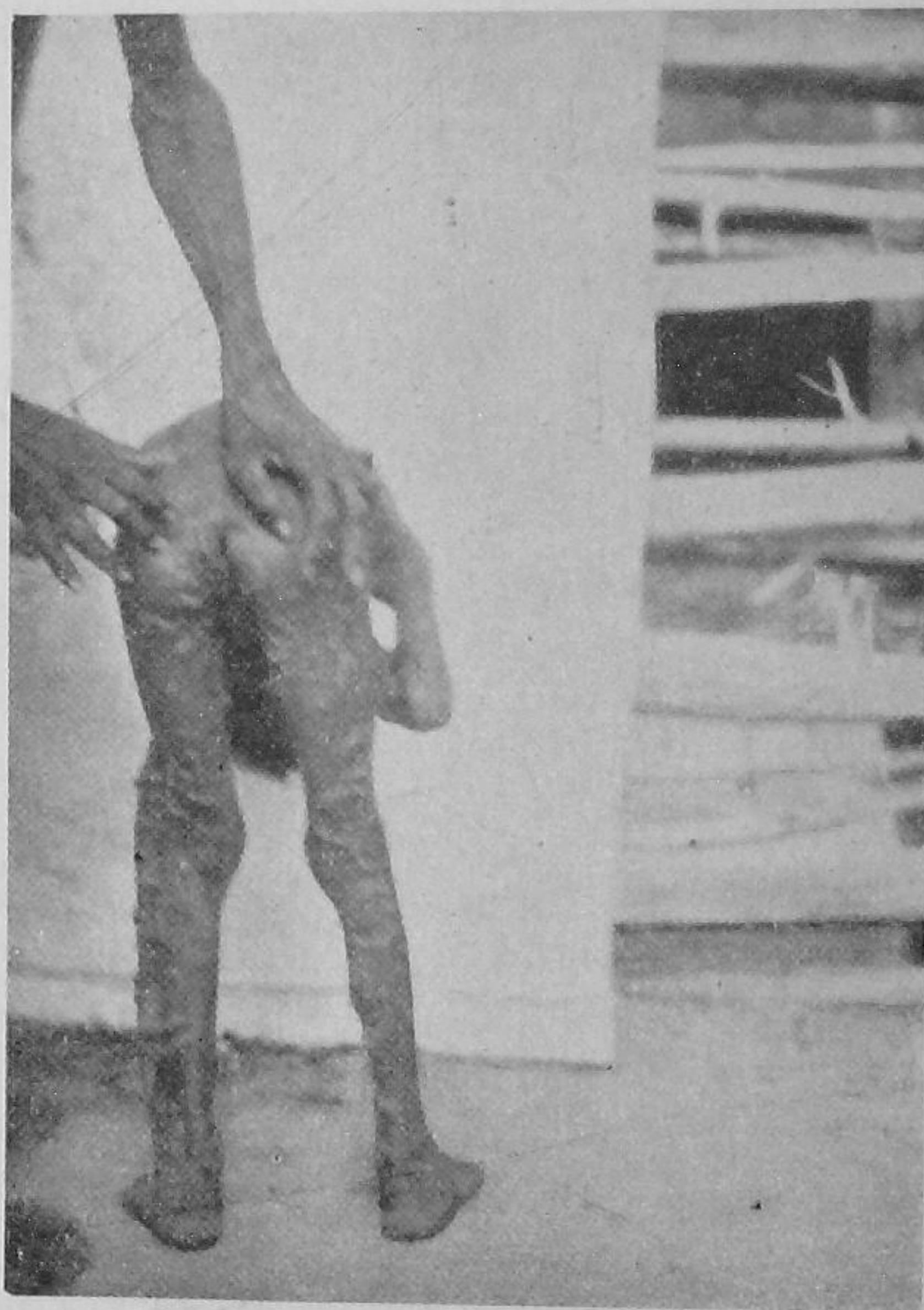


Lesion (Yaws)





Yaws
Lesions on the back, leg & arms



Yaws-lesions on the legs and buttocks



Papillomatous Lesions (Yaws)
(Through Courtesy WHO)



Macular Lesions (Yaws)
(Through Courtesy WHO)

Clothing and linen that have come in contact with the patient's discharges should be thoroughly disinfected before using again. Huts that have been occupied by the patient should not be used by the healthy people.

Investigation of the source of infection :—Survey should be carried out to find out the extent of the problem.

General Measures :—General education of the people about the causation of this disease and the method of spread will help in the control of this disease.

Improvement of general sanitary condition and better housing will lesson the chances of contact.

People suffering from this disease should be encouraged to go to the medical officer in the area and get regular treatment. Fortunately at the moment mass campaign against yaws is being carried out in a number of States with the assistance of World Health Organization and United Nations International Children Emergency Fund. Staff belonging to various State Governments has especially been trained in yaws control and they are carrying treatment to the people in their homes and villages. Our village level workers and other project staff should encourage the patients suffering from yaws to take advantage of this treatment, if yaws is a problem in their area.

SCABIES

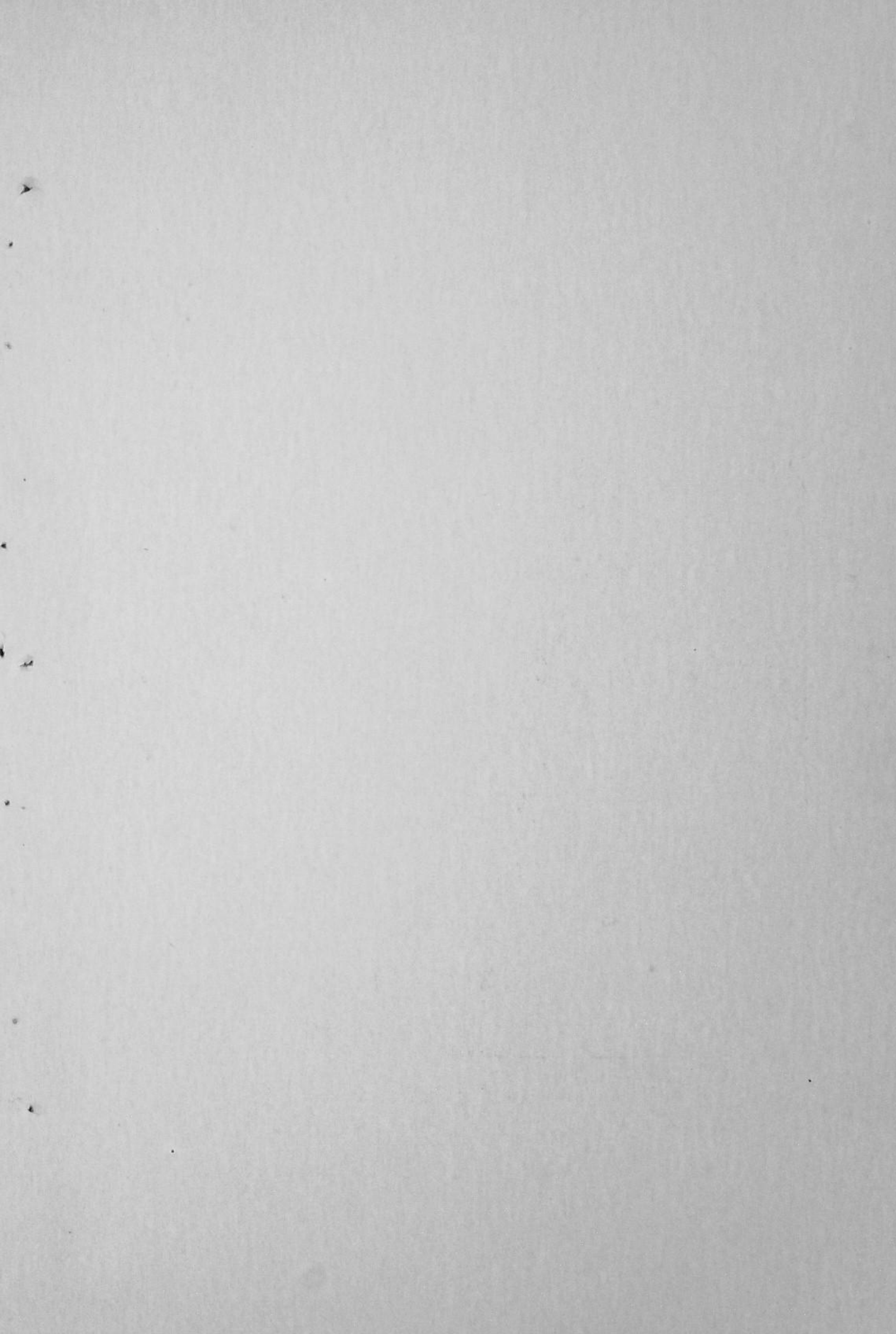
It is a specific contagious disease caused by an itch mite and characterised by the formation of burrows in the man's skin and by intense itching which is pronounced at night. The common sites of infection are spaces between the fingers, wrist, breast of women, genitals and palms and soles of children. Due to constant itching, there is always secondary infection by other pyogenic organisms. The disease is widespread and is common under conditions of overcrowding, poverty and where there is lack of personal cleanliness.

Causative agent :—It is an itch mite called *Sarcoptes scabiei*.

Source of infection :—Persons suffering from the disease are the chief source of infection.

Route of transmission :—It is due to direct contact with the infected person and indirectly by use of infected towels, bedding, etc.

Preventive measures :—Early diagnosis of the disease and prompt treatment is most essential. For the prevention it is necessary to maintain a high standard of personal cleanliness. People should avoid using towels and bed linens of other persons particularly of those where there is any suspicion of any skin disease.





Delousing Operation

LOUSINESS

It is a condition in which an individual has lice on his head or other hairy parts of the body or on the clothing mostly on the inner surface particularly in and along the seams. This condition is prevalent among people who do not observe principles of personal cleanliness, i.e. do not bathe and wash their clothes regularly. Anyone is liable to develop this condition but it is more common among children on account of the intimate contact they have with infected children in schools and when playing together in the village lanes. Poverty is an important factor in the spread of lousiness because it leads to overcrowding and insanitary habits. This condition is very common during the cold weather because of lack of facilities for maintenance of adequate personal cleanliness.

Mode of transmission:—This condition is acquired by direct contact with an infected person and indirectly by contact with the clothing and bed linen of the infected person. It is also transmitted by using combs, brushes, caps and clothing of the infected persons. Dogs sometimes carry human lice from one individual to another.

Preventive measures:—Disinfestation of the infected person is most essential. This means getting rid of all the lice on the person's body and on his clothes. Spraying of 5% D.D.T. insecticide powder on the hairy part of the body and on the inner surfaces of the under-clothing will kill the lice and also prevent lousiness. Health education of the people with regard to the spread of the disease is also necessary. Importance of personal cleanliness and washing of clothes is another factor in the prevention of this condition.

Diseases carried by lice:—Typhus fever, relapsing and trench fever—irritation caused by the bite of lice may lead to certain skin diseases as a result of secondary infection by other disease-producing germs.

GUINEA-WORM

This disease is due to an infestation of the tissues of man by a worm called *Dracunculus Medinensis*, commonly known as Guinea-worm. The infection occurs by drinking water contaminated with infected cyclops. The cyclop dies on account of the presence of hydrochloric acid in the gastric juice and the larva which is lying in the stomach is set free and develops into an adult worm. The adult worm after a journey lasting about a year through the human body eventually comes to the surface of the skin. A blister appears and then it ruptures and through the opening thus made the female protrudes its uterus and discharges enormous number of eggs. For their development, these eggs (embryos) must reach water in which the host cyclops (water fleas) are present. The cyclops swallow the eggs and further development of eggs into larvae takes place inside the cyclops and in two four weeks it is ready to infect man. Human beings acquire infection by drinking water containing infected cyclops. This infection is common in India particularly in areas affected with water scarcity and possessing wells. The infection in a community is maintained by the habits of the infected persons visiting step wells and washing their sores in water. In certain areas in the country this disease is present all the year round and one can see a large number of people having sores on their legs.

Preventive measures :—Infected individuals should not be permitted to contaminate water supplies. This can be achieved by the abolition of step wells and by construction of tube or other protected wells. Chlorination of water kills the cyclops and eggs of the guinea-worm. Boiling of water before drinking well also kill cyclops and the eggs of the guinea-worm. Straining of water through a piece of muslin will also hold back the cyclops. Education of the people about the causation of this disease will result in securing their cooperation in control measure.

TRACHOMA

It is a chronic contagious disease of the conjunctiva and cornea of the human being characterised by formation of granulations. This disease is responsible for a large number of total and partial blindness, opacities of the cornea and even deformity of the eyelids.

Trachoma is more prevalent in Northern and Central India and Rajasthan. Nobody is immune from this disease but it is most common in pre-school and school age children and more so in the rural areas.

Pre-disposing factors :—Hot and dry climate, dust and dirt, overcrowding, insanitary conditions and poor nutrition are important pre-disposing factors.

Causative Organism :—It is considered to be a virus.

Mode of Transmission :—This is from one patient to another. The secretions from the eye of the person who is suffering from this disease is transferred to the conjunctiva of the healthy person. This infection may be carried through using infected towels, handkerchiefs, pillows and also through flies and dust. Very often the mother is responsible for carrying infection unintentionally from the eyes of one child to the eyes of the other, when she is applying kajal or surma with her finger or by the thin rod used for the purpose.

Incubation period :—This is not known.

Preventive measures :—1. Early diagnosis and treatment of the patient.

2. Handkerchiefs, towels, pillow cases and other clothes soiled with the infective discharges from the eyes should be thoroughly boiled and washed before using again.

