Hand Book for Field Workers in

WATER, HEALTH AND SANITATION

WATERAID INDIA

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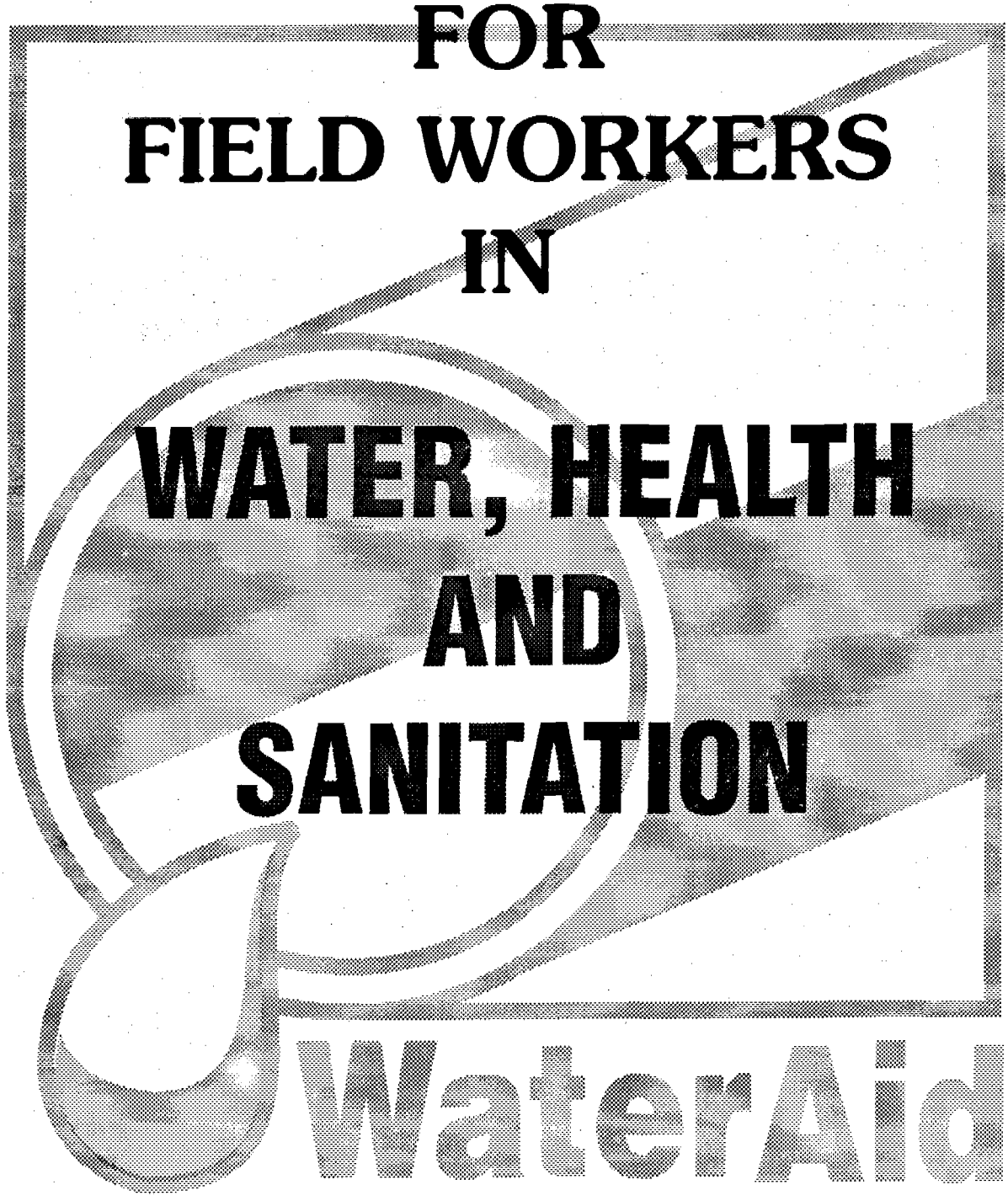

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TIRUCHIRAPPALLI - 620 020
TAMILNADU

PART - 1

Water Sources, Bore Well Hand Pump Installation and Maintenance

1.1 INTRODUCTION TO WATER SOURCES

"Water is Life"... "Water is the Source of Life"...

Water is a most vital commodity and one of the basic needs for the survival of human and other living beings next to air. Water grows our food, water keeps us clean and healthy, water makes all the important body functions, and water is the total instrument of healthy life. Water is also one of the basic requirement for domestic, municipal, agricultural, industrial and other multifarious activities.

Water is available from different sources. The sources of water can be divided as follows:

- Surface water, and
- Ground water

The surface water means the water that is available on the surface of the Earth (e.g. Sea, River, Stream, Lake, Pond etc.) The ground water is obtained beneath the surface of the Earth. Spring water is also one form of ground water.

Water sources originate as rainfall in the Hydrological Cycle or Water Cycle. Water circulates in a cyclic fashion through the oceans, atmosphere and land is known as water cycle. The driving force for the circulation is provided by the sun. It concerns the depletion and replenishment of water sources.

1.2 HYDROLOGICAL CYCLE OR WATER CYCLE

Understanding about the hydrological or water cycle is very much important. The water vapour evaporated from the sea, lakes, streams, etc., forming the clouds which get condensed and precipitate as rainfall or snow. The rainfall reaching the earth partly get stored in the depressions like lakes, ponds, etc., and flow as runoff to sea. Remaining water is percolated into the earth and part of it absorbed by vegetation which in turn reaches atmosphere through evapotranspiration. This cycle is called Hydrological Cycle or Water Cycle.

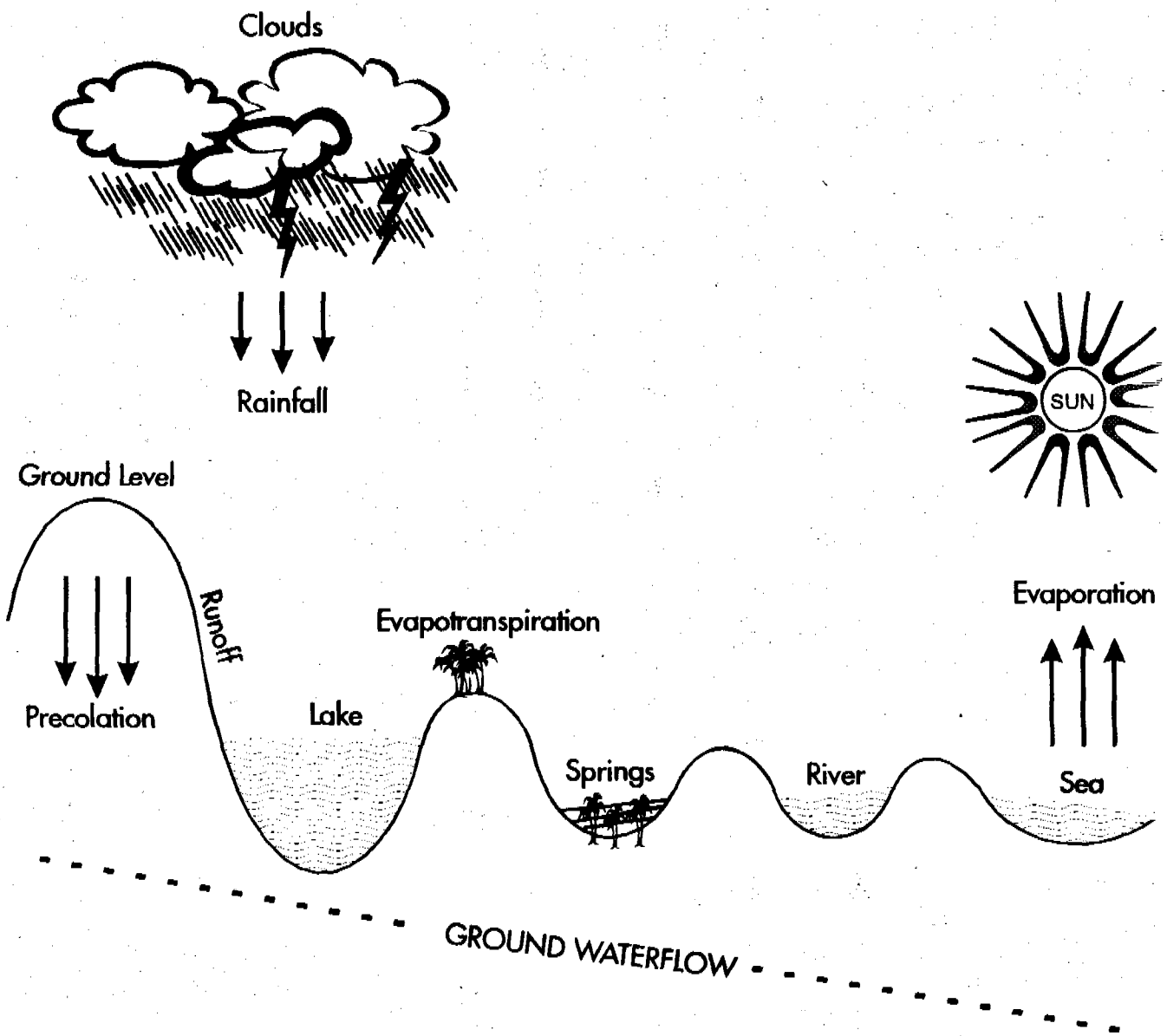
1.3 SOURCES OF DRINKING WATER

Among the various needs of water, the essential need is drinking. In general drinking water supply depends on the two major sources:

- Surface Water, and
- Ground Water

Water stored in the reservoirs, lakes, ponds, etc., during rainy season or the water flowing in the river or streams are the major drinking water sources of surface water. Water exist in the sub -surface or in the deep ground aquifer are called ground water. Mostly ground water is obtained by using open well or shallow and deep bore wells.

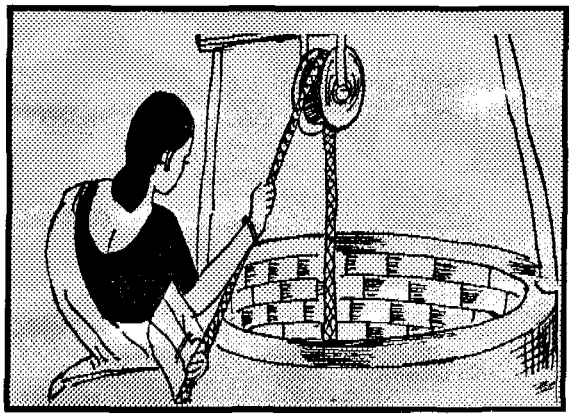
HYDROLOGICAL CYCLE
OR
WATER CYCLE



SOURCES OF DRINKING WATER

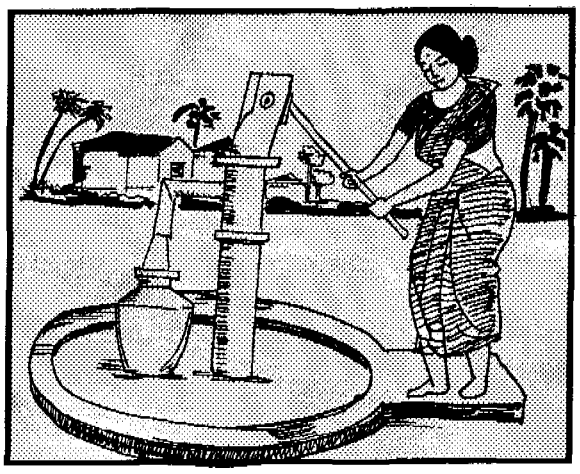
RIVER

POND

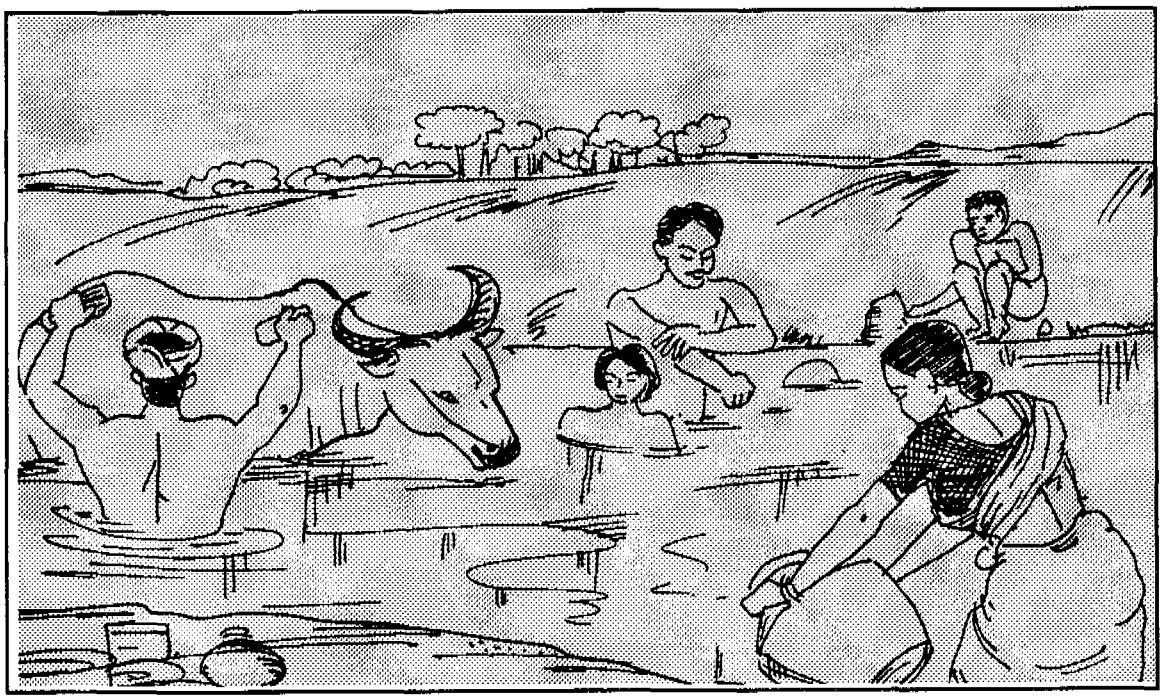


WELL

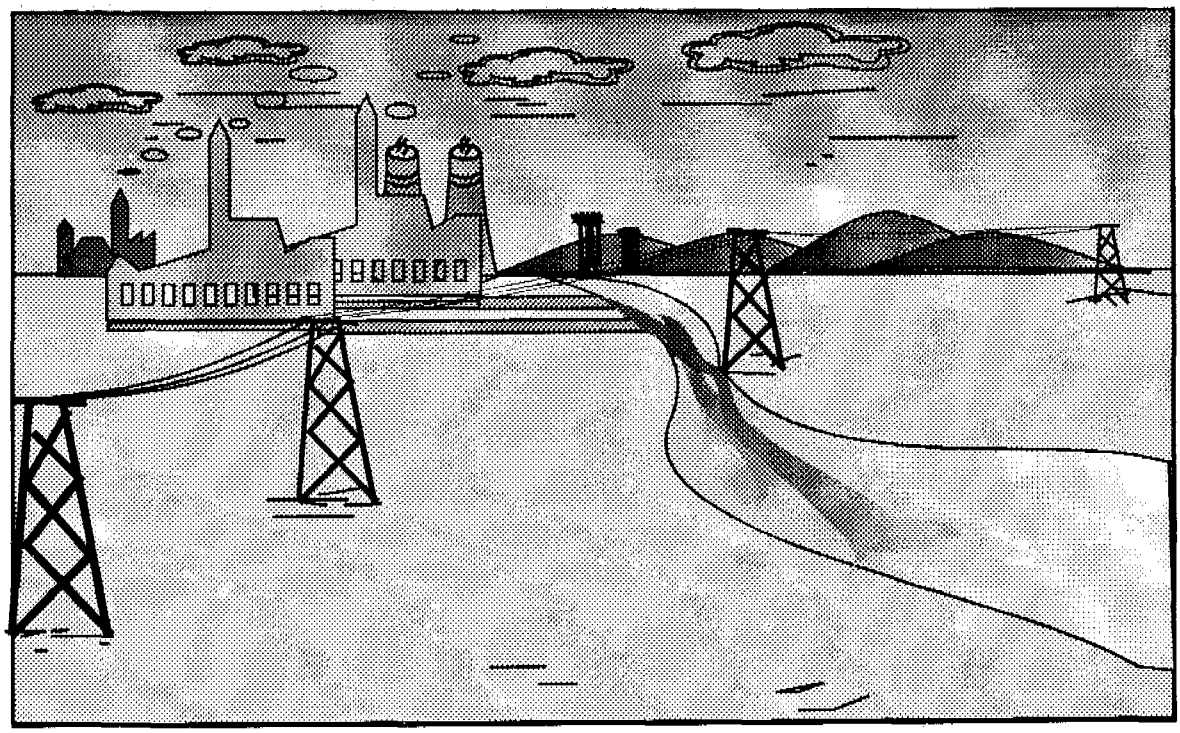
HANDPUMP



Contamination or Pollution of Water



Batching, Washing Clothes, Defection, Batching of Animals, Discharge of Waste Water, etc., in to the drinking water sources.



Disposal of Industrial Waste Water (effluents), Sewage and solid Wastes in to the rivers, streams lakes, etc.

1.4 IMPORTANCE OF SAFE AND PURE DRINKING WATER

Water intended for human consumption should not only be safe but also pure. Safe drinking water is essential for the health of individuals, families and communities. Potable water is that of safe and pure should be free from pathogenic agents, harmful chemical substances, turbidity and be pleasant to taste and usable for domestic purposes. People are using water for domestic purpose from the sources of river, lakes and ponds as well as the ground water from open wells and bore wells. Though we are having enormous sources of water, do we get pure and safe potable water!?.

Water sources are polluted and contaminated by various human activities such as discharge of human and animal wastes, sewage and industrial effluents and flow of agricultural runoff mainly containing the impurities of fertilizers and insecticides, etc., Even though rain water is pure and fresh, when it falls, it absorbs gases, bacteria and soiled impurities from the atmosphere. Consumption of such contaminated water is the primary reason for the diarrhoeal diseases and casualties in human life. A world wide study conducted on this issue reveals that 80% of diseases are caused and transmitted by the usage and consumption of unsafe water and contaminated water. Hence, the water form the sources of rivers, streams, ponds, lakes, open wells and rain water are not to be said as pure and safe potable water.

It is difficult to find an absolute pure water in nature, but it must be ensured that water must be collected from safe sources and also handled safely. In general the ground water is said to be pure and safer than the surface water sources, and more precisely deep borewells are more safer than the shallow open wells. The ground water obtained from the deeper depths is safe and dependable. The presence of impurities will be less or absent in deep bore wells compared to shallow wells because, the ground water has been accumulating of in-filtered water in to the Earth over many years together with rainfall adding each year to its volume. Thus a good quality of water that of safe and pure can be collected from the deep bore wells such as hand pumps, etc. as the ground water itself provides an effective filtering medium. Therefore,

Drink Hand Pump Water for Better Health.... Health is Wealth.....

1.6 RURAL DRINKING WATER SUPPLY SYSTEM

In small towns and major panchayat unions where there are no surface water sources, ground water is used for the drinking water supply system. In this system borewell/open well water is pumped in to the elevated water storage tank and from there water is distributed to the community. Whereas in most of the Indian village, rural drinking water supply mostly depends on the open well or bore well with hand pumps. Due to the over exploitation of ground water to meet the need of the growing population, year by year ground water table goes down, resulting in non availability of water in shallow open wells and bore wells. Hence deep bore well hand pumps have began to play a major role, of which India Mark - II hand Pumps are extensively used in most of the deep bore wells.