3. Personal cleanliness—One should not use towels, handkerchiefs, pillows, etc. that have been used by other persons.

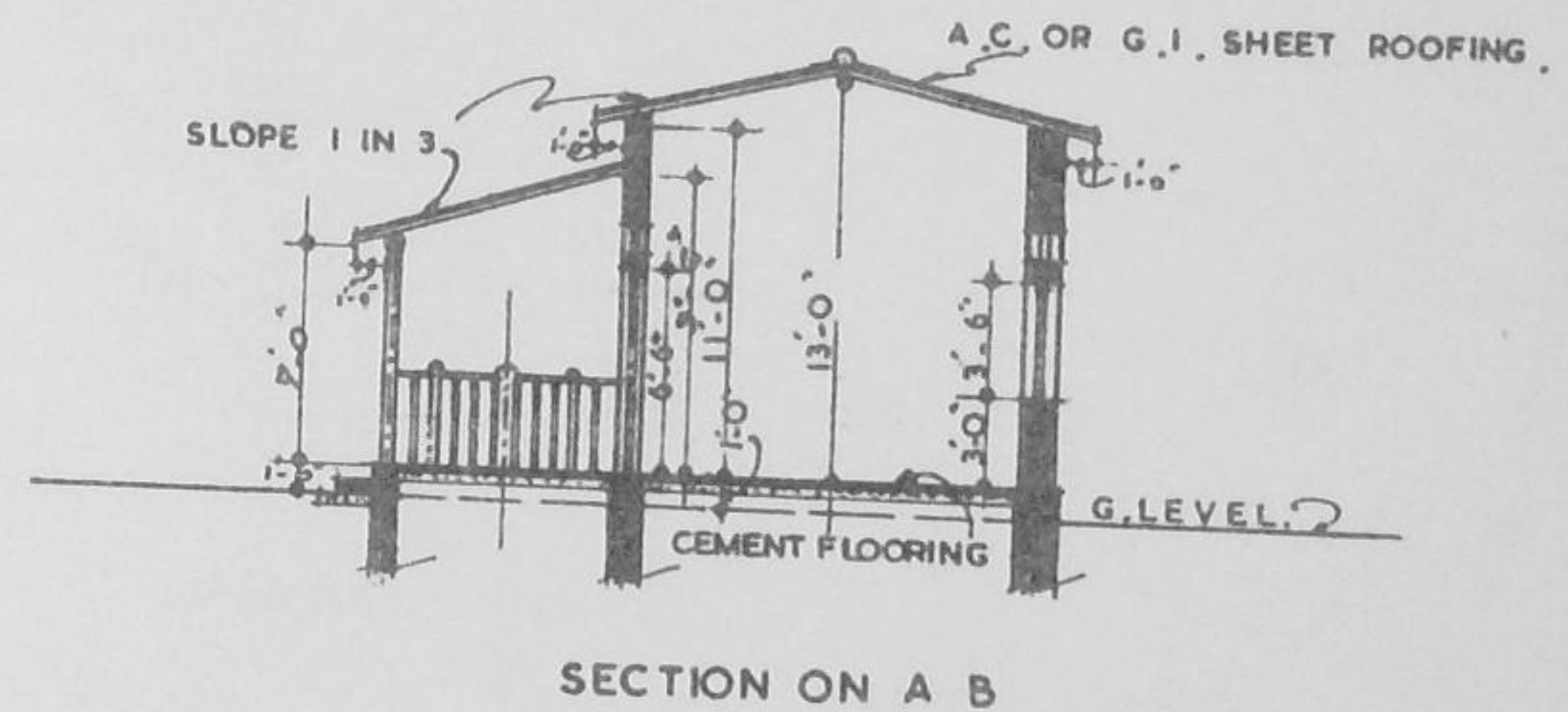
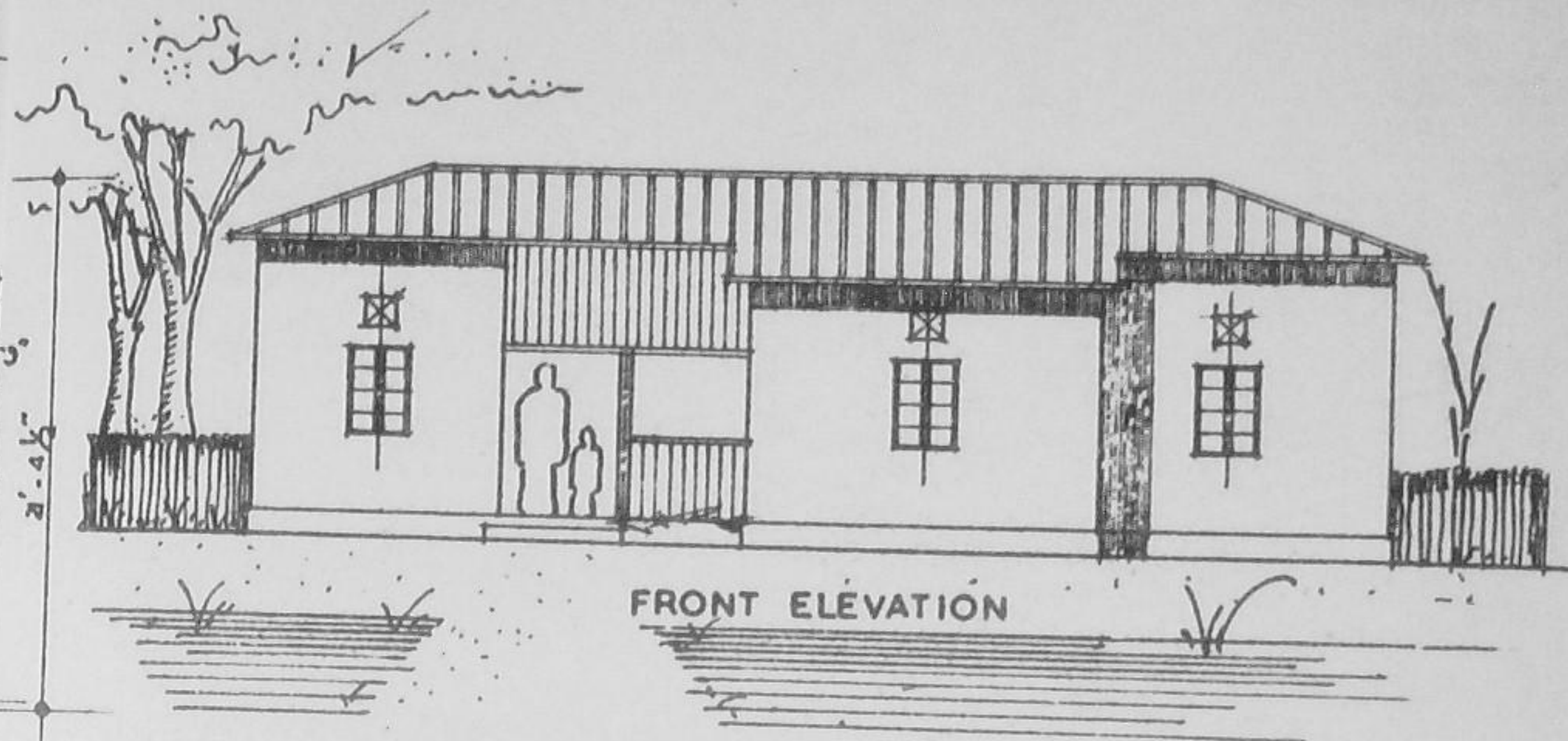
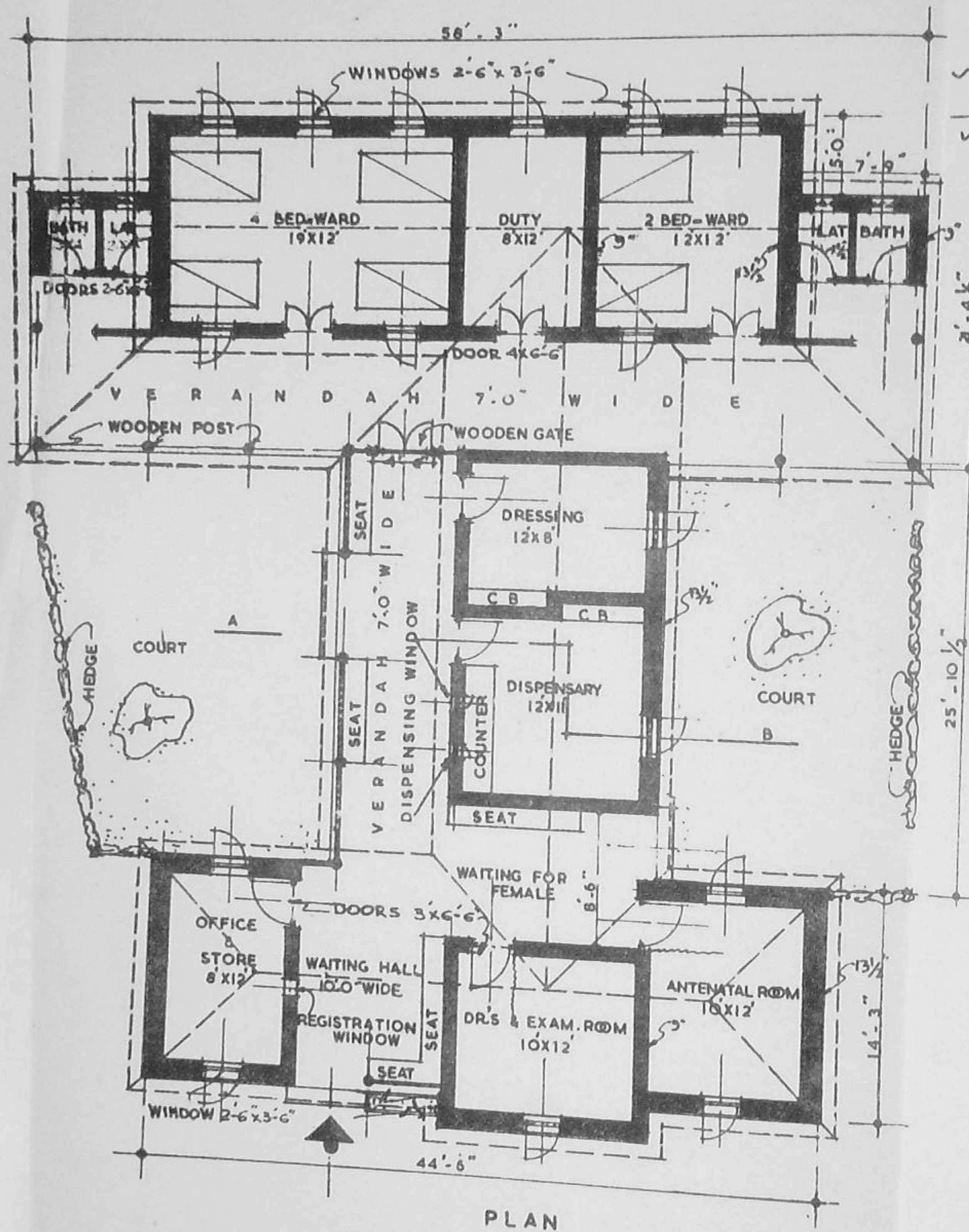
4. Improvement of general sanitation and cleanliness of the environment in which people live, play and work. Village lanes should be paved to minimise the dust nuisance. Every house should be provided with a smokeless chulla or a smoke-flue, so that the smoke from the kitchen does not cause irritation to the eyes of the inmates.

5. Every effort should be made to control fly nuisance and fly-breeding.

General measures :—Examination of school children should be carried out at the time of admission of every child to detect the disease. Further the person suffering from any type of conjunctiva should be treated immediately and every care should be taken that he does not infect other children.

Special effort should be made to examine and treat pre-school and school-age children, as Trachoma is mostly prevalent amongst this age group.

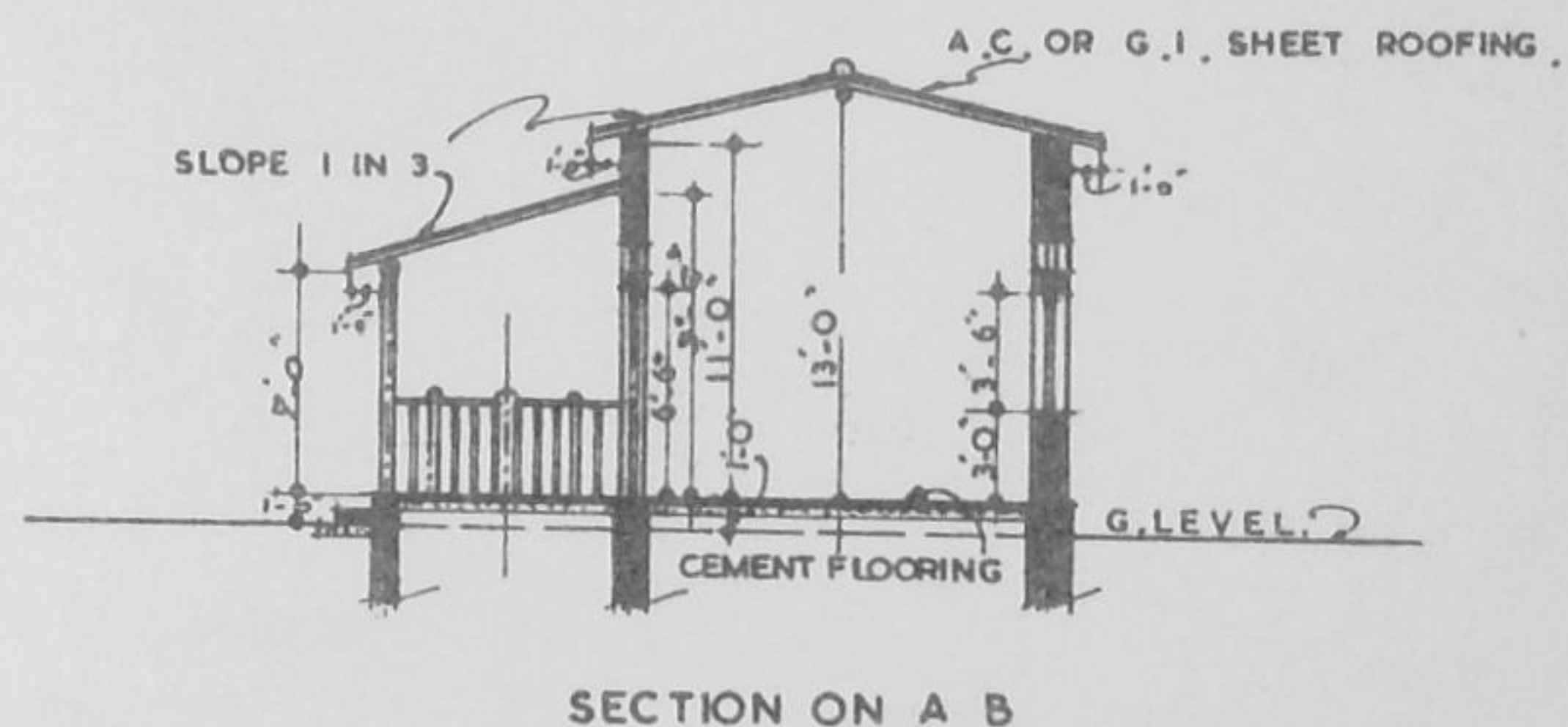
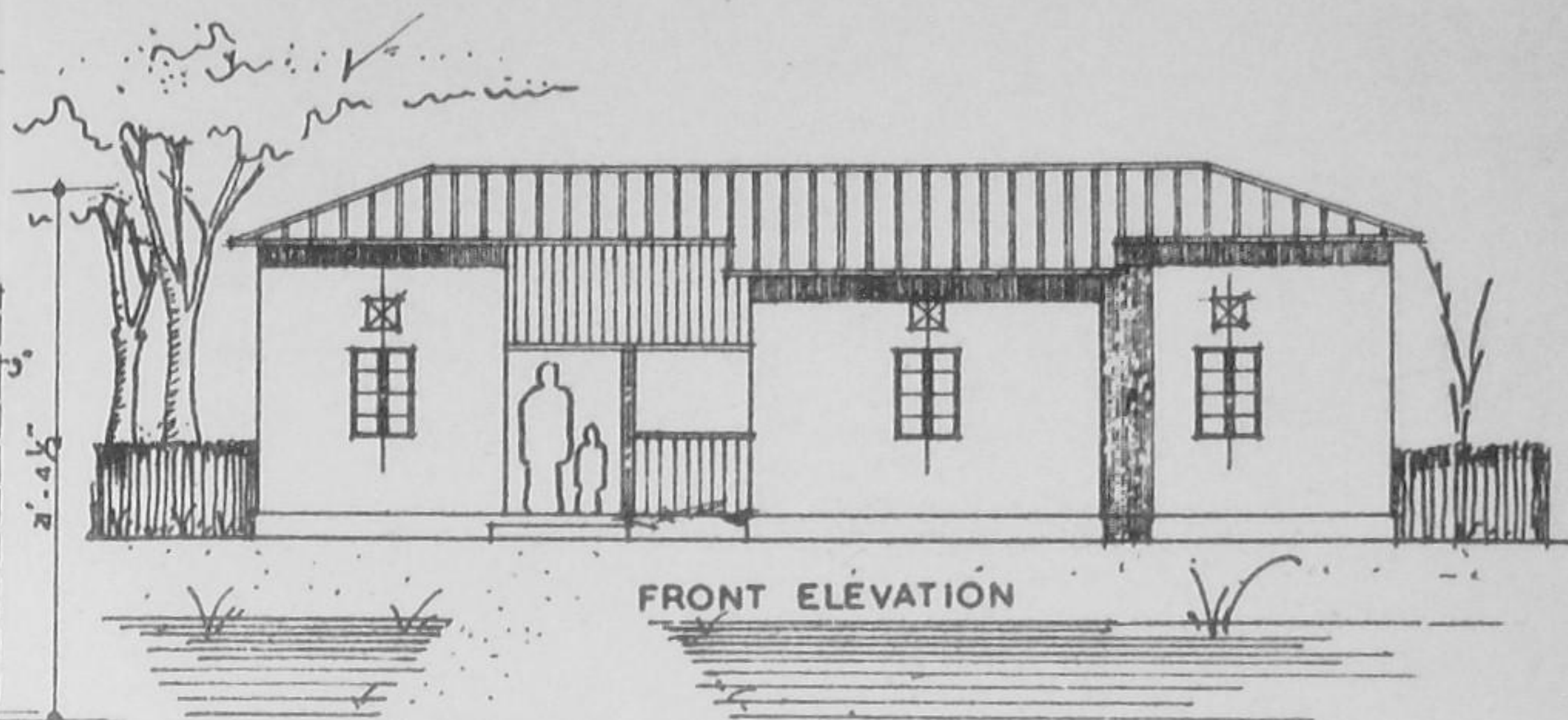
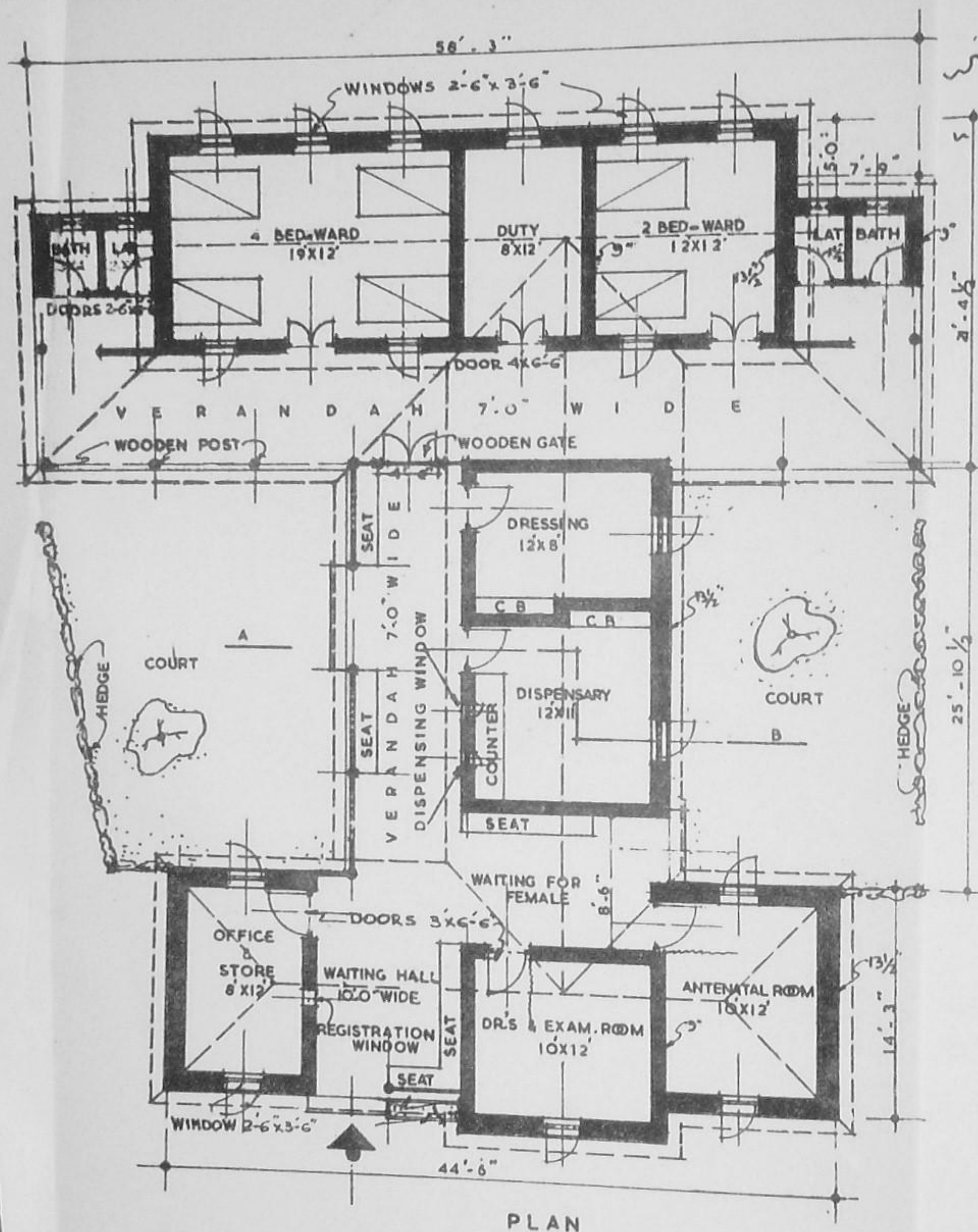
Education :—Education of the people about the disease and mode of spread should be carried out. To seek people's participation in control measures, it is essential that people should know all the factors responsible for the spread of this disease. This can be carried out by group talks, films, film strips, flannelgraphs, leaflets, posters, etc.