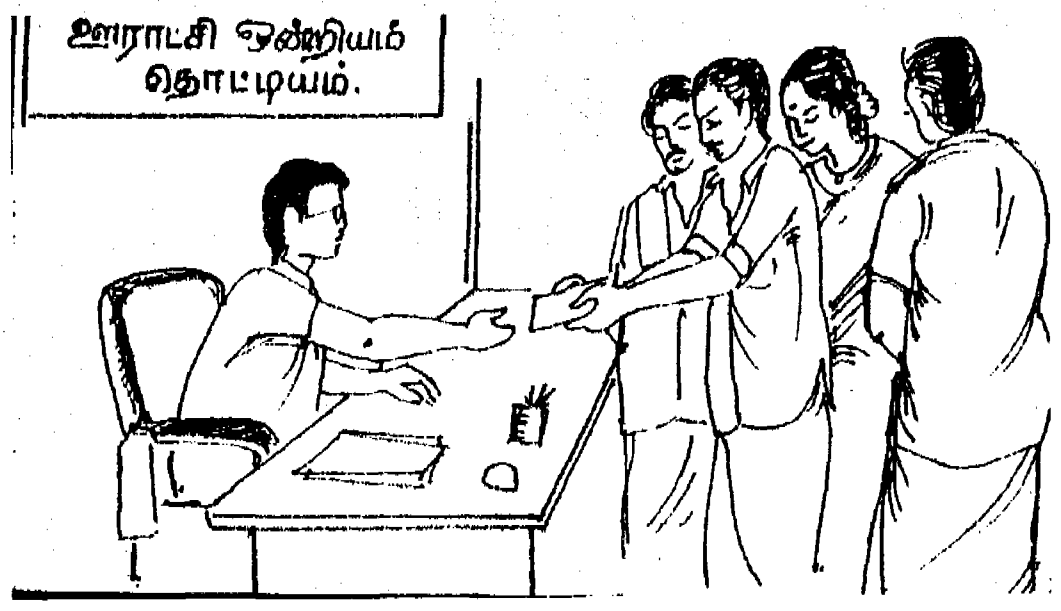
To know the drilling of deep bore well, hand pump installation, operation and maintenance, service and repairs of a IM - II Hand Pump, first we must know a best method of planning and execution of a rural drinking water supply scheme and sustainability of deep bore well hand pumps.

1.7. A Best Method for Planning and Impleme tation of a Rural Drinking Water Supply Scheme

Fig - 1.

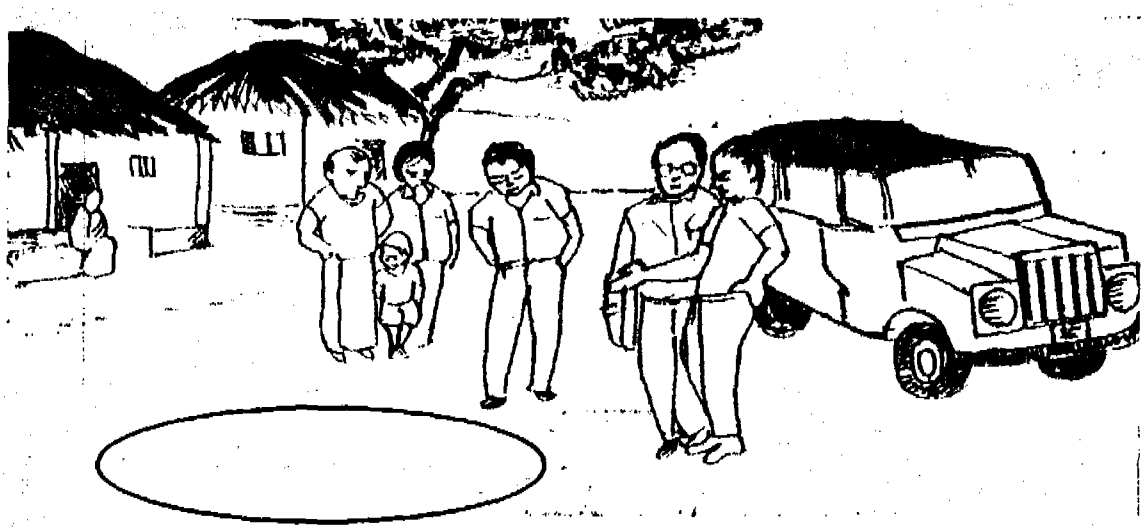
Have a discussion on the problem of drinking water at your village by a Village Meeting or Women Sangam or Youth Club Meeting

Fig - 2.



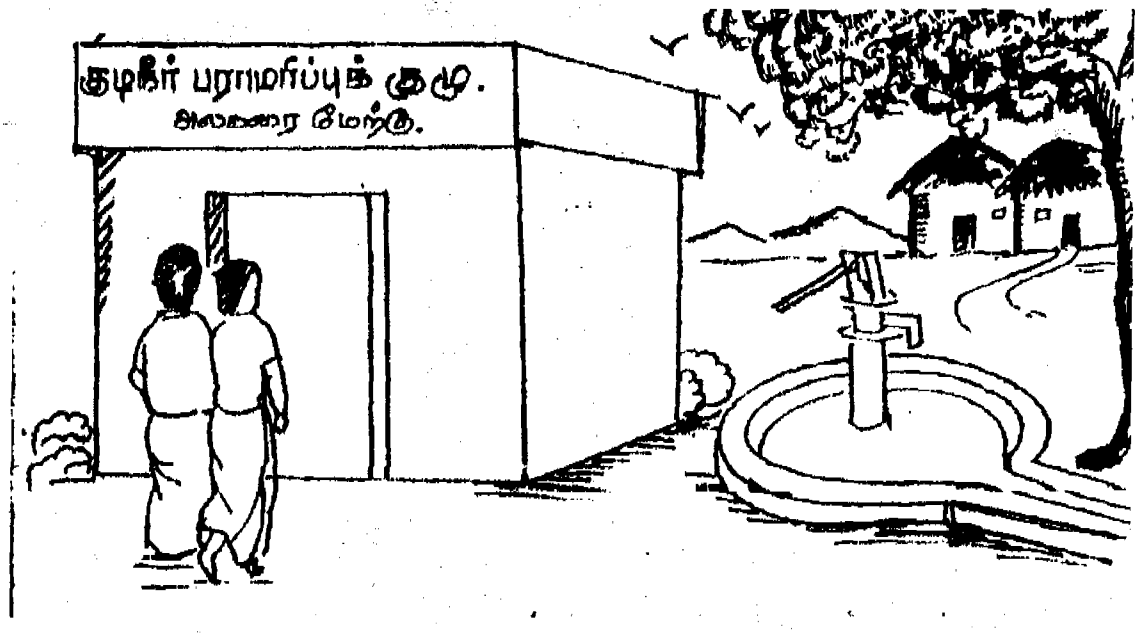
Convey your village drinking water problem to the Executive Officer or Panchayat Union or the Voluntary Organisation or NGO in your area.

Fig - 3.



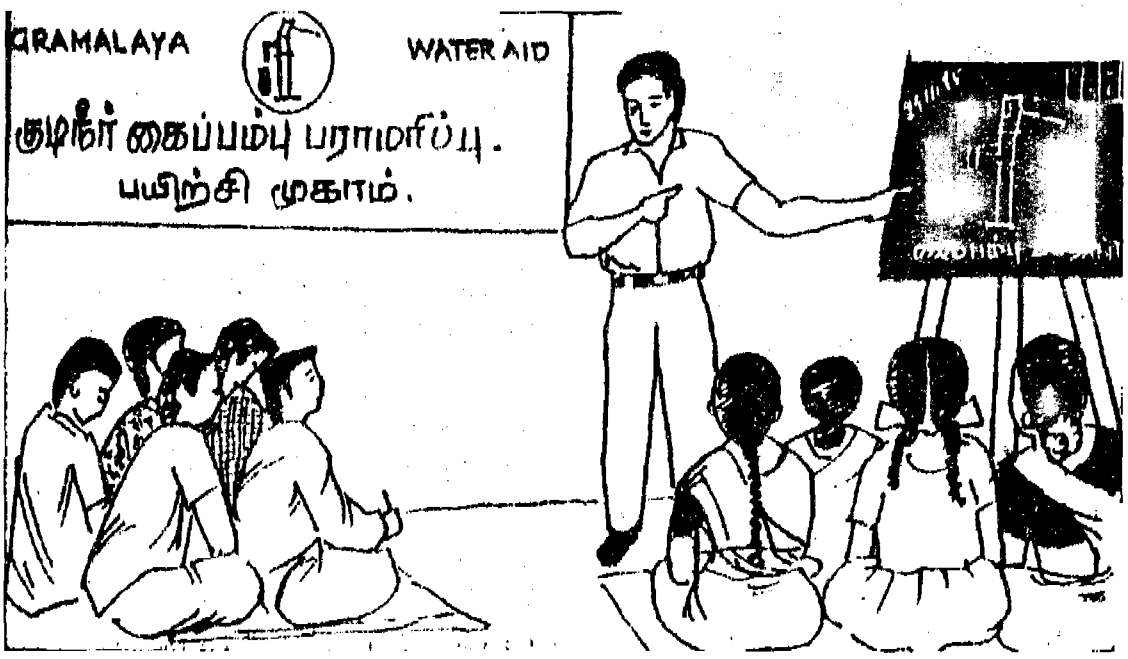
Based on your request and problem, the Panchayat Union Executive Officer (or) the Staff of the NGO comes to your village and does the survey.

Fig - 4.



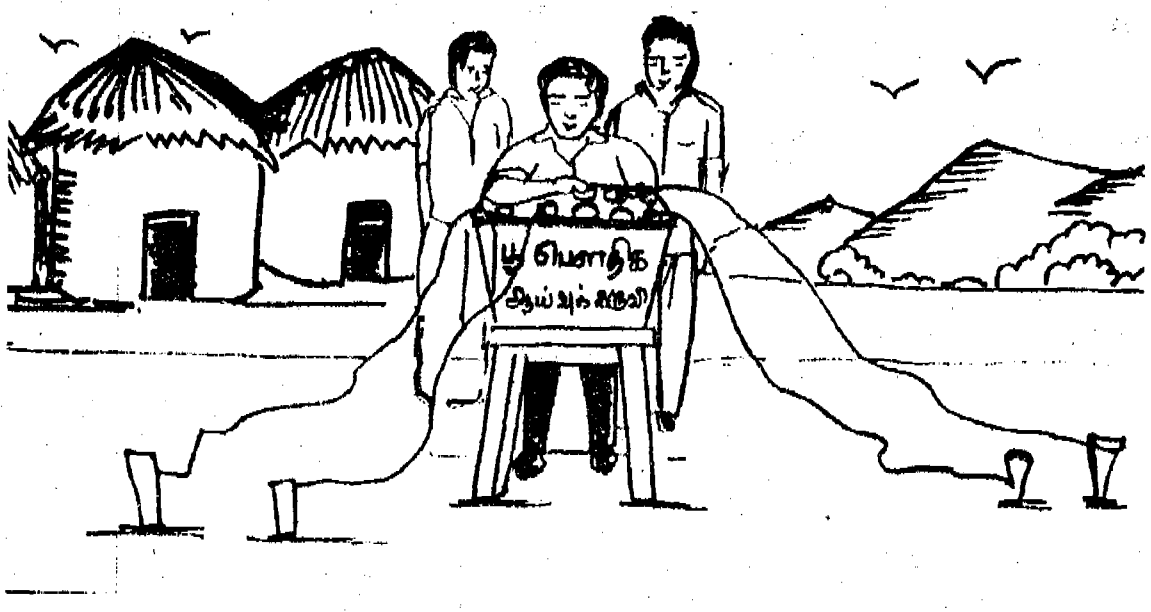
After the decision of undertaking a rural drinking water supply scheme at your village, organise a WASAN Committee and raise maintenance fund from the people.