DESIGN FOR A PRIMARY HEALTH CENTRE (WITH 6 BEDS)

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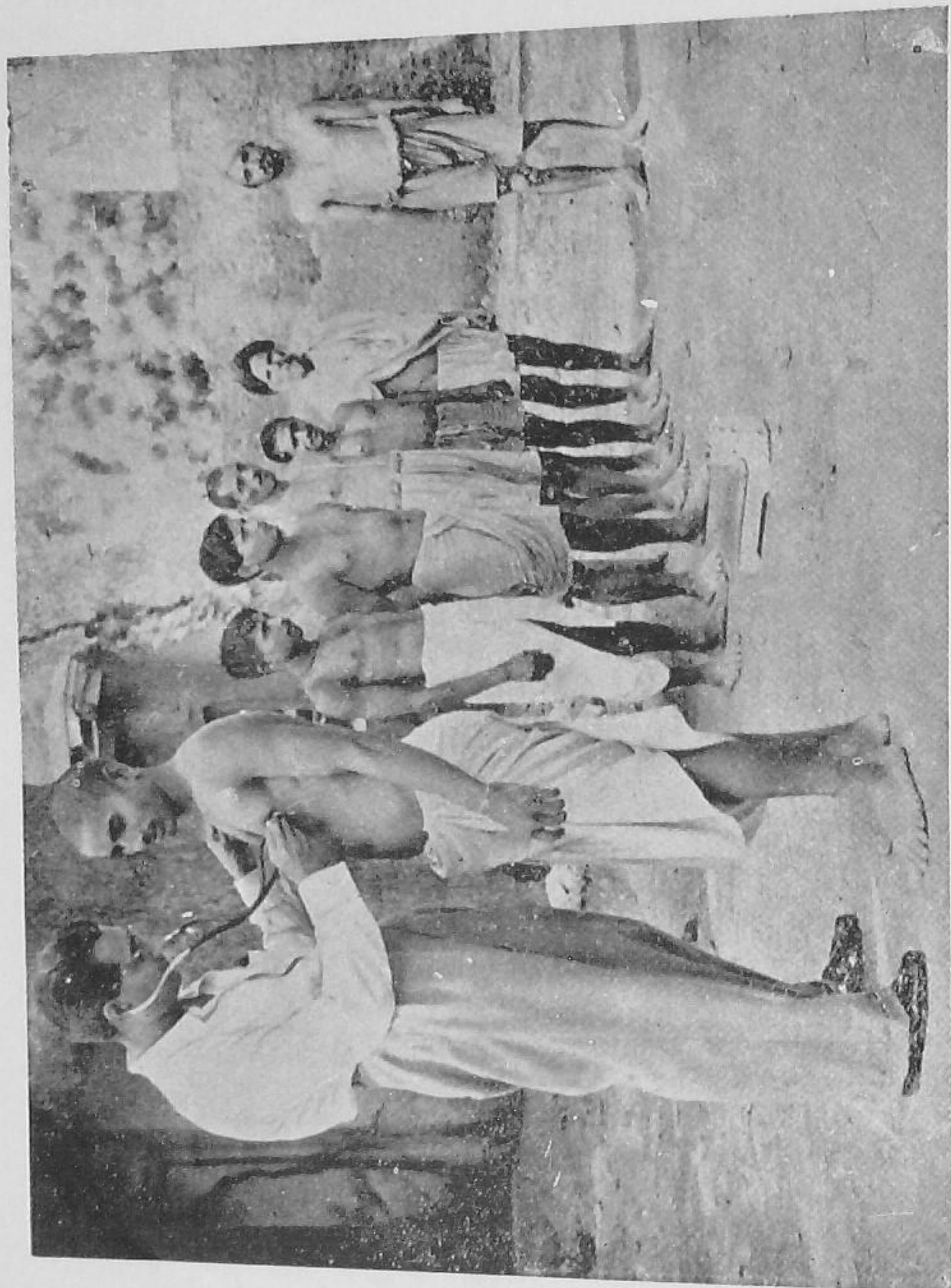
DRG. NO. 12.



DESIGN FOR A PRIMARY HEALTH CENTRE (WITH 6 BEDS)

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DRG. NO. 12.



Health Examination at the Primary Health Centre

HEALTH SERVICES IN THE COMMUNITY PROJECT AREAS

It is recognised that the people will not be able to enjoy the full benefit of their labour and the resultant improvement in their economic condition without having conditions conducive to the promotion of positive health. The success of the development of Community Projects will, therefore necessarily depend upon the satisfactory maintenance of health of the community; as such measures for the improvement of health must form an integral part of the economic development programme of the community. To meet these requirements, Primary and Secondary Health Centres are being set up in the community development programme.

Primary Health Centre :—This centre will be located in each Block and will form the focus from which health services will radiate into the area covered by the Development Block. It will serve a population of about 66,000 living in about 100 villages. The centre will have a dispensary, some diagnostic facilities and an indoor ward of about 6 beds. At least two beds will be reserved for maternity cases. There will be a Maternity and Child Welfare Centre attached to this centre where expectant and nursing mothers will be given ante-natal and post-natal care and during labour domiciliary help would be available. To serve a larger population in the field of maternal and child health, three sub-centres will be set up at convenient places in the block and a midwife will be in residence at each one of these, so that she is readily available. These sub-centres will be under the supervision of the Lady Doctor/Lady Health Visitor. A Sanitary Inspector will be attached to each centre and will visit the villages frequently and give advice and instructions for the improvement of environmental sanitation and take necessary steps for control of communicable diseases. He will take active part in Health Education Programme.

Sufficient staff is being appointed in the health centre and arrangements have been made to supply Mobile Health Van which will facilitate the flow of health services into the different villages and into the homes of the people. (Details can be seen in the Appendices).

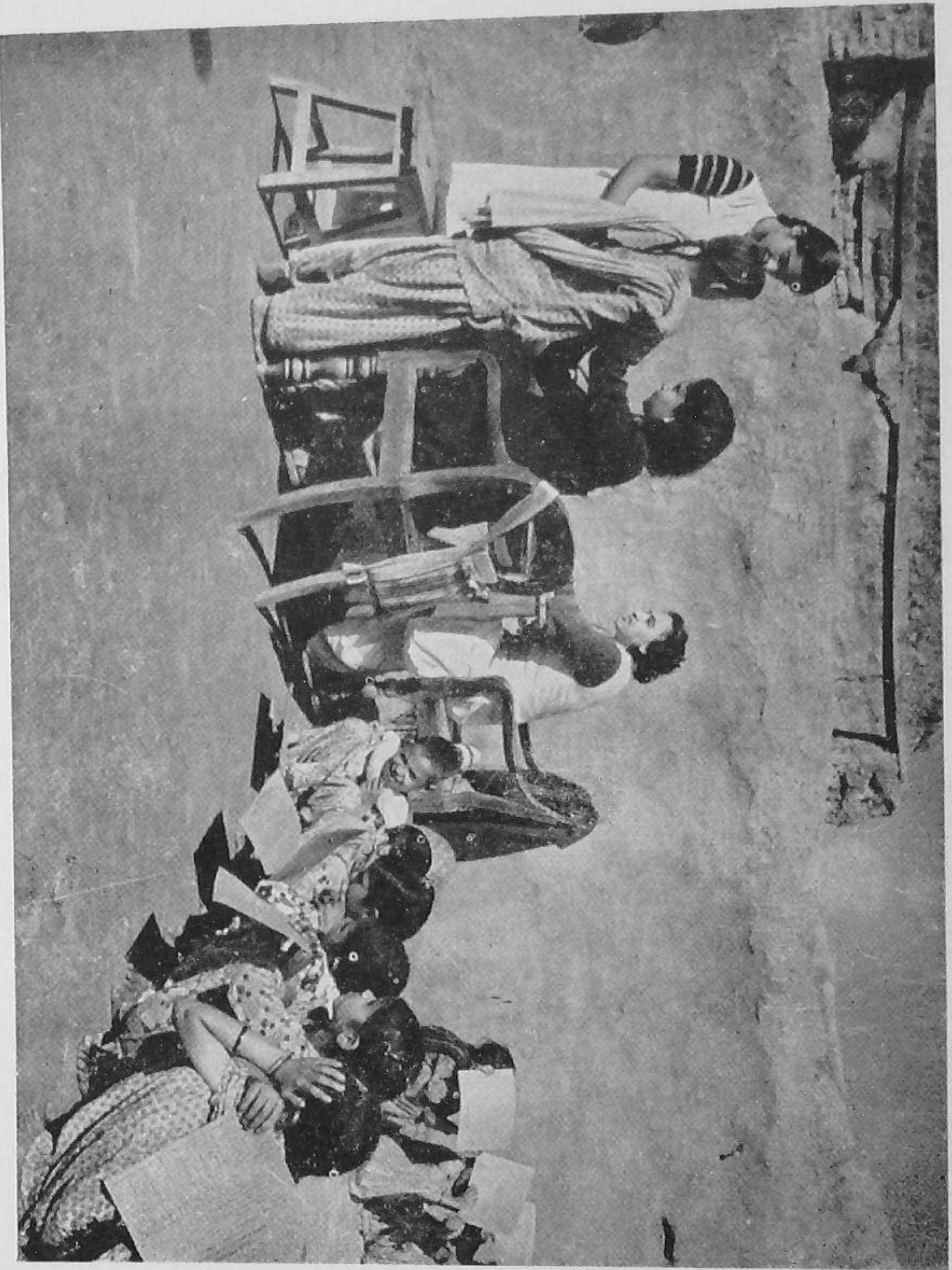
Secondary Health Centre :—It has been proposed to have a Secondary Health Centre for each projects so that it will take care of three Primary Health Centres. In most of the areas, such centres already exist. It should be located at the headquarters of each Community Project. It should have indoor accommodation for at least 40 beds and should be fully staffed and equipped to render specialised type of services that are not available at the Primary Health Centre. It must possess adequate X-ray and other diagnostic facilities.

Medical Officer in charge of the Secondary Health Centre will

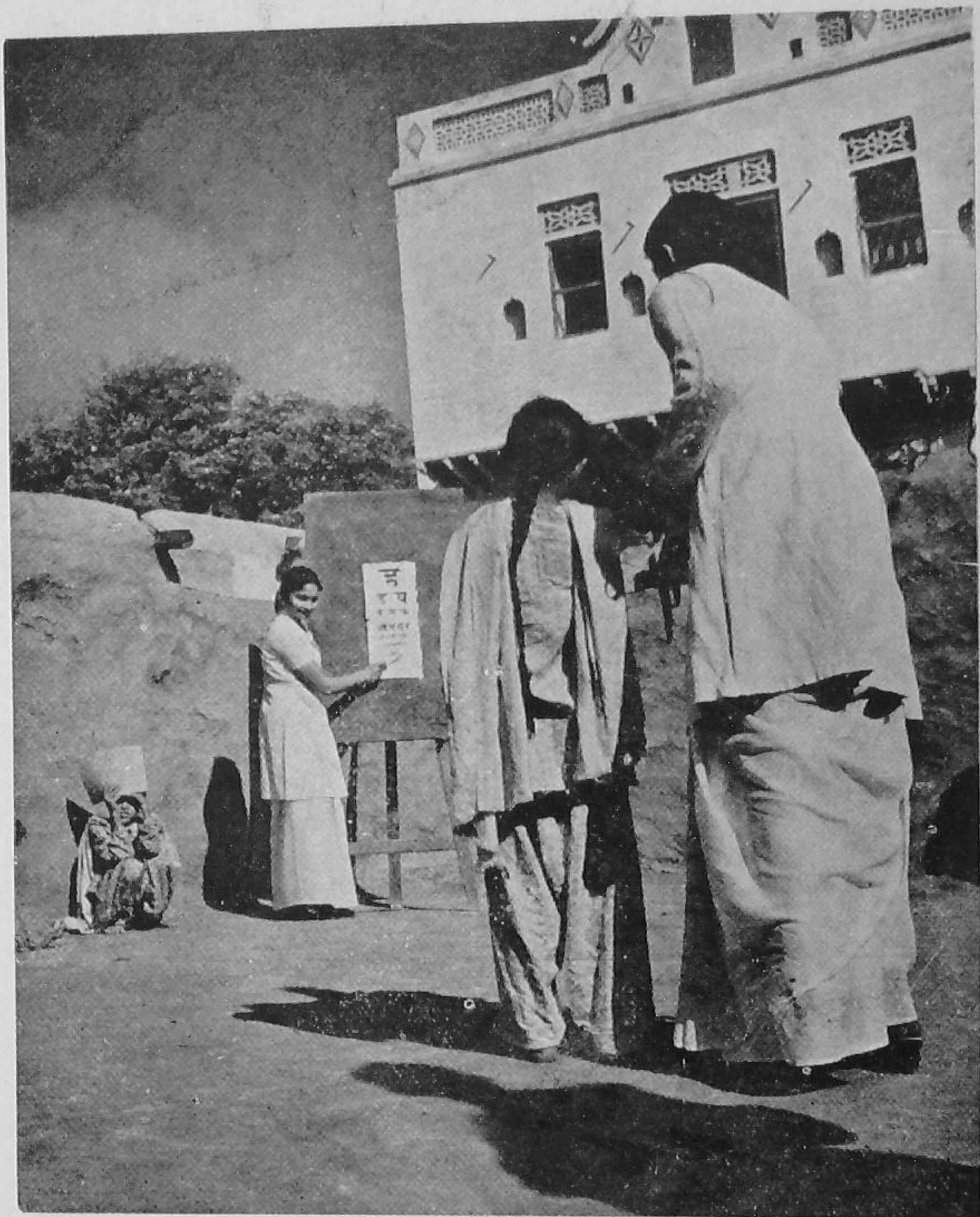
supervise both preventive and curative services in the whole project and periodically inspect Primary Health Centres. He will in consultation with the Project Executive Officer and Block Development Officer chalk out a programme for the development of health services in each Block and set up targets for achievements. In this programme, emphasis has to be laid on the preventive side and for improvement of environmental sanitation, i.e., provision of safe water supply, hygienic disposal of human excreta, provision of soakpits and smokeflues etc.

These centres will also be responsible for conducting health surveys and collection of health statistics. These surveys will give valuable information about the existing health conditions and prevalence of certain important diseases in the community. This knowledge will help in the implementation of preventive measures and evaluate the progress.

Health of the School Children :—The medical and health staff attached to the Primary Health Centre will also carry out medical examination of the school children to evaluate their health status and to find out if they are suffering from any physical defects or disabilities. They will take suitable action for the correction of physical defects and disabilities detected during the course of examination. Immunisation of school children against smallpox, cholera and other prevalent diseases will also be carried out. Health cards in respect of every individual child must be maintained giving details of the medical examination, defects and disabilities detected and corrected and also about immunisation. In addition, they will be responsible to see that the environment in which the child lives and studies correspond to the pattern of healthful living. The Medical Officer and the Sanitary Inspector of the area will make sure that there are arrangements for safe water supply for the children and that adequate arrangements for sanitary latrines exist. The Sanitary Inspector and the Social Education Organizer will arrange to give talks to the school children on personal hygiene. Schools are very important centres for imparting health education for the development of healthy habits.



Health Examination of School Children



Health Examination
of
School Children



HEALTH CODE FOR THE PROJECT PERSONNEL

Sanitation and public health are one of the most important features in the Community Projects Development Programme. Our aims are not only to fight hunger and ignorance but to check and eradicate disease which has been the bane of the rural life in India. To achieve full benefits of the economic improvement, it is necessary to make every effort to maintain and improve the health of the people.

The personnel working in the Community Project Areas are charged with the responsibilities to teach and train the village folk to keep their hearth and homes clean and to create conditions which would completely root out all preventable diseases from our countryside. The Gramsevaks, the Social Education Organisers, Sanitary Inspectors and other staff working in the project areas are given training in principles of healthful living in the improvement of environmental sanitation and prevention of disease. To educate the villagers and to instil in them the desire for healthful living, it is absolutely essential that our project staff must set an example by their personal habits and methods of living. In fact every member of our project staff is to be a "Model" for villagers to look up to and follow his example. It will be unfair for our project staff to ask the villagers to construct and use latrines when they themselves continue to use the village fields and ponds. Similarly it will have a very little effect on the villagers if they are asked to have a smokeless chulha when our own staff prefer to use an open oven which creates plenty of smoke. As such it is absolutely essential that our staff must practice all they want others to practice. The homes of every one of our project staff must act as demonstration centres for the rest of the villagers so far as improvement of environmental sanitation is concerned.

APPENDICES

LATRINES FOR IMPROVED METHODS OF EXCRETA DISPOSAL IN VILLAGES

The status of the health of the people in a village or nation is a measure of the human resources available to produce food, operate industries and to otherwise maintain the standard of living. Poor health not only takes workers from the fields and other places of employment, but it greatly burdens the reduced family income and brings suffering and sadness. The great majority of sickness and deaths now occurring in India can be prevented by proper health practices.

The following shows the average annual number of deaths from filth-borne diseases in India during the period 1940-49 as reported by physicians, health visitors, sanitary inspectors and village officials responsible for reporting the number of deaths and their causes.

| | |
|---|-----------|
| Cholera | 2,02,857 |
| Dysentery and Diarrhoea | 2,27,850 |
| Typhoid and other fevers (excluding malaria) | 23,13,146 |

While the information on the number of cases of illness is incomplete, a rough estimate could be obtained by multiplying the above number of deaths occurring annually by 20, which would indicate about 55,000,000 cases of the above diseases per year. This does not include hook-worm and other worm diseases. Estimates of infection run as high as 75% of the population in some areas. These figures represent a great economic loss in absence from work and cost of medical care as well as the untold suffering and loss of life.

The above listed diseases are transmitted through the faeces from persons ill with the disease to those who are susceptible. This transmission of disease usually occurs by infected human wastes reaching the water or food supply directly or by flies. In addition, hook-worm and other worm diseases are transmitted by the pollution of soil with faeces from persons having the worm diseases. Thus the prevention or control of cholera, typhoid fever, diarrhoea, dysentery and the worm diseases depends upon breaking the chain of transmission of infected human excreta from one person to another. Safe water supplies and sanitary methods of human excreta disposal are essential in preventing the spread of these communicable diseases.

There are several sanitary methods of human excreta disposal. These methods meet the basic principles of disposal of excreta so that it will not—

- (1) contaminate any drinking water or food supply;
- (2) be accessible to flies and other insects, rodents, animals and other vehicles of transmission which may come in contact with food or drinking water;

- (3) contaminate the surface of the soil and thus expose human-beings to hook-worm disease;
- (4) contaminate waters used for swimming, bathing or laundering;
- (5) create a nuisance due to odour or unsightly appearance.

One method which does not comply with these principles, especially No. 3, is the indiscriminate spread of human excreta on the soil. Cysts of infectious diseases, tubercle bacilli and the eggs of hook-worm and round-worm diseases may survive in excreta for long periods and may not be killed by the usual temperatures reached in composting. Hence, the spread of excreta containing these organisms on to the soil exposes the population to worm and other diseases and also may contaminate the vegetable crops. Another undesirable factor in this practice is the exposure of individuals who handle the excreta to the various filth-borne diseases and thereby maintaining foci from which these diseases may spread to the rest of the community. For these reasons human excreta should not be disposed of indiscriminately on the surface of the soil or handled unnecessarily by individuals. Pending further research to determine the time and conditions required to kill the infectious agents, it is suggested that the practice of composting or otherwise using night-soil be discouraged.

Water-flush toilets discharging into sanitary sewers and an adequate municipal sewage treatment plant or individual septic tanks provide the best means of sewage disposal. For various reasons these facilities are not practical for the major portion of the rural population, which comprises about 90 per cent of the total in India. Hence, it is essential that other sanitary methods be made available for this large segment of our population.

Sketches of several types of latrines are included here so that a type suitable to local conditions can be selected. These designs were developed by the States as indicated on each drawing. Other States may have equally suitable plans for latrines which were not readily available for inclusion in this manual. In view of this and the fact that each State Directorate of Health Services is concerned with the improvement of village sanitation, a representative of that Directorate should be consulted for guidance and assistance in sanitation, as well as other health problems.

Some of the most important factors which apply to each type of latrine are as follows :

1. *Location* : Latrines should be located at least 50 feet from a well water supply and should be at a lower elevation, so that the direction of flow of the ground water will be away from the well. Where there are creviced rock formations, such as lime-stone, utmost care must be exercised in locating the latrine to avoid contaminating the ground water supply. In such cases, the latrine pit or borehole should not extend into the ground water table. Where possible, latrines should not be located in areas usually subject to flooding. The

latrine plate should be surrounded by a compacted earth mound, the top of which should be above the usual storm water level.

2. *Squatting Plate* : It is important that the squatting plate and foot-rests be of the dimensions shown in the sketches in order to minimise soiling. The plate should be constructed of impervious materials, preferably porcelain or burnt clay. Where concrete is used, it should be given a hard and smooth finish.

3. *Vents* : The size of the vent depends on the type of latrine. Wire mesh or other comparable screening should be used to mosquito-and-fly-proof the vent at the top.

4. *Superstructure* : Locally available materials should be used for the superstructure to provide shelter and privacy. While these are the primary purposes of the building, a neat and attractive structure usually is better maintained.

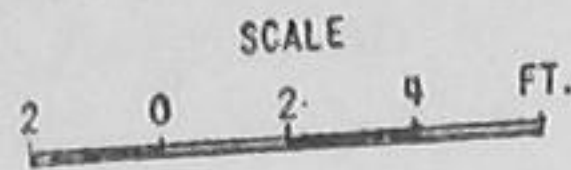
5. *Maintenance* : The length of time, the borehole, well or trench will be serviceable, depends on several factors, including soil conditions, number of users, care in usage, etc. The latrine should be used only for the intended purpose and not for the disposal of refuse or other debris which will rapidly fill the trench, well or other receptacle. The squatting plate should be washed down daily and the latrine otherwise kept clean. When the hole or other receptacle becomes filled to within two feet of the top, its use should be discontinued and earth should be compacted in the remainder of the space. A new trench or well should be made and the squatting plate moved to drain into it.

6. *Use* : Each member of the household should be informed as to the importance of the latrine from the standpoint of the family, as well as the village. They should be encouraged to use the latrine at all times and to see that it is properly maintained.

TYPE DESIGN HAND FLUSHED WELL LATRINE

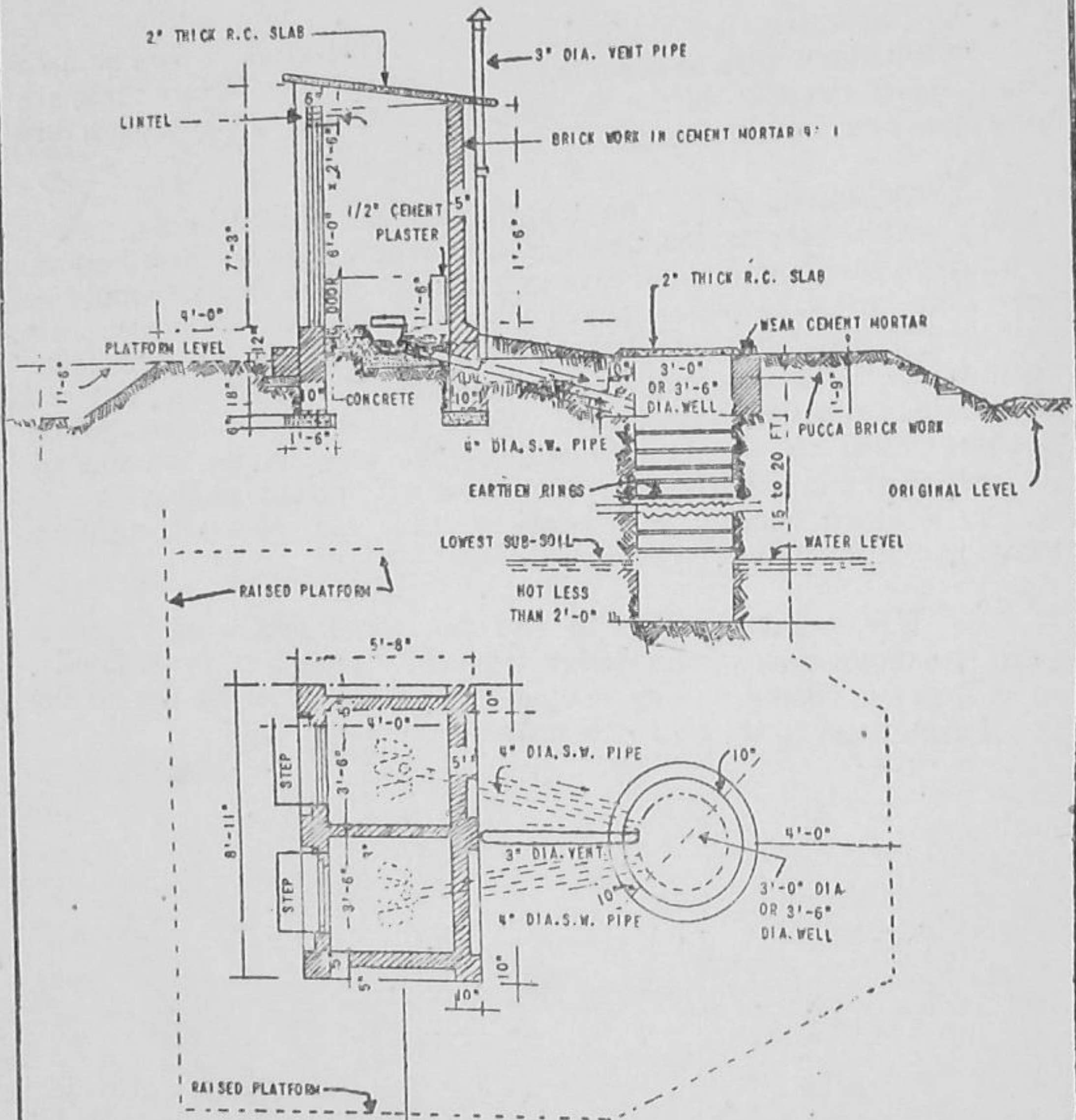
DRG. No: A-2

Brick dimensions to
vary according to the
brick sizes available



Latrine per seat ... Rs. 310/-
3'-0" Dia.
Earthen Ringwell ... Rs. 120/-
Sanitary fittings
including pan..... Rs. 100/-
Rs. 530/-

SECTION



With courtesy of Chief Engineer,
P. H. Engineering, Govt. of West Bengal.
ISSUED WITH SLIGHT MODIFICATIONS BY THE
MINISTRY OF HEALTH, GOVT. OF INDIA.