Fig - 5.



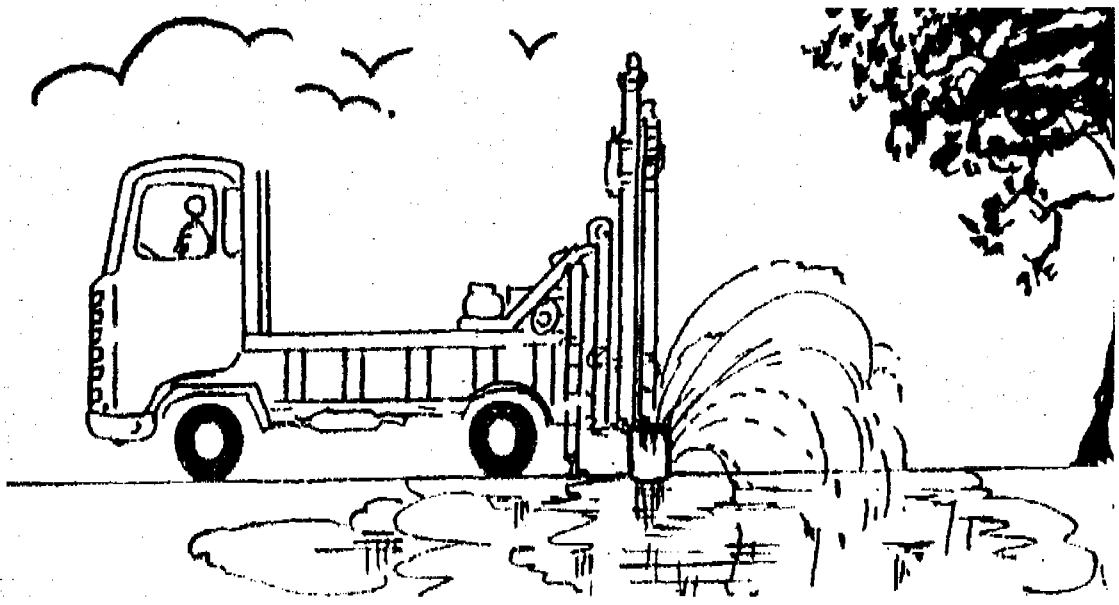
Hand Pump Care Takers and Mechanic Trainning (CTMT) for the WASAN Committee members from the selected villages.

Fig - 6.



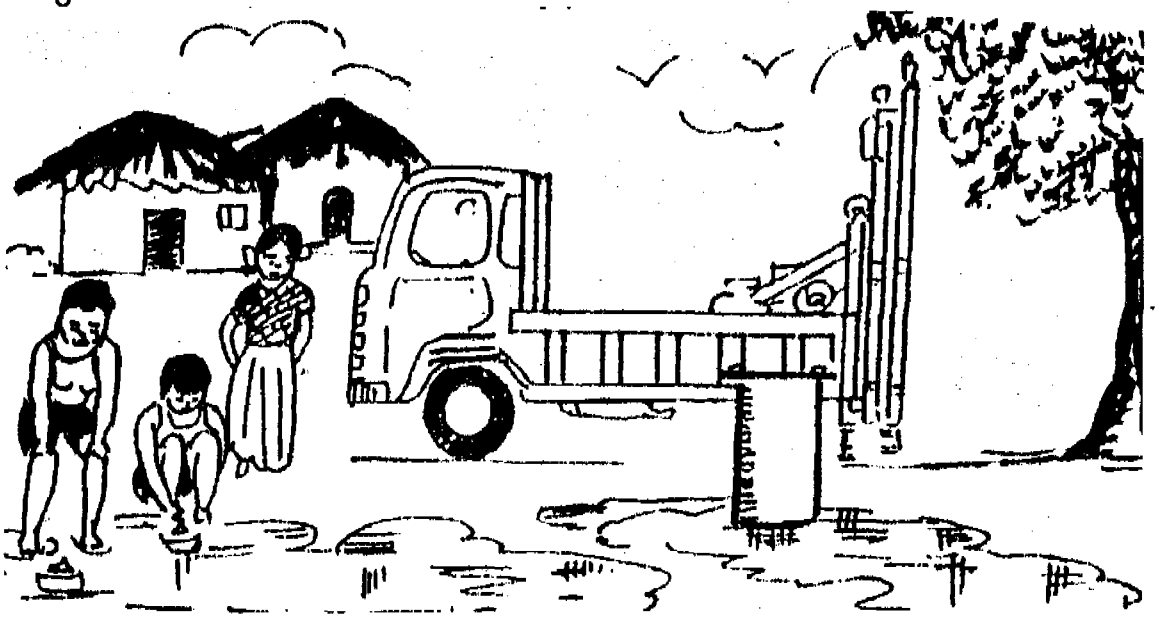
Doing geophysical survey of the site selected for drilling bore well and to find the ground water by Hydro-geologists using a geophysical instrument with the participation of local people.

Fig - 7.



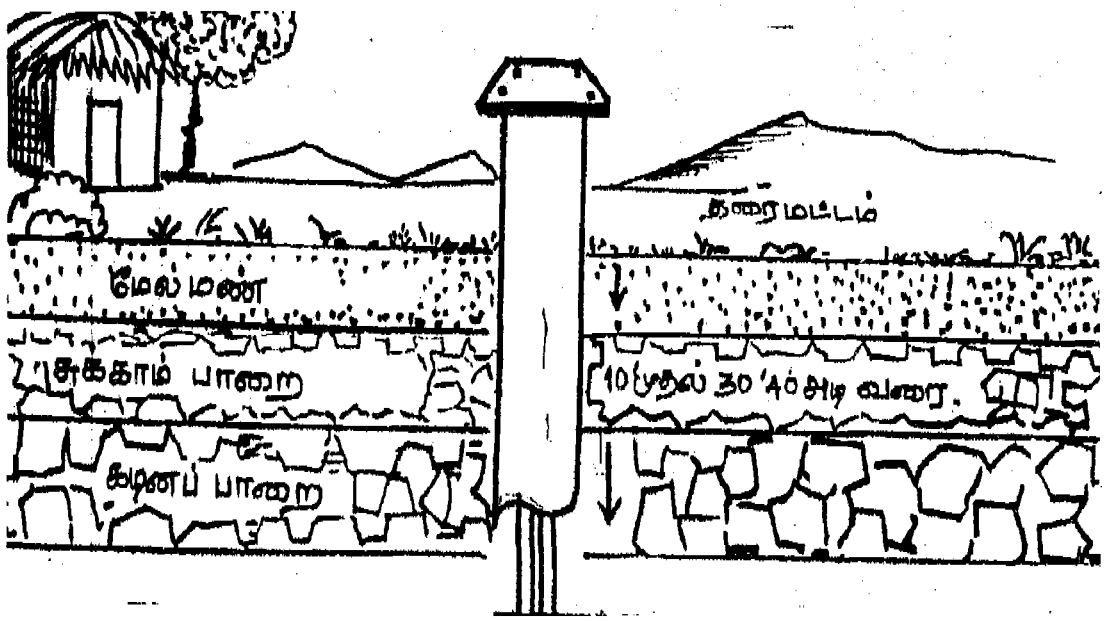
Drilling of bore hole at the selected site by a deep bore - drilling unit. In general 4.5 inches diameter bore hole is suitable for a deep bore well.

Fig - 8.



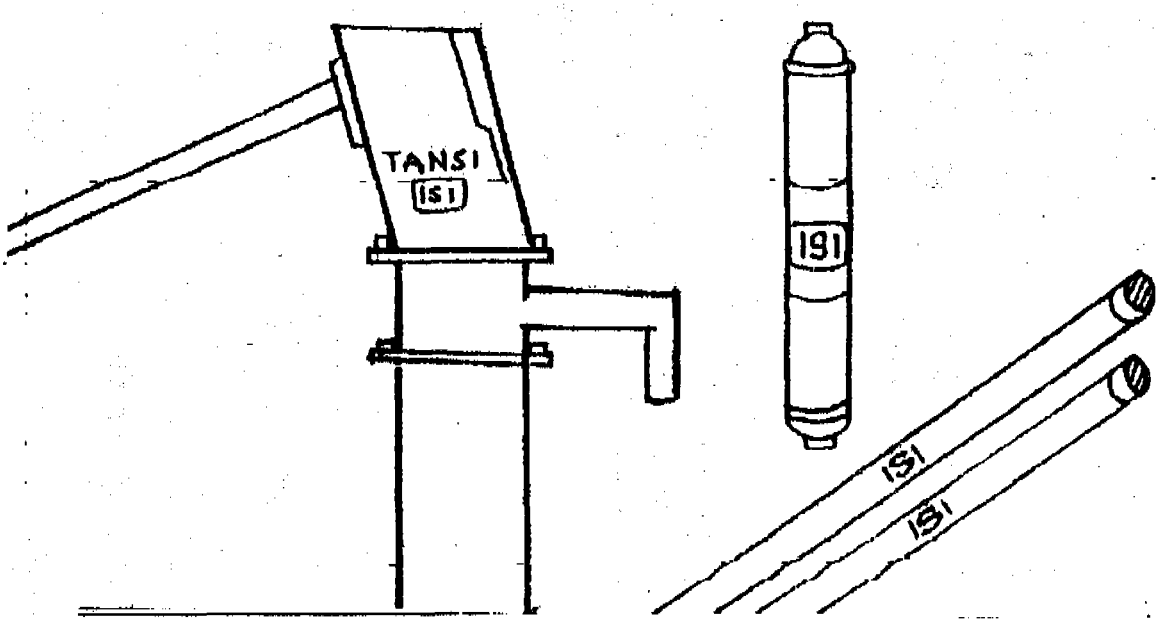
The yield of water from the bore well should be the minimum of 1.5 inches. It would be good if its is 3 or 4 inches.

Fig - 9.



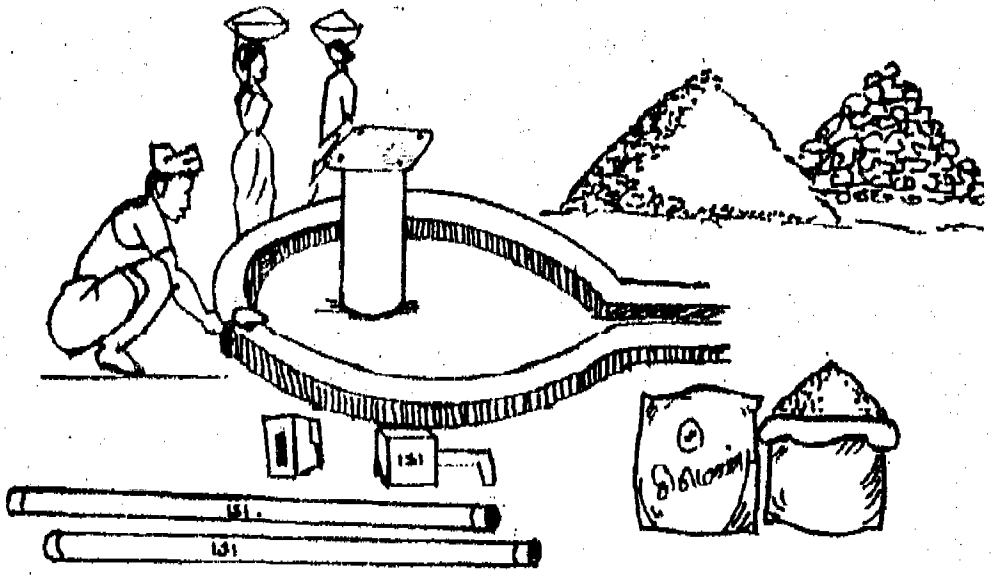
Erection of casing pipe in the bore well should be up to the minimum depth of 10 feet or up to the level of hard rock formation. PVC pipe can be used as the casing pipe. After the drilling of bore well, flushing of bore well should be perfectly done. Other wise the water source may be blocked and the depth of the bore well may also be reduced.

Fig - 10.



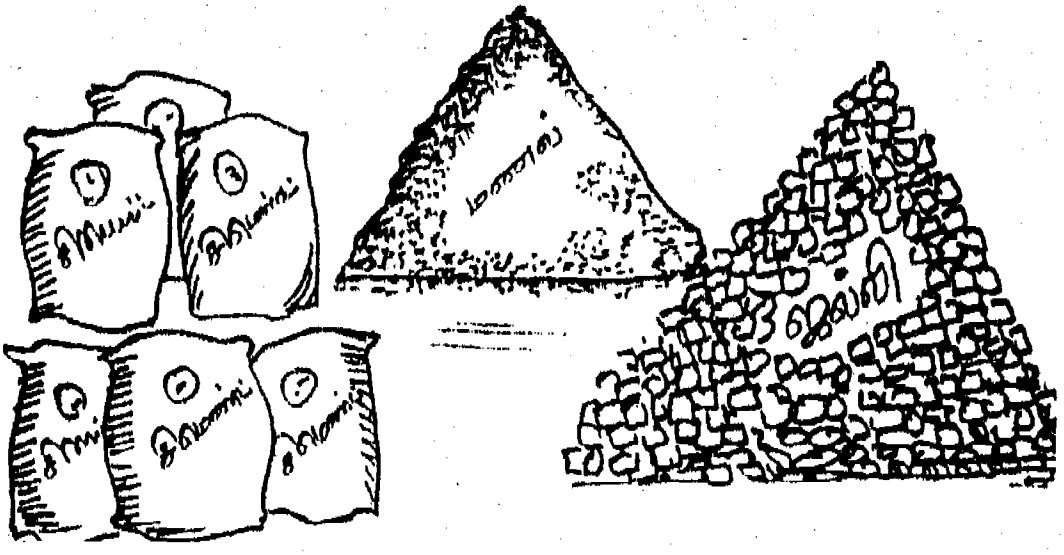
Check and ensure that the purchased or provided hand pump and its parts are made of good quality and with ISI Mark.

Fig - 11.



Construction of platform for the hand pump with the help of trained members in the WASAN Committee. The platform can be constructed in the shape of a circle or square. If the platform is to be constructed near to lake, pond, stream, roadside or in low lying areas, construct it with more required height. (vaised platform)

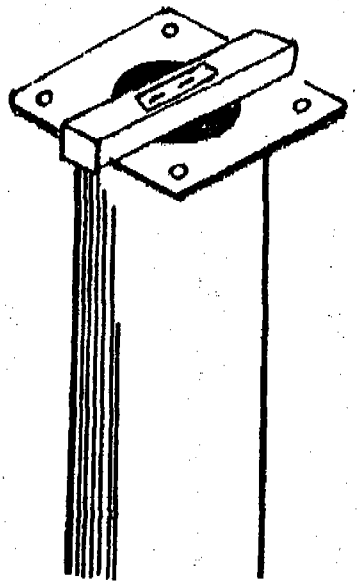
Fig - 12.



The following materials are required for a durable hand pump platform construction.

Cement : 6 bags	*Sand : 12 bags or 0.40 cum.*	*Jelly (20mm) : 24 bags or 0.80 cum.*

Fig - 13.



Check and ensure the vertical erection of pedestal with the help of spirit level. Check concrete ratio as 1:2:4, and construct the platform.

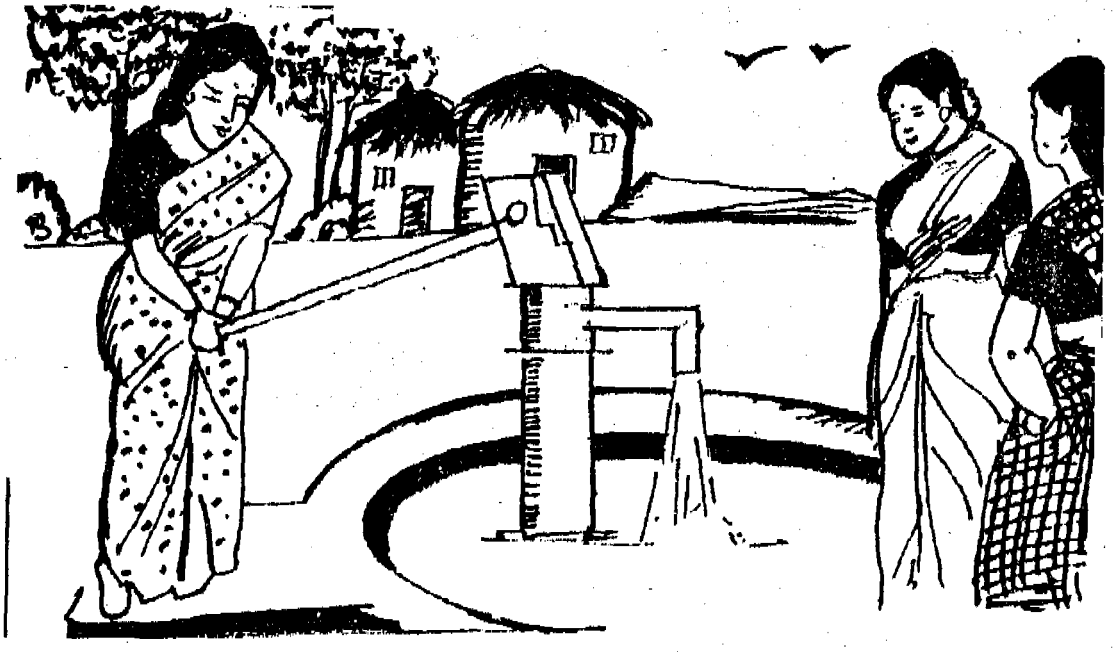
Fig - 14.

After the platform construction, curing of platform by drenching with water and keeping wet at least for a week to strengthening the concrete structure.

Fig - 15.

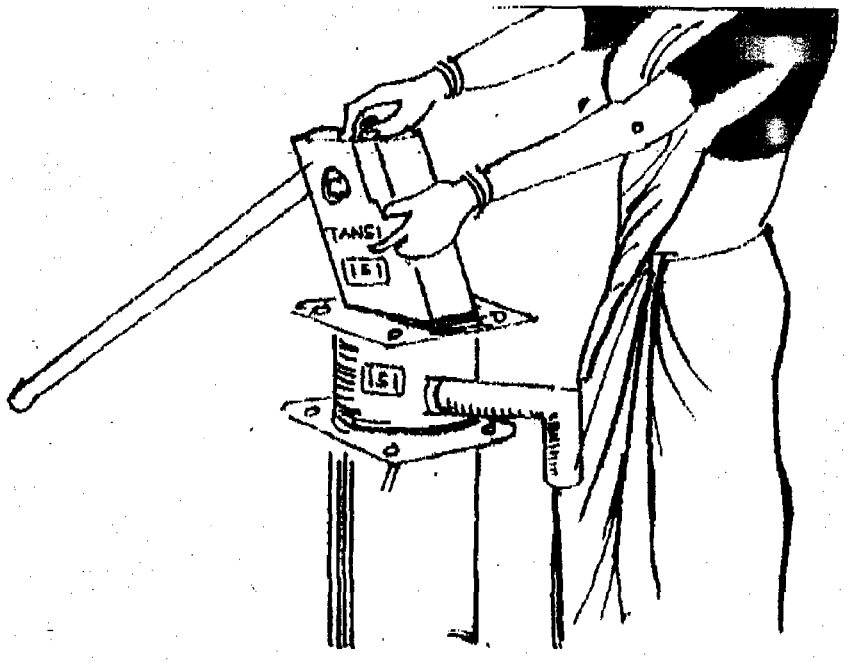
Installation of hand pump with the help of a experienced hand pump mechanic trained members.