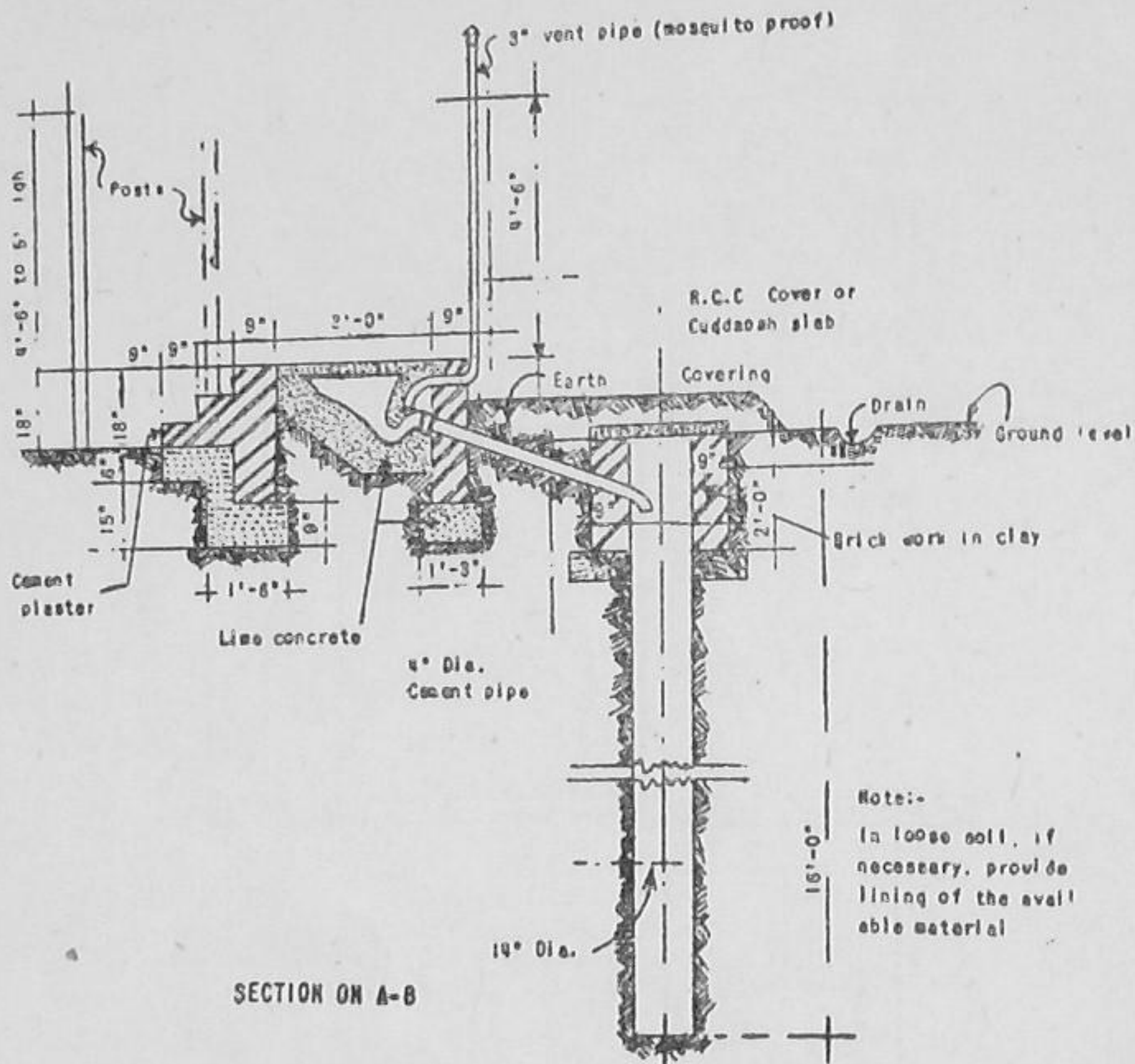
DESIGN FOR A SINGLE SEATED WATER BORNE BORE HOLE LATRINE

DRG. NO. A-4

SCALE

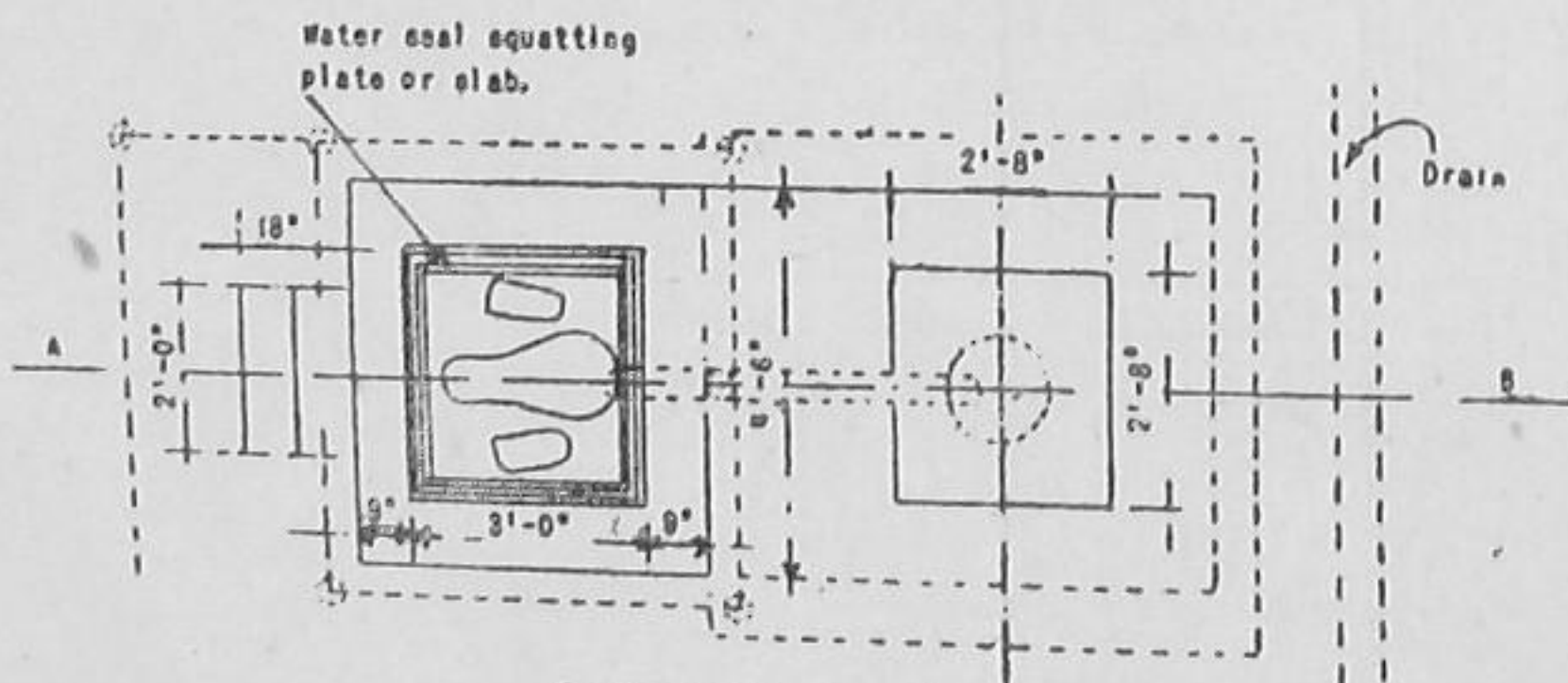


Brick dimensions to
vary according to the
brick sizes available.



Note:-

In loose soil, if
necessary, provide
lining of the avail-
able material

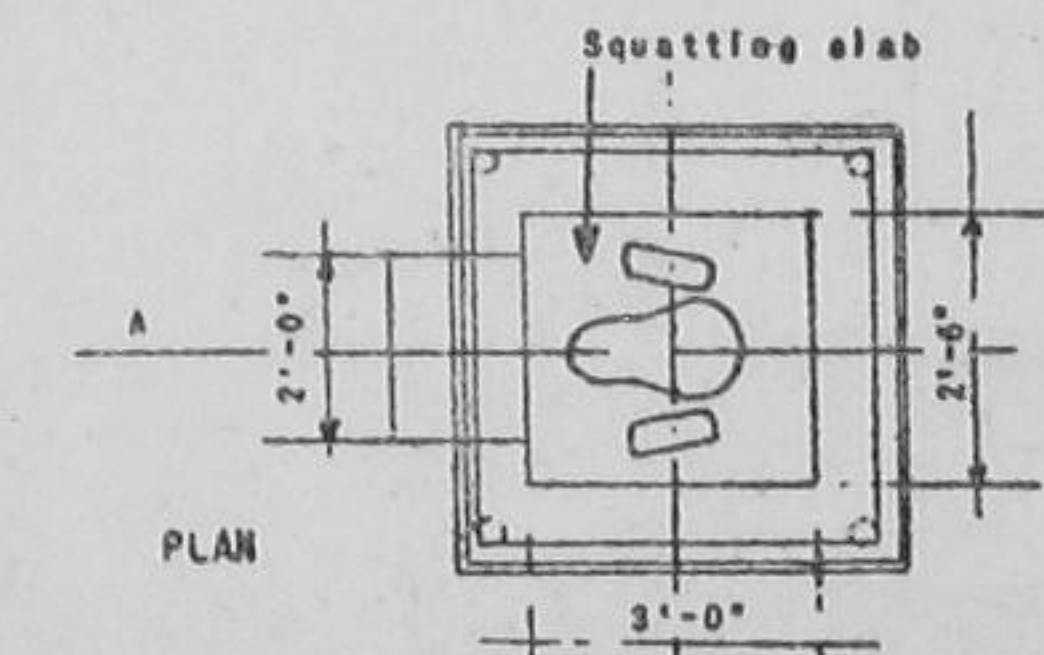
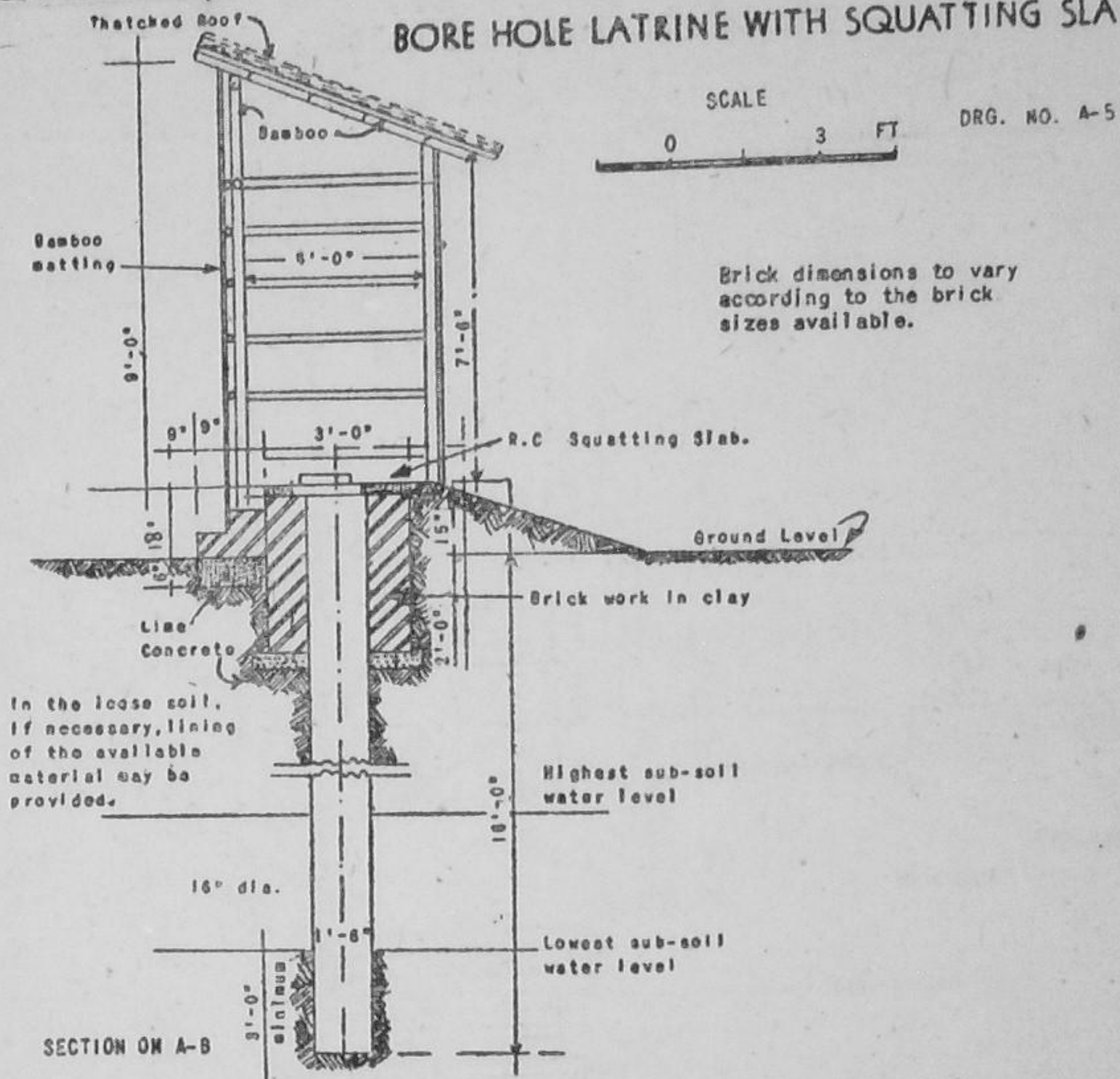


Enclosure Posts. Bamboo or casurina sticks or
country teak logs and tied with coconut or cadjen
leaves or bamboo thatty.

With courtesy of
Govt. of Madras.

ISSUED WITH SLIGHT MODIFICATIONS BY THE
MINISTRY OF HEALTH, GOVT. OF INDIA.

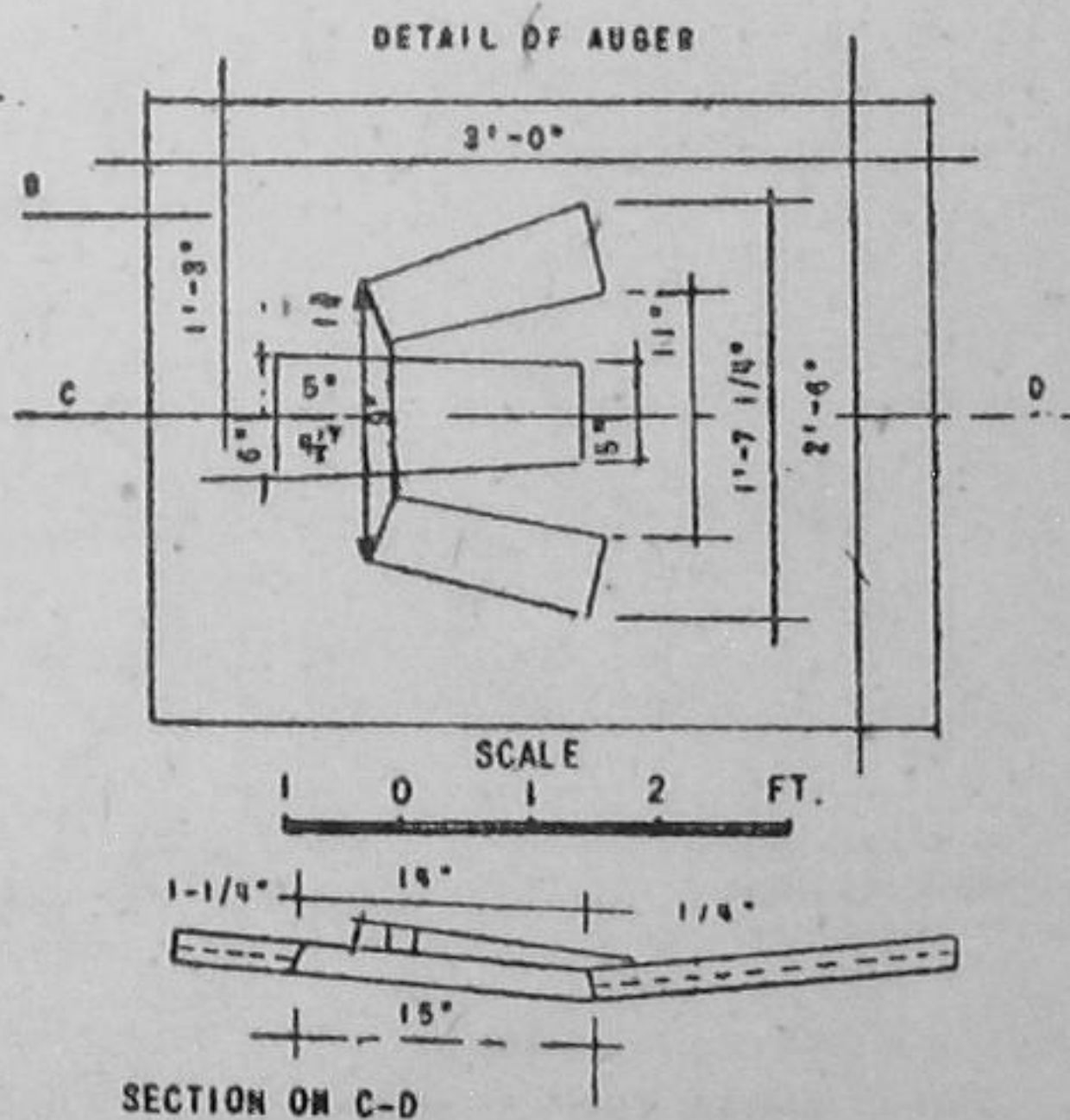
BORE HOLE LATRINE WITH SQUATTING SLAB



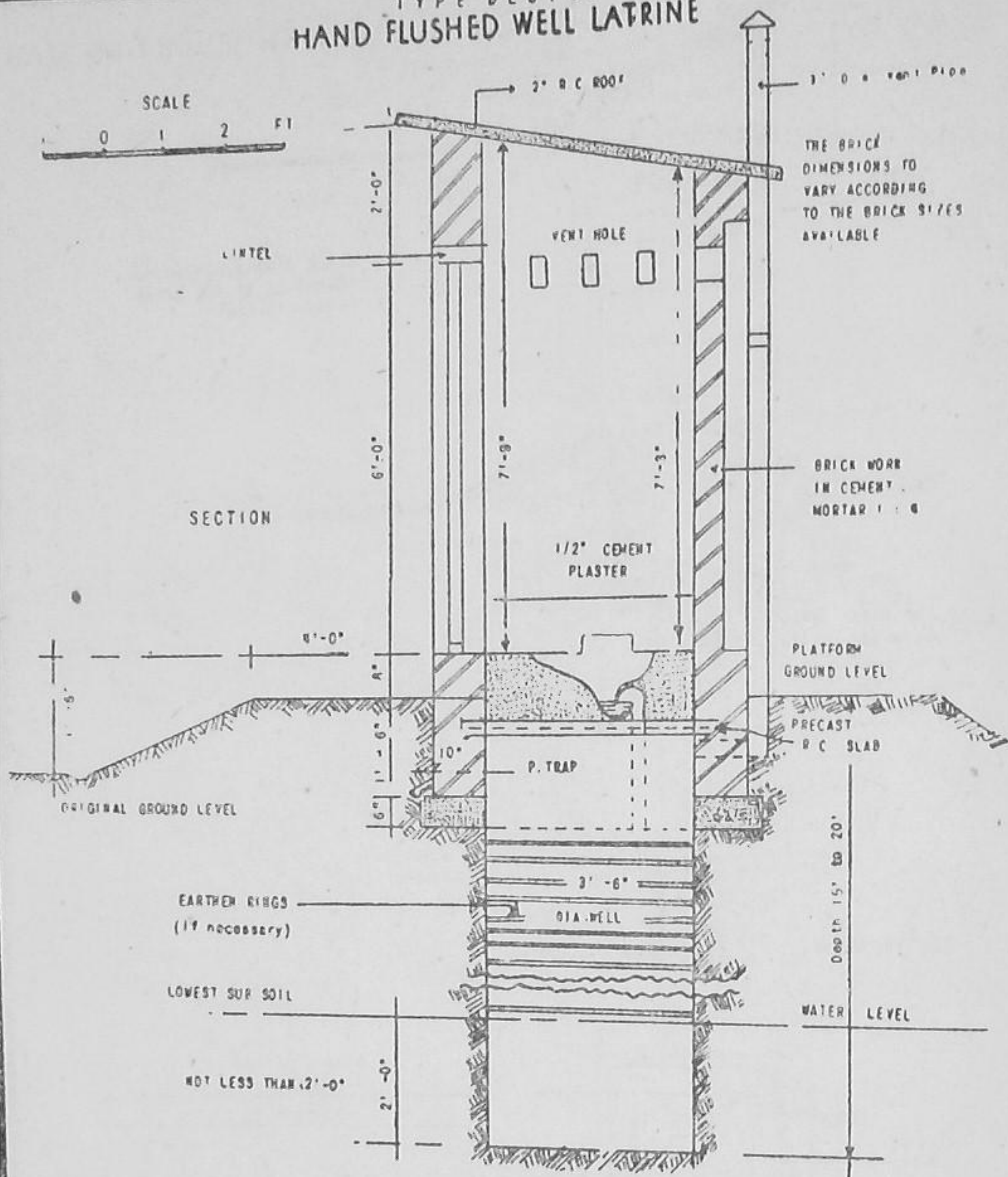
Enclosure Posts. Bamboo or Casuarina sticks or country teak logs and tied with coconut or cadjan leaves or bamboo thatty.

With courtesy of Chief Engineer, P.H. Engineering, West Bengal.

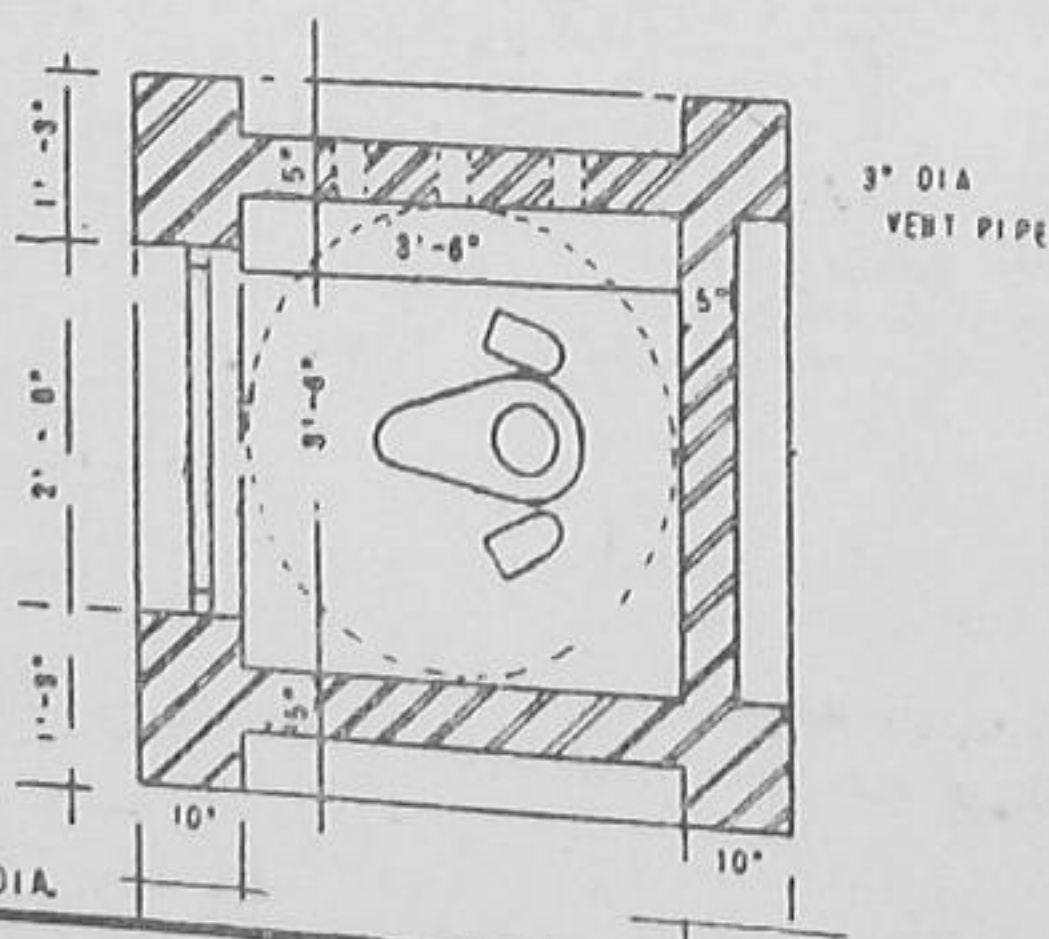
ISSUED WITH SLIGHT MODIFICATIONS BY THE MINISTRY OF HEALTH, GOVT. OF INDIA.



TYPE DESIGN HAND FLUSHED WELL LATRINE



PLAN



With courtesy of
Chief Engineer,
P.H. Engineering,
West Bengal.

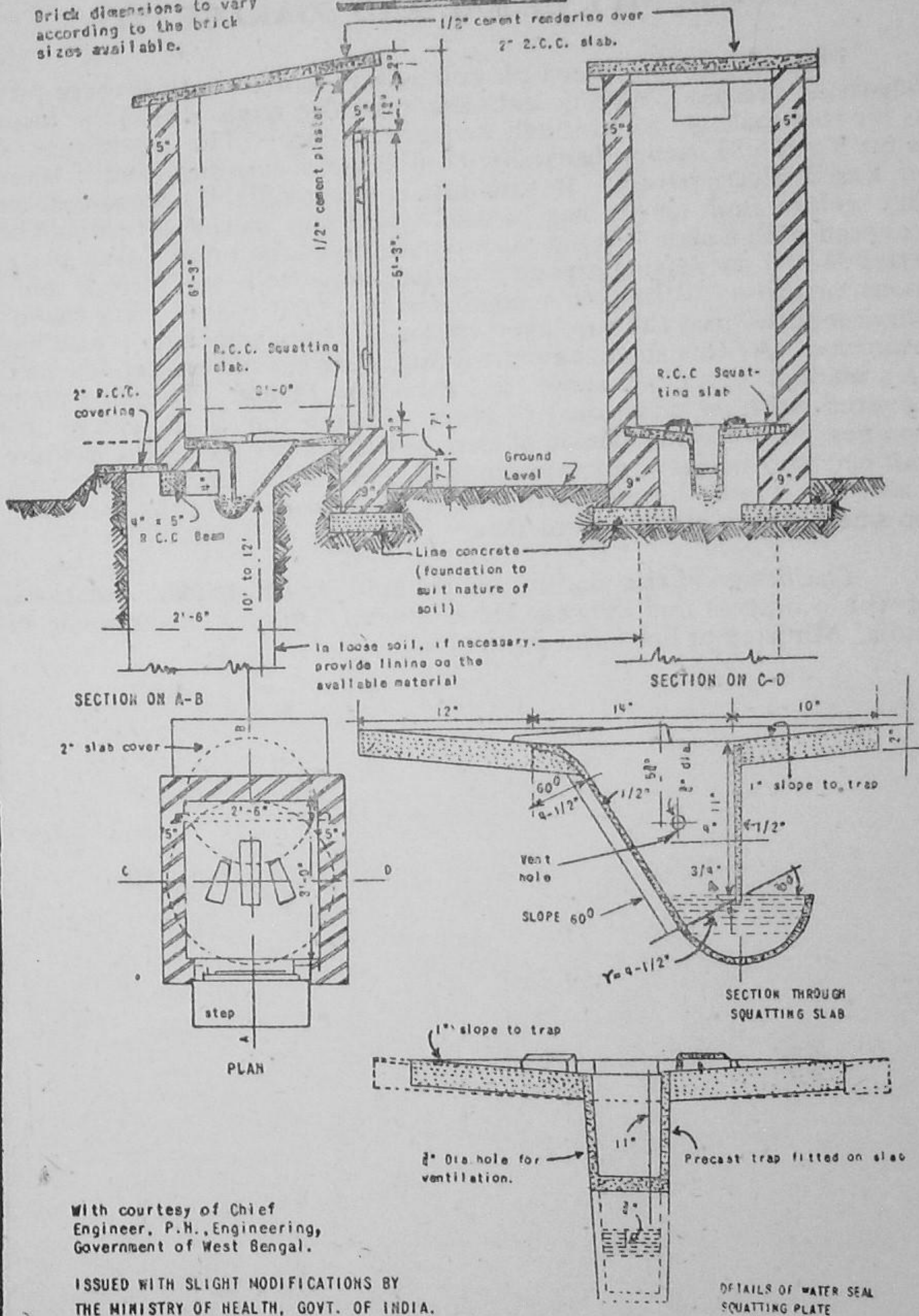
ISSUED WITH SLIGHT MODIFICATIONS BY
THE MINISTRY OF HEALTH, GOVT. OF INDIA.

DUG WELL LATRINE

ORG. No. A-6

Brick dimensions to vary according to the brick sizes available.

SCALE 2 FT.



With courtesy of Chief Engineer, P.H. Engineering, Government of West Bengal.

ISSUED WITH SLIGHT MODIFICATIONS BY THE MINISTRY OF HEALTH, GOVT. OF INDIA.

COMMUNITY URINAL AND SOAKAGE PIT

Plan shows the design for community urinals with soakage pits. Squatting precast concrete slabs are provided from which the urine is let to a soakage pit through stone-ware pipe. The liquid runs to a pit $3' \times 3' \times 3\frac{1}{2}'$ deep, packed with 6" layer of saw-dust and 1" layer of earth alternatively. If saw-dust is not available, wood-coal or dry refuse and leaves may be used. The top of the pit should be covered with a slab. Rapid decomposition of the refuse takes place, attended by decreasing capacity of the humus, to retain further additions of urine. When this condition is reached (say after two or three months' use) the top layer becomes damp and there is smell of ammonia. At this stage, new pit is dug, near the old one, and is filled in a manner described above and then put to use. The first pit is covered with an additional 1" layer of earth and is allowed to decompose for a further period of two months, after which the manure can be removed for application to land. When the urinal is properly soaked by lower layers, there will be no saturation of the top layer, no smell and no attraction to flies.

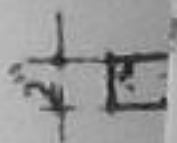
The design of the manure pit is based on the recommendations, of the Compost and Sewage Development Officer, Government of India, Ministry of Food and Agriculture.