Fig - 16.



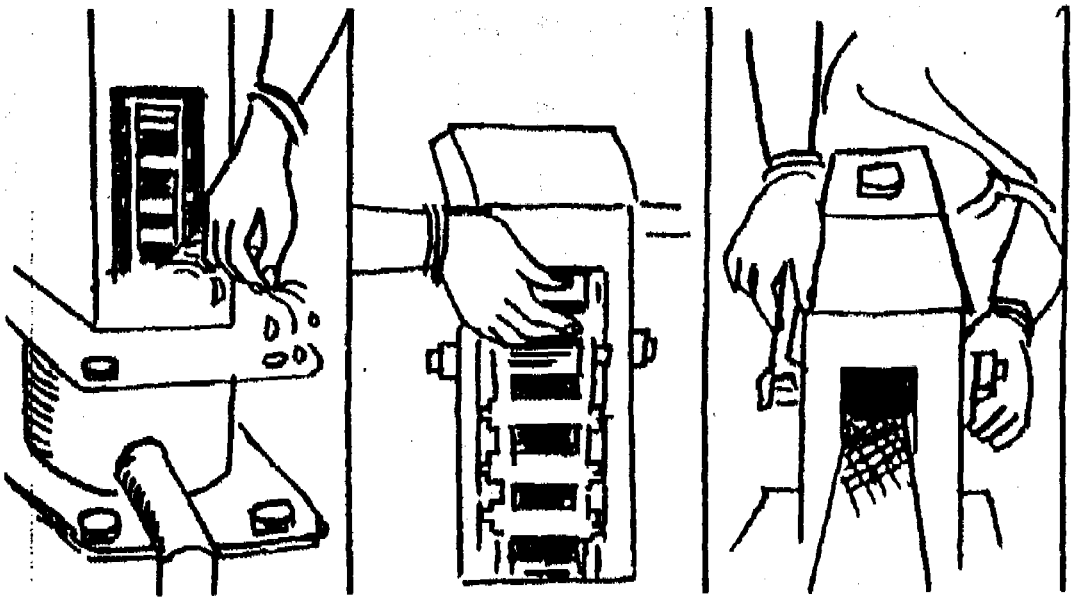
Check and ensure the pumping capacity and flow of water from the hand pump and strike the handle minimum for 100 times to pump out the dirty water.

Fig - 17.



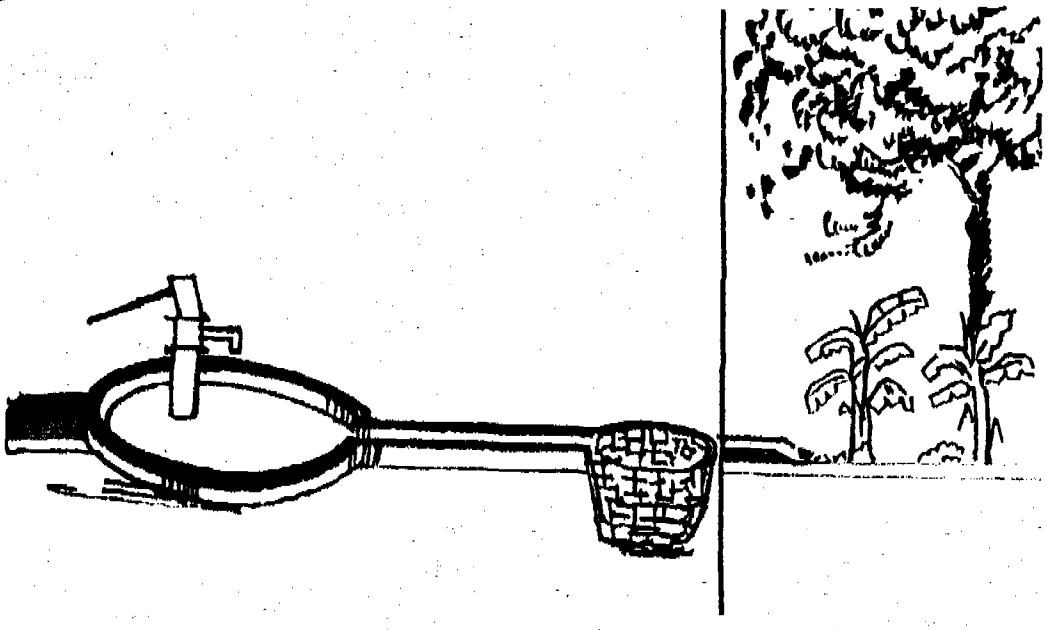
Check all the parts of the hand pump, it bolts and nuts are properly fixed.

Fig - 18.



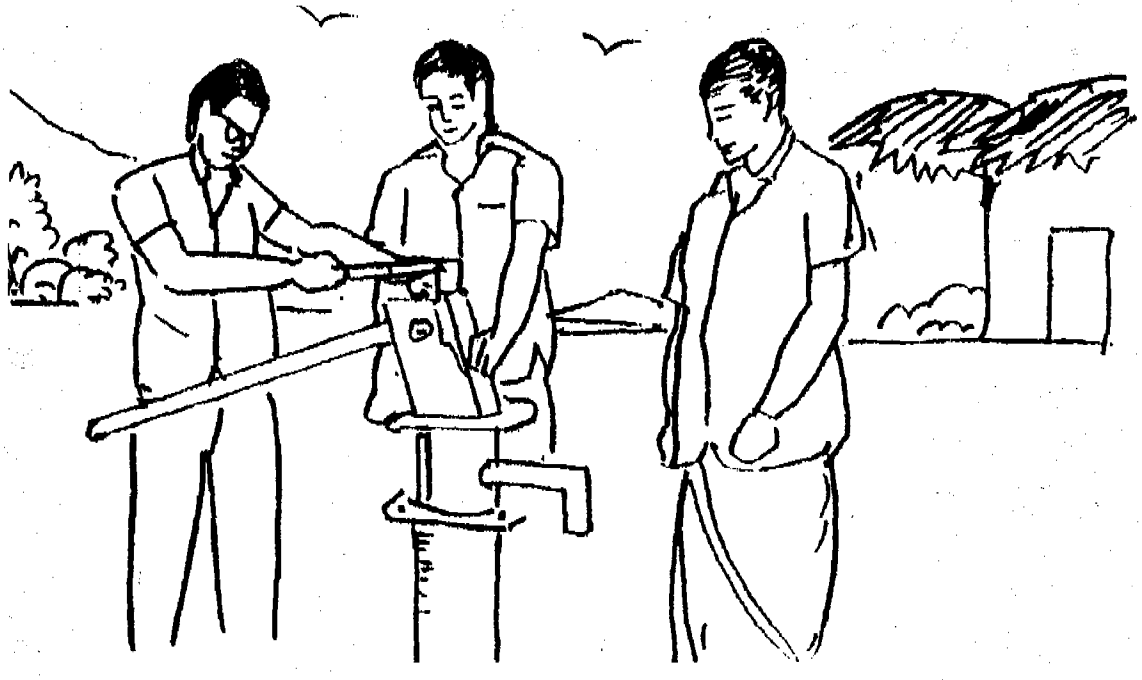
Open the head assembly inspection cover every 30 days once and remove the dust from inside Grease the chain and axle, and tighten the axle nut. Tighten all the bolts and nuts in the hand pump.

Fig - 19.



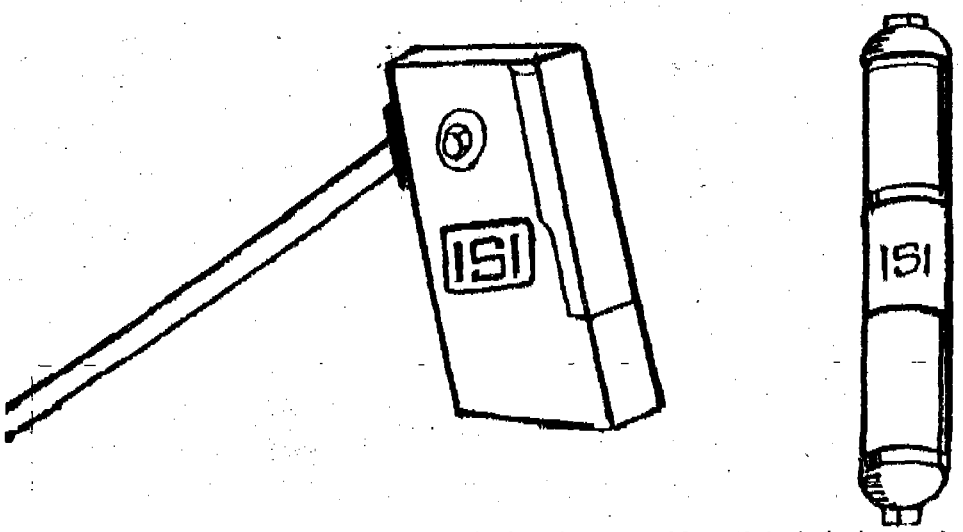
For the safe disposal of waste water from the hand pump, construct a soak pit at the out let of drain or raise a garden near by for utilising the waste water.

Fig - 20.