$\frac{1}{2}$ " PLANK COVER

3'-0"
A

DETA

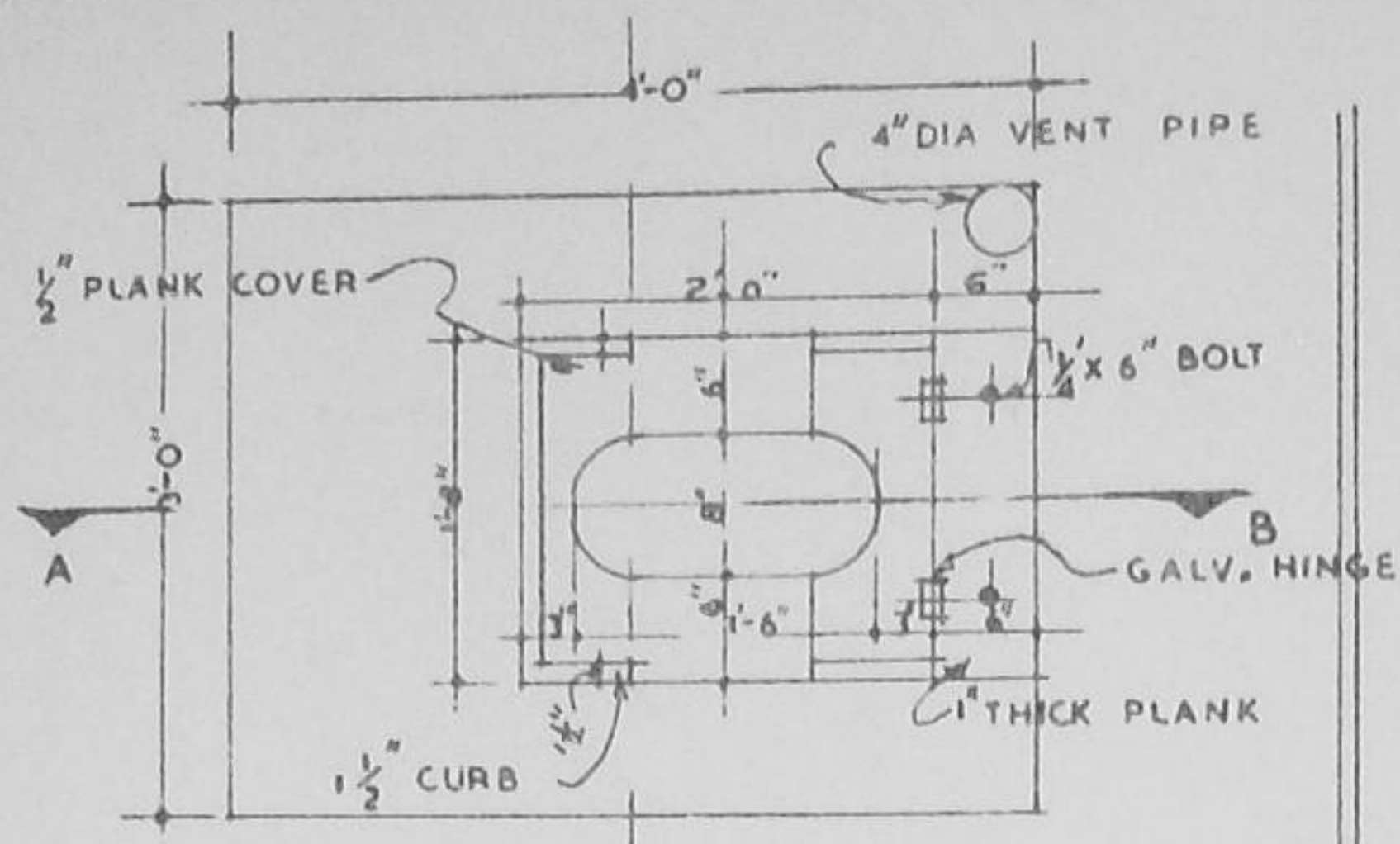
$\frac{1}{2}$ " PLA
 $\frac{1}{2}$ " C



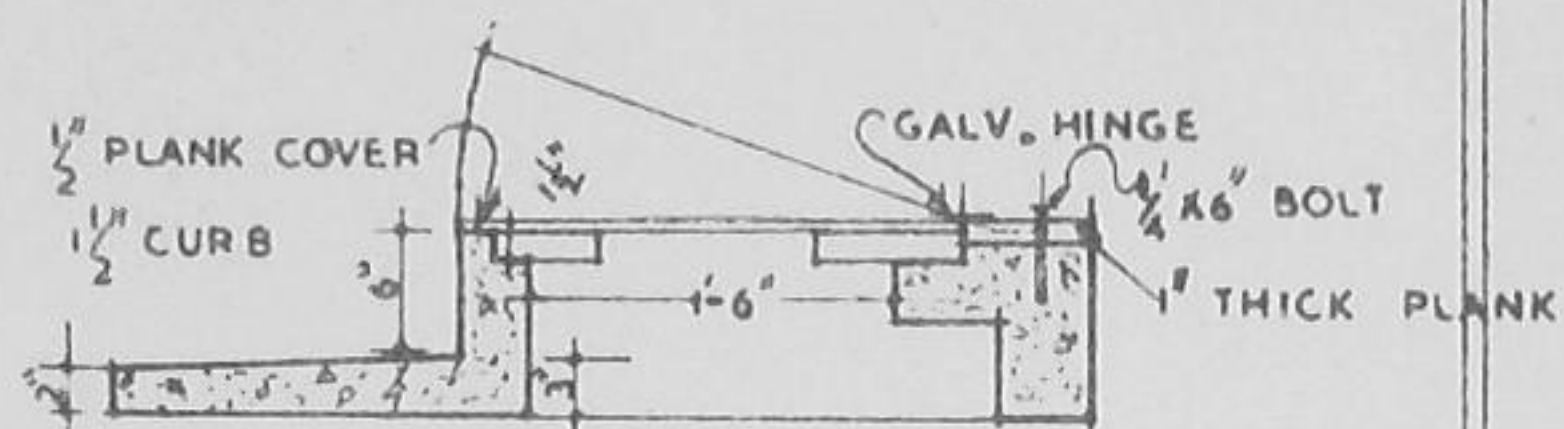
2'-6"
C

DE

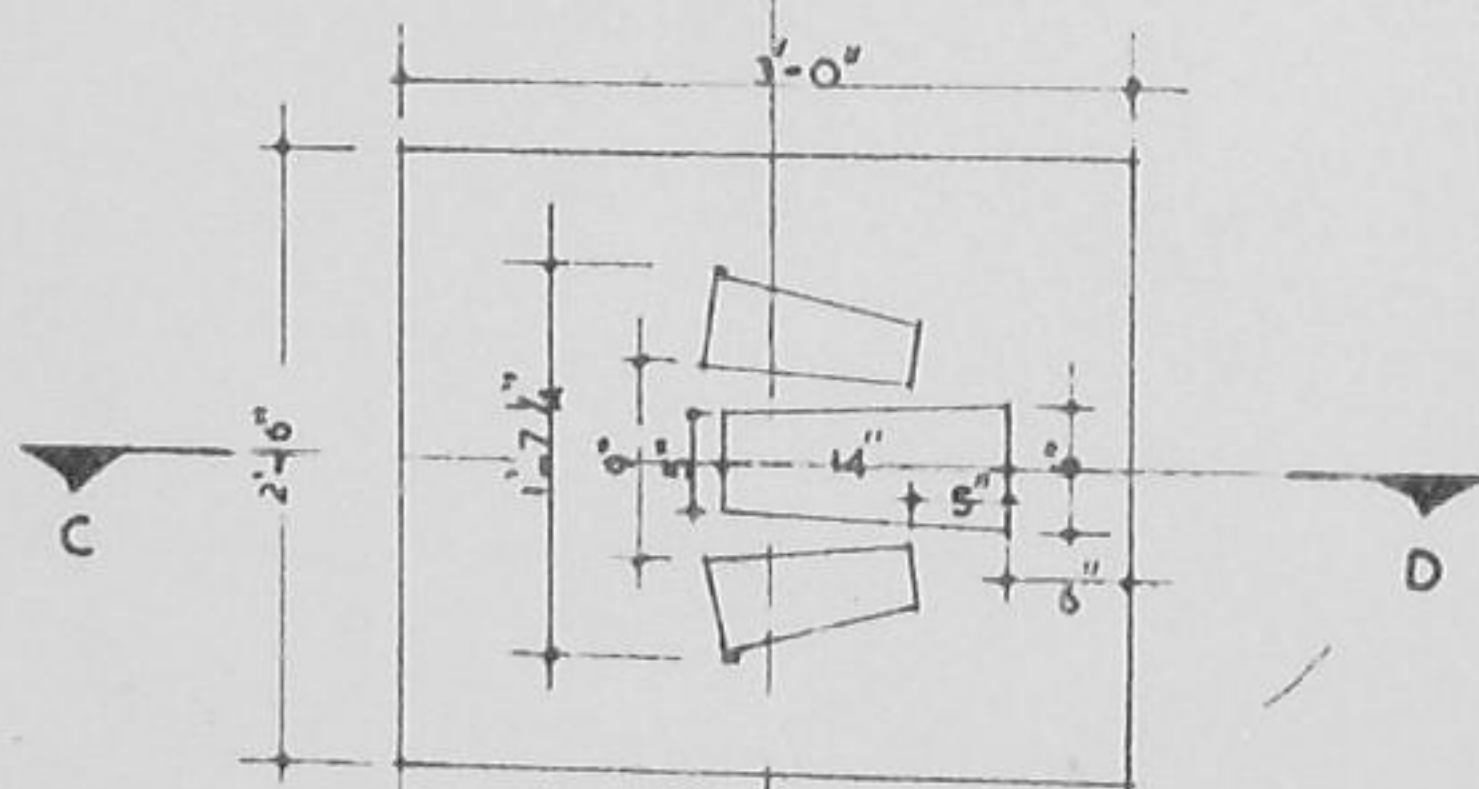
D



DETAIL PLAN OF CONCRETE SLAB
(OF PIT LATRINE) ①



SECTION ON A B

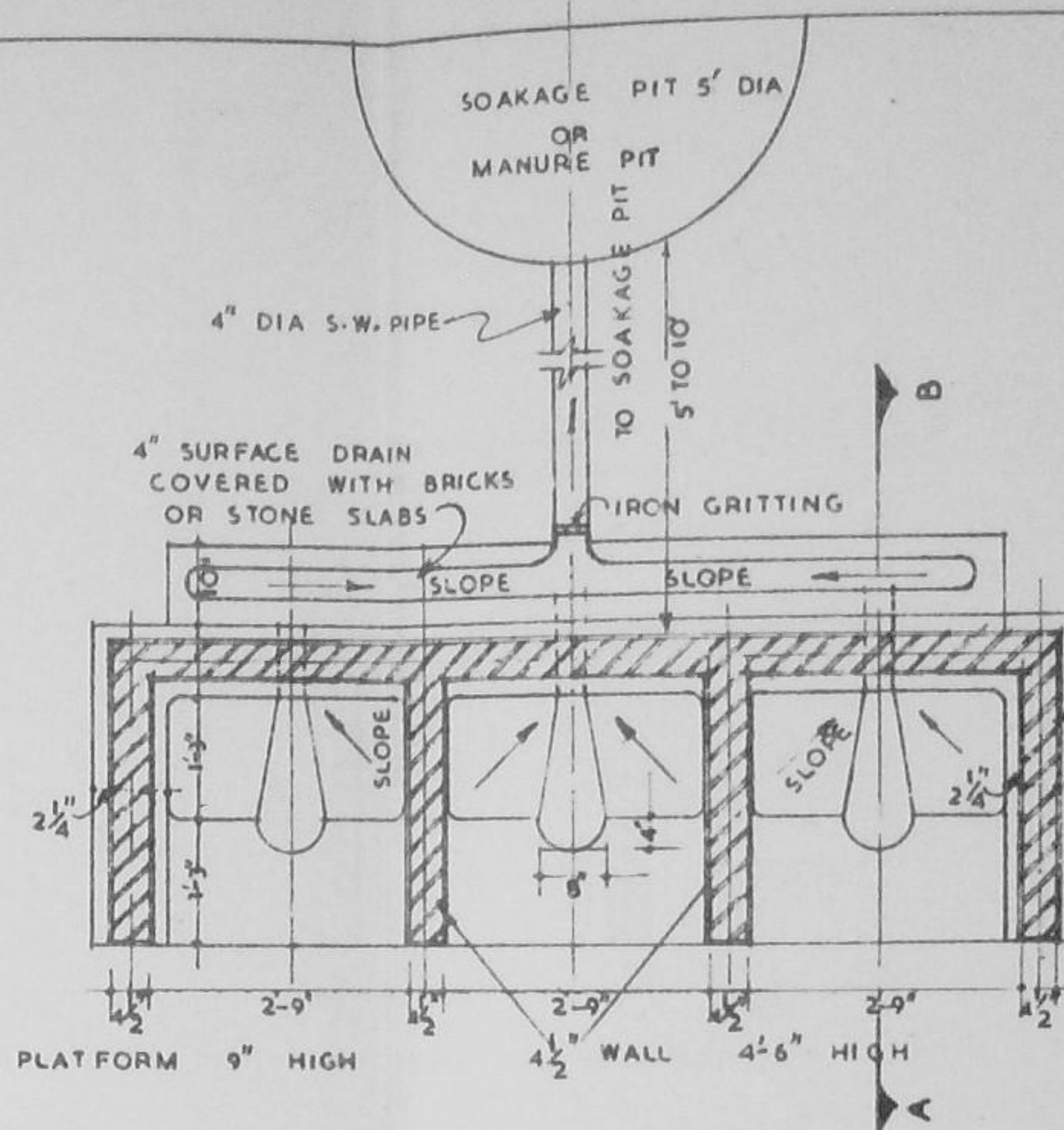


DETAIL PLAN OF SQUATTING SLAB
(BORE HOLE LATRINE) ② & ③



SECTION ON C D

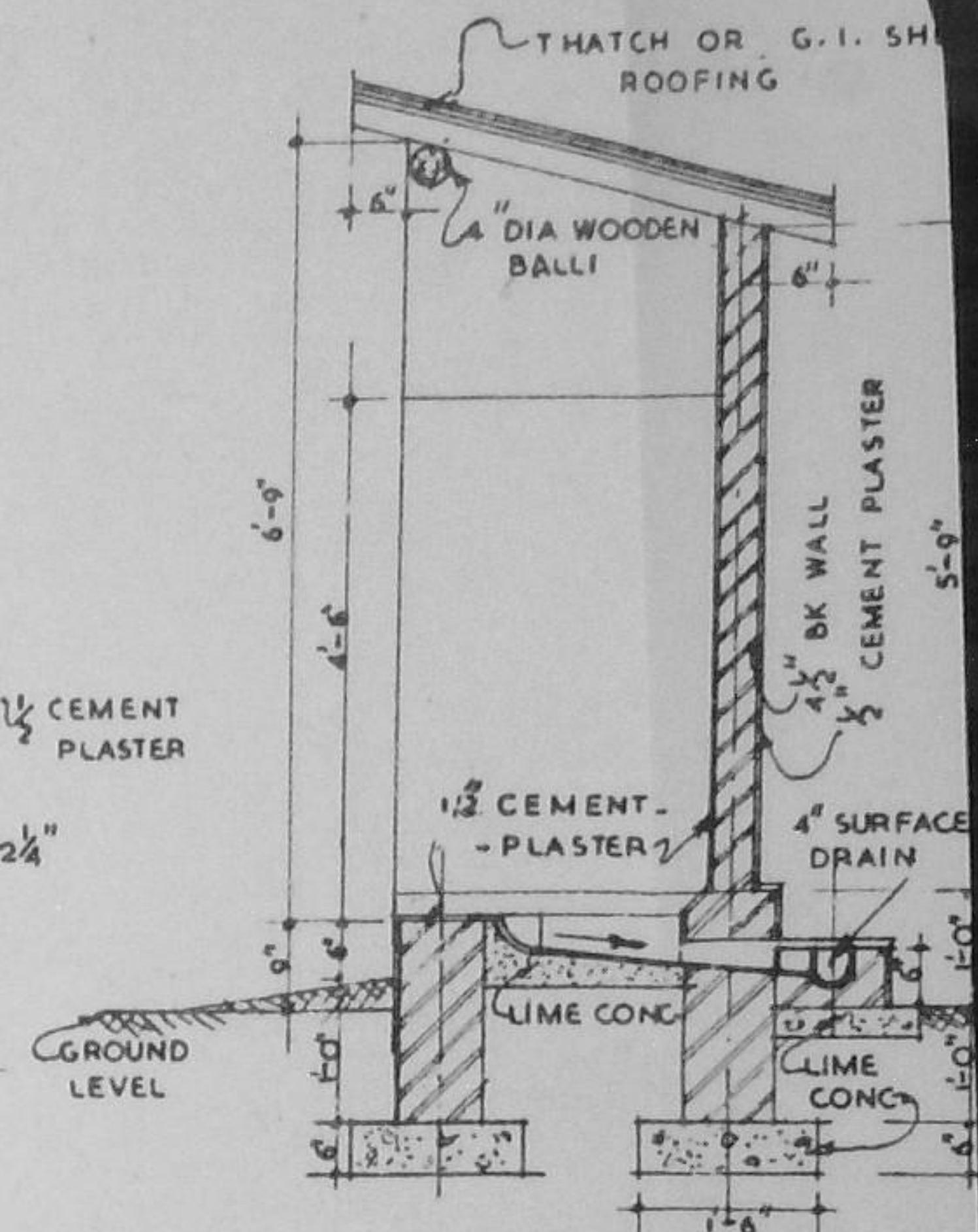
DETAILS OF SQUATTING
TYPE SEATS (OF DRG. NO. 21)



PLAN OF COMMUNITY URINALS



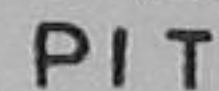
1/2" DETAIL OF SOAKAGE PIT 5' DIA: 10' DEEP



SECTION ON A B

COMMUNITY URINALS AND SOAKAGE
PIT





ETAWAH TYPE SOAKAGE PIT

Proper disposal of waste water from village houses is essential for the maintenance of rural sanitation. The present practice is usually to construct an unwieldy soakage pit filled with over-burnt bricks. Difficulty in collection of over-burnt bricks in villages and then renewal after rains usually come in the way of larger implementation of the works. A simpler type of soakage, which eliminates the above items, has therefore been found out after certain experimentation in this direction at Etawah Pilot Project. This new type soakage pit has the following parts :—

1. *Borehole* :—9"-12" in diameter and 10 ft. deep may be dug out with the help of a simple "one man's cutter" used in Ingraham Institute, Ghaziabad. These are now being manufactured at Etawah Pilot Project Workshop @ Rs. 4/- per cutter and the Deputy Development Commissioner has ordered supply of 2 cutters to each Community Block.

2. *House drain* :—The house drain is then connected to the borehole by fixing closed burnt clay extension pipes, which have a diameter of 2" at one end and 3" at the other. This can be cast locally by Kumhars.

Earthenghara :—As shown in the sketch, an earthenghara is fixed underground between the extension pipes from the house drain and the borehole. The diameter of the mouth of the ghara should be 4". A hole of 4" should be made on the side of the ghara towards the borehole.

4. *Inlet Bend* :—A 3" bend pipe also made of burnt clay is fitted on to the neck of the ghara. To the other end of the bend pipe, the extension pipes for the house drain is connected.

5. *Outlet Bend* :—Another 3" bend pipe made of burnt clay is fixed into the side hole made in the ghara but its distal end opening into the borehole for discharges of waste water.

6. *Leadway drain for rainy season* is made at the point where the last extension pipe is connected to the inlet bend. The idea being to disconnect the borehole pit from the house drain during rains, so that it may not be filled with the rain water.

7. *Cement concrete top* to cover the borehole may be cast at the headquarters from a suitable mould and supplied to villages.

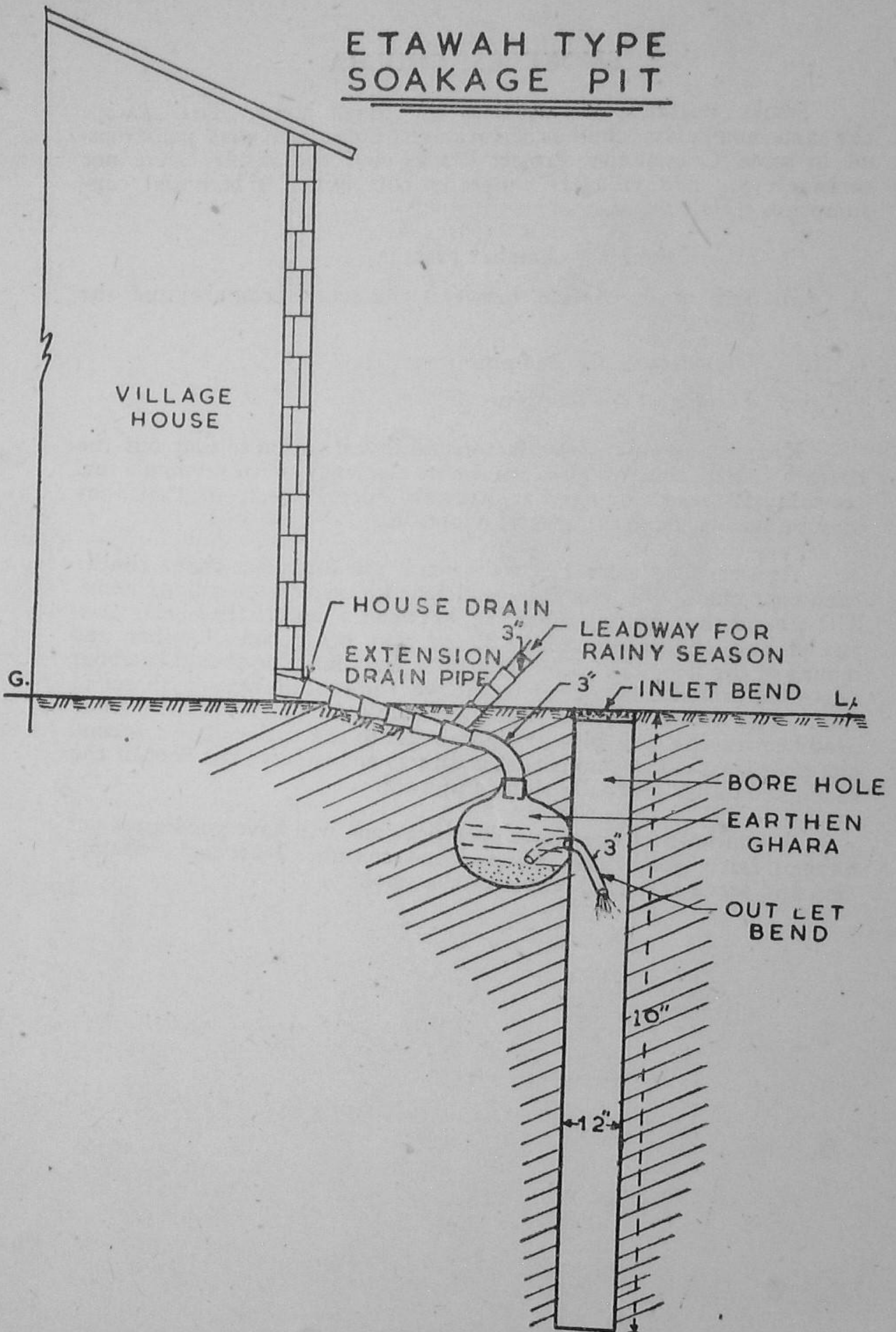
Advantages :—The advantages of such a type of soakage pit are as follows :—

(i) Its low cost;

(ii) cutter can be owned even by the Panchayats because of its low cost;

- (iii) material required for its construction can be available in villages;
- (iv) life of this borehole is increased because of the interception of a ghara, which acts as silt catcher. It can be taken out and silt cleaned whenever required;
- (v) all the construction being underground, there is no encroachment on the village lanes or paths where these soakage pits are made.

ETAWAH TYPE SOAKAGE PIT



SMOKELESS CHULHA

Smoke nuisance is a problem in village home. To deal with the same, smokeless chulhas of various specifications were constructed in some Community Project Blocks, but the results were not satisfactory. The villagers generally complained of high fuel consumption which depends on :—

- (i) Size of the inter chamber passage.
- (ii) Size of the passage between the second chamber and the flue.
- (iii) Diameter of the flue pipe.
- (iv) Length of the flue pipe.

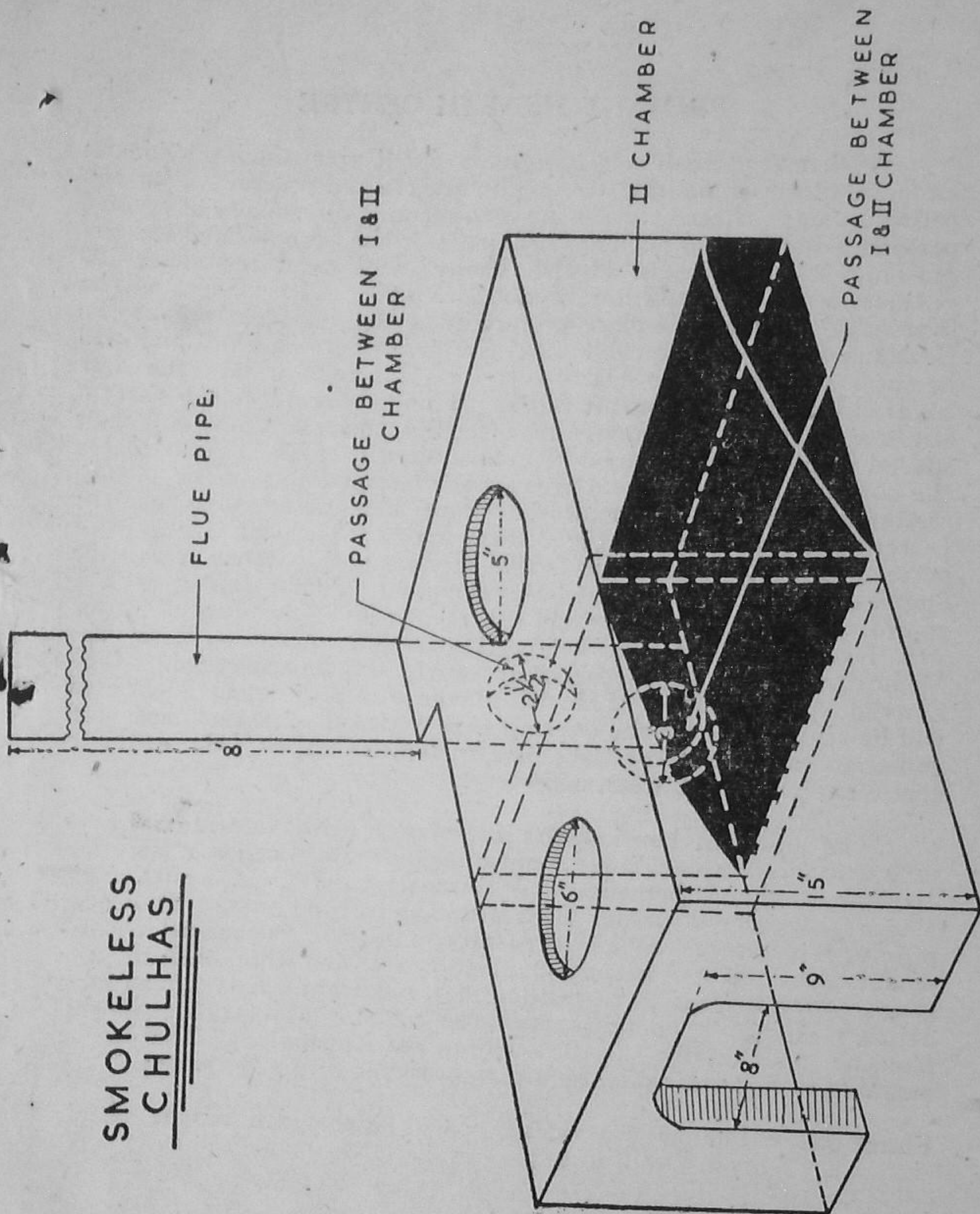
Keeping in view these factors, an investigation to find out the correct specification to give maximum efficiency with minimum fuel consumption was conducted at Etawah Pilot Project, so that they may be standardized for general adoption.

As a result of actual experiment, it was found out that a chulha with two chambers should be sufficient for an average village home. The size of the interchamber (i.e. between I and II chambers) passage of the chulha should be 3" and that of second chamber and mouth of the flue 2½". The length of the flue pipe should be about 8 feet of which 2 feet must be above the roof in case of thatched roof. The diameter of the flue-pipe should be 4". It was also found useful to fix the flue-pipe at right angle to the outlet of the second chamber (instead of connecting it direct) and to have the floor of the second chamber gradually sloping upward.

A chulha with the above specifications will have good supply of oxygen, fairly good flame in the second chamber, least fuel consumption and serve as a good outlet of the smoke.

SMOKELESS CHULHAS

XV



PRIMARY HEALTH CENTRE

A Primary Health Centre is a small unit which provides an integrated form of medical care both curative and preventive to the people living in the area. Taking into account the paucity of trained personnel and limited financial resources, it has been decided for the present that a Primary Health Centre will cater for about 100 villages with a population of about 66,000. The Centre will be located at a convenient place preferably at the headquarters of the Community Development/National Extension Service Block and will be the focus from which health activities will radiate into the area covered by the Development Block. This is the proposed pattern but the State Governments may modify this pattern to suit their special requirements, if any. The development of health services in the community development areas is the responsibility of the Administrative Medical Officer of the State concerned and as such the pattern of development in these areas must conform to the over-all pattern for provision of rural health services in the State. It must be emphasized here that the Development Commissioner is the co-ordinating authority only and the responsibility for the initiation and development of health programme rests entirely with the Medical and Health Department of the State concerned. The District Medical Officer of Health in whose area the block is situated will be responsible for the over-all supervision of the technical staff and services rendered by the Primary Health Centre. He will also give technical advice when necessary.

The building housing the Primary Health Centre will have sufficient accommodation for a consultation room, diagnostic facilities, dispensary, minor operations and maternity and child health care. There will be six indoor beds attached to the Centre. To render prompt services, it would be necessary to provide residential accommodation for the staff because of all the extension work, medical care is one which is required throughout day and night. A type plan for a Primary Health Centre as prepared by the Ministry of Works, Housing and Supply can be seen in the Appendices. This can be modified to suit individual requirement of the State concerned.

Functions :—The main services that will be provided for the people from the Centre are :

1. Medical relief
2. Maternal and child health care including family planning
3. School health
4. Health education
5. Environmental sanitation
6. Control of communicable diseases with priority for malaria
7. Collection of vital statistics.

Besides, the institutional care that would be available in the Primary Health Centre, the main object of these Health Centres is to take medical care both curative and preventive to the people in their homes. For this purpose, it is essential that the medical as well as the ancillary staff should arrange a regular programme of visits to all the villages coming under their care. Under this programme every person living in the community development area, in time of an emergency, can secure the services of a doctor, free of all costs. The services can be secured by informing the village level worker who shall proceed to procure the necessary medical aid. It is the duty of the health staff to view the problem of health in its entirety without taking the narrow view of their relative duties and responsibilities. It is a team work for the development of better health and creation of healthful environment in which there must be close co-ordination not only between the members of the medical and health staff but with other staff working in the community development area also. Here I would like to make a special mention of the village level worker. He is our key-man in the development of this multi-purpose programme. During the period of his training in the Extension Training Centre, he is given an orientation in public health and environmental sanitation. He is in close touch with the villagers. He can be of great assistance to the medical and public health staff in the development of health programme. In some areas the village level worker has been the first person to give information about the occurrence of an infectious case or the prevalence of some specific disease.

Health education must form an essential part of the health programme. All the medical and health personnel employed in the community development area must take an active part in the dissemination of this knowledge so essential for man's well-being. In this effort, there must be full co-operation between the health and education personnel and such education must begin with the child and go right up to the adult. Every advantage must be taken of the personnel and equipment supplied for the social education programme.

For the improvement of environmental sanitation priority must be given for the provision of safe water and adequate disposal of human excreta. Arrangement for this will vary from area to area depending upon the local conditions and as such, it is recommended that the District Medical Officer of Health of the area must be consulted. He will supply the necessary plans, designs, etc. The District Medical Officer of Health will also be in a position to advise about the method of disposal of sullage water and about the construction of soakage pits, ventilators, smoke-less chulhas (Magan Chulha), manure pits, pavement of lanes, etc.

The staff should have at their disposal correct vital statistical data based on surveys conducted by the Department of Health or by other Departments. This will give a fairly accurate picture of the conditions present in the development area. On the basis of this, the medical officer incharge of the Primary Health Centre will be able to base his future programme. Further, during the course of their visits, the health staff may come across certain cases suffering from specific

diseases like tuberculosis, leprosy, filariasis, yaws, etc. Such discoveries will have to be followed up by more accurate and detailed survey with the help of the District Medical Officer of Health.

Staff :—The minimum staff that has been provided to attain the above objectives is mentioned below and this is to supplement the existing medical and health facilities in the area :

| | |
|---------------------|---|
| Medical Officer | 1 |
| Compounder | 1 |
| Lady Health Visitor | 1 |
| Midwives | 4 |
| Sanitary Inspector | 1 |
| Class IV staff | 2 |

It is suggested that the lady health visitor and one midwife will be located at the Primary Health Centre, while the other 3 midwives will be located at 3 maternity and child welfare sub-centres which will be set up at convenient places where the midwife can render prompt service to the people.

Transport :—Project Executive Officer/Block Development Officer must provide transport facilities to the medical and health staff, if the medical care is to be carried into the villages from the Primary Health Centre.

Note :—It can rightly be criticised that the staff mentioned above is absolutely inadequate for the average population of 66,000 of the community development block, covering approximately 100 villages. Unfortunately, majority of the States are short of personnel as well as funds and even this much staff is not in position, although the programme has been in operation for the last three years. Training Programmes are going on to increase the output of personnel, particularly, lady health visitors, auxiliary-nurse midwives and midwives. For adequate medical care, we will need nearly three times the staff mentioned above. In the meantime State Governments are at liberty to employ more staff if personnel and funds are available.

Duties :

Medical Officer

1. The medical officer will be responsible both for curative and preventive health work. He will, therefore, not only attend to the dispensary and the wards, but also supervise the work of the public health staff working in the villages in the block. In case of any serious cases which need specialized care, he will arrange to transport such cases to the hospital where those facilities are available.
2. He will tour the area to organize, direct and control different health activities.
3. He will visit a certain number of villages in the afternoon to render medical aid.

4. He will carry out health survey of the villages with the help of sanitary inspector and village level workers.
5. He will prepare advance programme of visits to villages for all the personnel working under him.
6. He will arrange for collection and maintenance of vital statistics and other records.
7. He will prepare indents for drugs, dressings, etc.
8. He will prepare and submit periodic returns as instructed by the Administrative Medical Officer of the State concerned.
9. In case of threatened epidemic, he will immediately contact the District Medical Officer of Health and render help in the control measures.
10. He will attend the meetings of the Block Advisory Committee and maintain a close liaison with other extension workers particularly the social education organizer.
11. He will arrange for the health education work in the area. For this, he will procure education material from the District Medical Officer of Health and make the best use of it through his sanitary inspector, education authorities and social education organizer.
12. He will be responsible for the development of school health programme and medical examination of school children and try to get the defects, if any, corrected.
13. He will maintain an inventory of all the equipment, medicines, surgical instruments, linen, furniture, etc. and check the inventory at specified periods.

Lady Health Visitor :

1. She will be responsible for the development of maternal and child health services in the block.
2. She will conduct ante-natal clinics, and well-baby and toddlers' clinics at the Primary Health Centre and at the maternity sub-centres.
3. She will arrange to give group talks to expectant mothers. During these talks she will lay stress on personal hygiene, nutrition and environmental sanitation.
4. She will carry out 'home visits' when not conducting clinics at the Primary Health Centre or the maternity sub-centres. During these visits in addition to giving advice about maternity and child health, she will demonstrate simple procedure to relieve conditions such as lousiness, scabies, sore eyes, etc.
5. She will visit once a week on fixed days each of the 3 maternity sub-centres. During these visits, she will conduct ante-natal and well-baby clinics.
6. She will advise on Family Planning.
7. She will observe and supervise the work of the midwives and dais. For this purpose, it will be necessary for her to observe them conduct one or two deliveries in the homes.

8. She will observe the midwife/dai during the clinic session and help her improve her technical and human relationship skills.
9. She will respond to an urgent call from the midwife/dai.
10. She will scrutinize and approve the order for supplies and equipment by the midwives.
11. She will ensure that ante-natal and post-natal cards are maintained for mothers, and infants and toddlers cards for the children.
12. She will be responsible for maintenance of records, preparation and submission of reports and returns.
13. In abnormal cases, she will arrange for the transport to take expectant mothers to the hospital.
14. She will see that adequate equipment is provided and maintained for maternity and child care.
15. She will help in the training of indigenous dais.
16. She will help in the development of school health programme and assist the medical officer in the medical examination of girl students.
17. She will hold staff conferences with the midwives and dais once a month.
18. She will give an evaluation report of the work done in the field of maternal and child health.
19. She will maintain an inventory of all the equipment, instruments, furniture and other articles required for maternity and child welfare work and check the inventory at specified periods.

Midwife :

She will work under the over-all supervision of the lady health visitor. She will try to gain the confidence and co-operation of the people where she is working. She will take particular care to make friends with the local untrained dais and encourage them to come to the Centre and train them in better methods and techniques in conducting deliveries. She should even accompany the local dais when they go for conducting labour cases in homes. There will be a number of cases who, even though, have been receiving ante-natal care at the centre, will probably send for the local untrained dai at the time of delivery. In such cases, the midwife should not hesitate to pay post-natal visits to mothers. Her duties are :

1. During home visits, she will contact expectant mothers and encourage them to come to the Centre.
2. She will help the lady health visitor on days of her visit to the Centre for clinics.
3. She will keep records of her work and submit returns as and when asked for.

4. She will help in the training of indigenous daïs.
5. She will take part in health education programme during home visits and when mothers come to the Centre.
6. She will maintain a register of all the equipment and other materials supplied to her.

Sanitary Inspector :

He will work under the general supervision of the medical officer incharge of the Primary Health Centre. His duties are :

1. He will assist the medical officer in carrying out health surveys of the villages in the block.
2. On the basis of the survey, the medical officer will plan out a programme and the sanitary inspector will be responsible for its execution.
3. He will collect and consolidate vital statistics and submit returns to the medical officer.
4. He will be incharge of the over-all environmental sanitation programme in the block.
5. He will help in the supervision and construction of wells, rural latrines, and urinals, smokeless chulhas (Magan Chulha), soakage pits, pavement of streets, etc. For this purpose, the sanitary inspector must be in possession of 'Blue-prints of all the above items which can be procured from the District Medical Officer of Health of the area.
6. During his tours, he will visit schools for looking into the environmental conditions. He will also arrange to give health talks in these schools.
7. He will carry out all measures for the control of communicable diseases under the instructions of the medical officer, i.e., immunisation against smallpox, cholera, plague, etc. and disinfection of wells and homes, when necessary.
8. He will undertake control measures against fly and mosquito nuisance and will be responsible for spraying of residual insecticides. In fact he will be responsible for all vector control in his area.
9. He will bring to the notice of the medical officer cases of leprosy, tuberculosis, filariasis, yaws, if any and take measures for their isolation and treatment as directed by the medical officer.
10. He will carry out health education programme in the block and will seek the assistance of the village level workers, social education organizer and school teachers in this programme.
11. He will carry out health education programme at all melas, yatras, etc. In fact he will take advantage of any gathering of the people any where in his block.

12. He will procure health education material like posters, leaflets, pamphlets, cinema slides, flash cards, etc. from the District Medical Officer of Health through the medical officer incharge of the Primary Health Centre.
13. He will maintain a stock ledger concerning his section, *i.e.*, for all the furniture, equipment and other materials received from the medical officer.
14. He must gain the confidence, co-operation and participation of the people in the block if he has to make a success of his job.
15. He will maintain close liaison with the social education organizer and village level workers who can help him considerably in all his duties. The village level worker is in close touch with the villagers and is in a position to interpret the 'felt-needs' of the people in the field of environmental sanitation.
16. He will organize Village Health Committees and maintain close liaison with other voluntary organizations that may be present in his area with a view to securing their assistance in the execution of his programme.