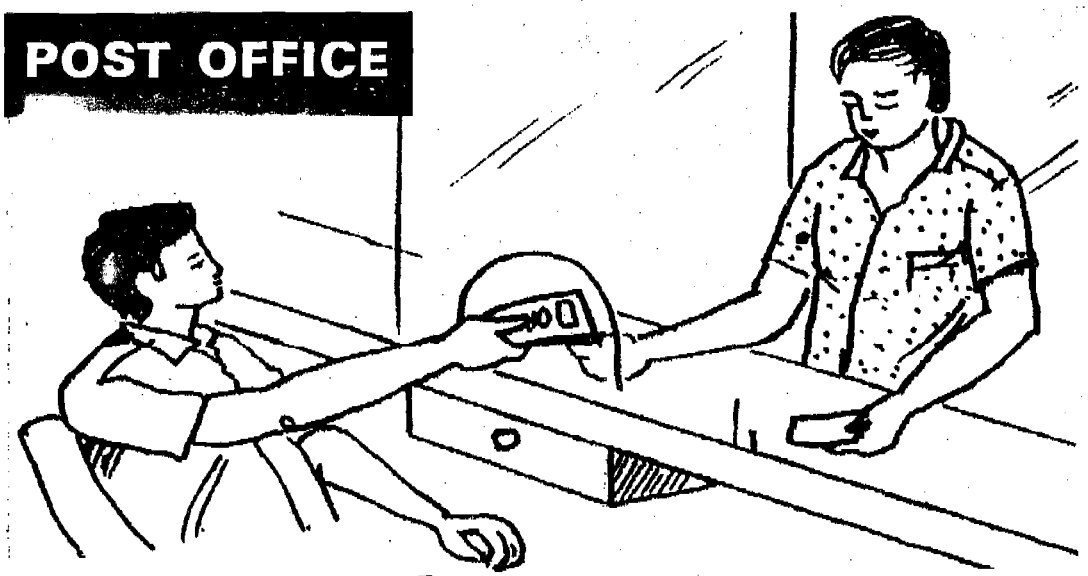
Service and Repairs of Hand pump: Rectify the problems of hand pumps at once with trained caretakers and mechanic team in the village or Panchayat Union mechanic or the NGO's mechanic.

Fig - 21.



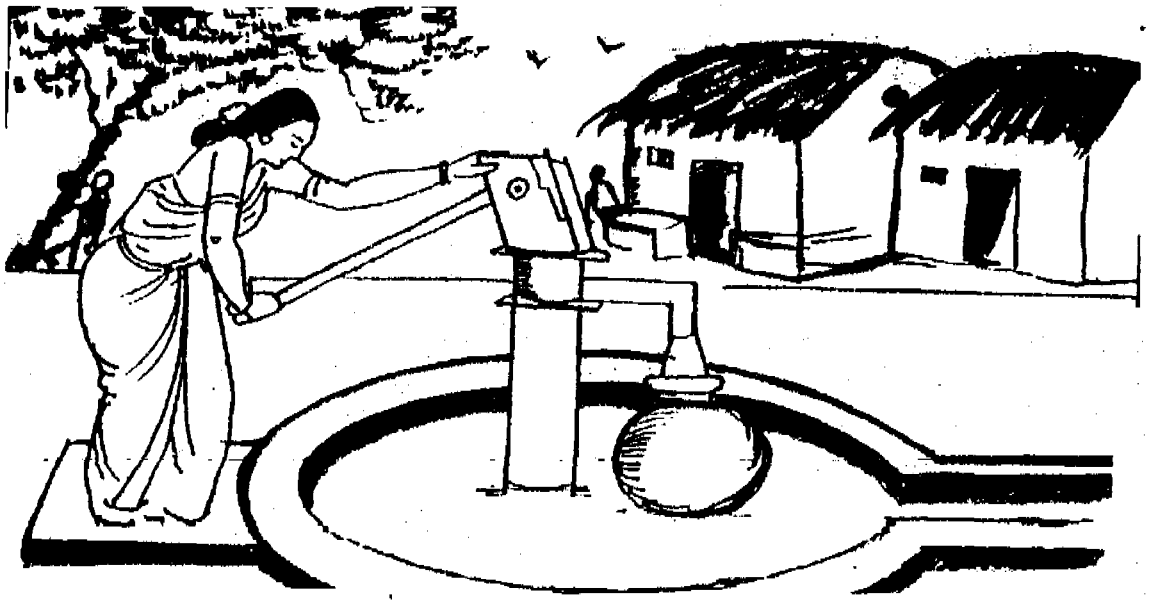
Check and ensure the newly replaced parts of the hand pump with ISI Mark during replacement of spares in the hand pump.

Fig - 22.



Financial Management: Make use of the hand pump maintenance fund for the service and repairs expenses on the hand pump and collect the amount from the people and deposit back into the Post Office Account or Bank Account.

Fig - 23.



By the above said methods, you can get a sutainable safe and pure drinking water source for you village.

Fig - 24.

Consumption of safe and pure drinking water makes a healthly community of self-sufficient families and through which your village would get a sustainable development.

COMPARISON OF OPEN WELL AND BORE WELL

OPEN WELL	*BORE WELL*
Water could not be safe and pure	More safe and pure
Requires more space	Requires less space
Needs more strength to draw water	Needs less strength to draw water
Requires more time to construct	Requires less time to install
Consumes more time to collect	Consumes less time and speedy collection.

INSTRUCTIONS TO HAND PUMP USERS

Do's	*Dont's*
Use / strike the hand pump slowly and gently	Hard usage and knocking strokes
Gentle motion of full up & down handle strokes	Fast and short strokes

MAINTENANCE OF HAND PUMPS

Do's	*Dont's*
1. Keep clean hand pump platforms	keeping dirty and unclean platform
2. Keep the hand pump area clean and dry	Stagnation of waste water around the platform
3. Construct soak pit away from the hand pump	Construction of soak pit very near to the hand pump
4. Keep animals far away from the hand pump	Bathing, Washing clothes, defecation of animals and children near to the hand pump.

1.8 SUSTAINABILITY OF BORE WELL HAND PUMP

- Sustainability of water sources
- Sustainability of hand pumps

1.8.1 Sustainability of Sources

Any drinking water programme may fail, if there is no sustainable sources. If a source goes dry within a short span of time after its generation, the money invested for the scheme becomes a waste. Many of such defunct system can be seen in many villages in India. Sustainability of ground water sources depends on many parameters, for e.g., poor or lack of surface water conservation measures, over exploitation etc. Hence it is most important to take appropriate measures to conserve more surface water and minimise the exploitation of ground water.

Since, water conservation measures are itself a wise subject but our role in this aspect is to motivate the community and create awareness on the importance of water conservation works and maintaining the existing surface water conservation structures such as percolation tanks, check dam, irrigation, tanks, etc. De-silting of tanks, adopting proper soil conservation works in the agricultural fields, etc., are the important measures of knowledge , which are to be provided to the community by a developmental worker.

1.8.2 Sustainability of Hand Pumps

Sustainability of the hand pumps mostly depends on the community or beneficiaries who should take responsibility of proper utilisation and regular maintenance. The community should take care of the maintenance of hand pumps to get continuous drinking water supply. If the community adopt the following two levels of maintenance system under the management of WASAN Committee will give better results.

- Care Taker Level
- Mechanic Level

Care Taker Level

The following are the responsibilities of a Care Taker :

- keep platform and surrounding of the bore well hand pump clean.
- regular application of grease to chain.
- regular checking and tightening of bolts and nuts.
- regular checking and tightening of the handle axle.
- maintaining the soak pit or kitchen garden for the safe disposal of waste water.
- guide the beneficiaries not to knock the handle with handle bracket while pumping water.
- regular reporting to the mechanic about the performance of the hand pump.

Mechanic Level

- monitoring the water discharge of the pump at regular interval.
- check any shake in the handle move or pedestal assembly.
- replace the worn out bolt, nut or chain
- whenever there is even a small problem in the pump it is the responsibility of mechanic to rectify it with the support of Care Takers and WASAN Committee members.
- keep the records and registers for the attended service and repair works; replacement of spare parts, expenses incurred for the maintenance, etc.

Role of WASAN Committee

The overall management responsibility falls on the WASAN Committee to have a sustainable drinking water supply system of a village. The committee has to take steps to raise a fund for the maintenance of existing water sources by regularly collecting some amount from the user groups. Delegating the care takers from the committee on rotational basis, providing or sending the members for the required caretakers and mechanic training, supporting the mechanic while attending service and repair works, keeping the bore well environment clean, solving of problems which arise among the community in relation to the hand pump, etc. The committee should undertake all the above measures effectively to make the existing water sources sustainable and serve for longer time to the village.

INDIA MARK - II

Bore Well Hand Pump
Anatomy and Installation

1.9 ANATOMY OF INDIA MARK - II BORE WELL HAND PUMP

Since IM -II hand pump is used in many bore wells; it is better to know all about the pump. In general IM - II is able to pump water from 80 to 100 feet depth. It has a capacity of lifting 12 litres of water for ever/ 40 strokes. If the water level is deeper than 120 feet, you can go for IM-II extra deep bore well hand pump, which can pump out water from 180 feet depth. The only disadvantage of this pump is, if there is any problem in the cylinder assembly, the whole raiser mains has to be lifted from the bore well to carry out the repair work. Whereas in the case of IM-III, no need for lifting the whole raiser mains.

The anatomy of the IM-II hand pump can be classified into two parts as follows,

- parts above the ground level, and
- parts below the ground level.

Parts above the ground level

a. Head Assembly

- Handle (2 Bearings, one Bush, Axle and Chain with Bolt & Nut)
- Inspection Cover

b. Water Tank

- Top and Bottom Flange
- Spout
-Pipe Holder

C. Pedestal

- 3 legs
-Flange

Parts below the ground level

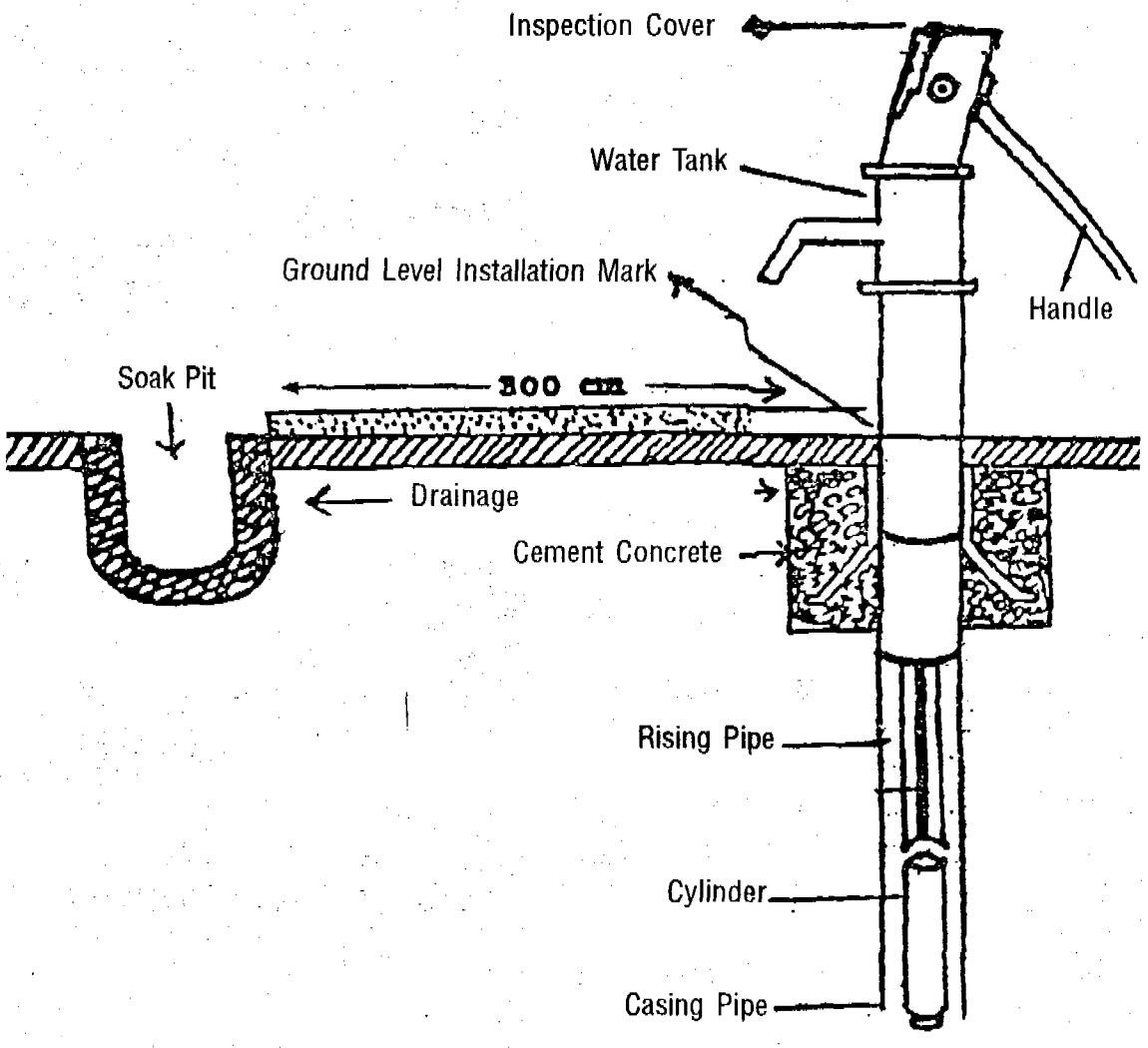
a. Raiser Mains (32 mm diameter of galvanised iron pipe and couplings - there are three classes as A,B and C of pipes are available in the market of which, class B is sufficient for the hand pump)

b. Connecting Rods (galvanised - since these rods have standard length of 10 feet raiser main's length should also be made to 10 feet standard length).

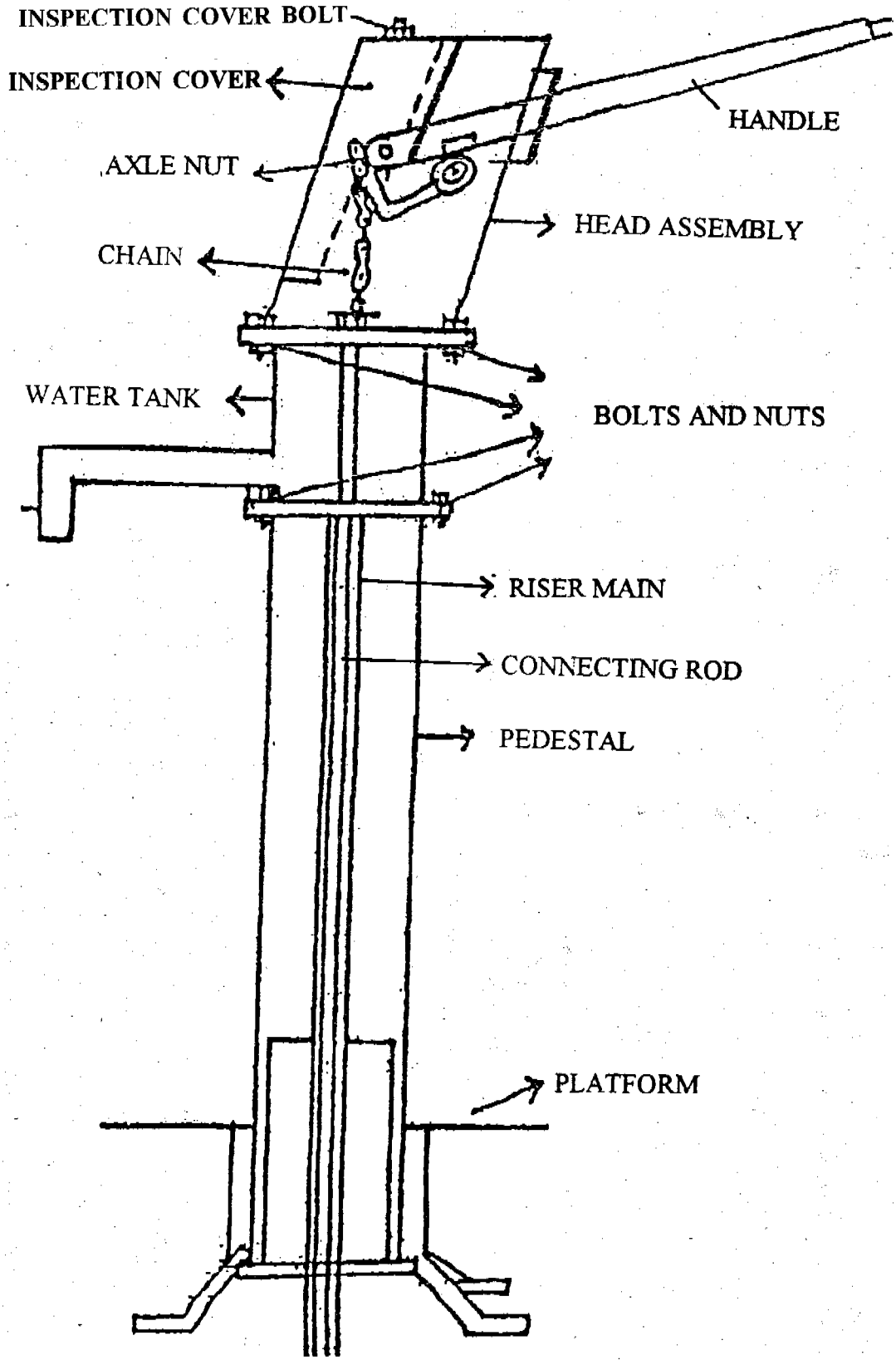
c. Cylinder Assembly
   1. Cylinder Body
   2. Reducer cups (2 nos)
   3. Sealing rings (2 nos)
   4. Plunger Rod (electroplated)
   5. Piston :
      - Plunger Rod Yoke Body
      - Upper Valve Guide
      - Bucket Washer (2 nos)
      - Spacer
      - Follower
      - Check Valve Assembly

The required tools are special tools and standard tools for the service and repairs of IM-II hand pump are also given in detail.

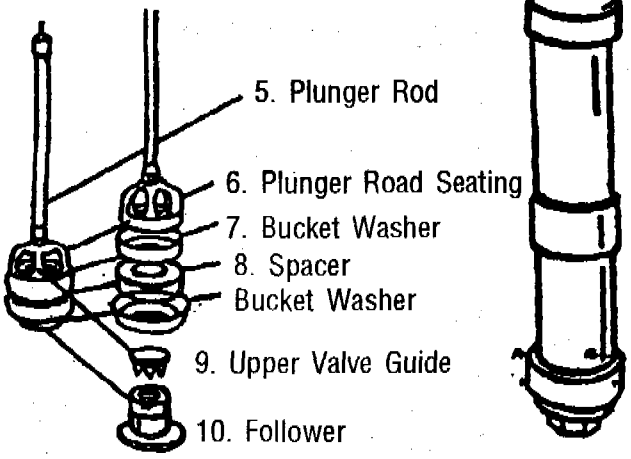
A Complete View of an installed
India Mark - II Hand Pump



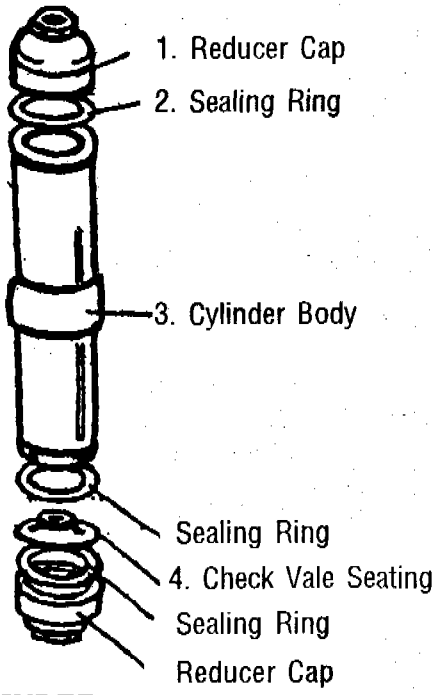
India Mark - II Hand Pump
Antomy and Parts



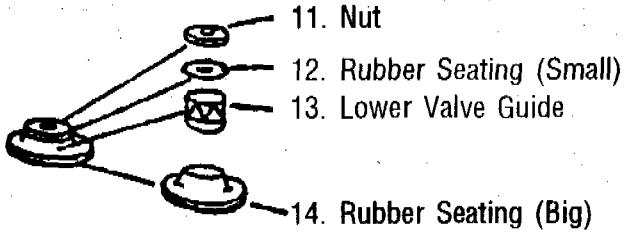
Cylinder Assembly and Parts



PISTON SET

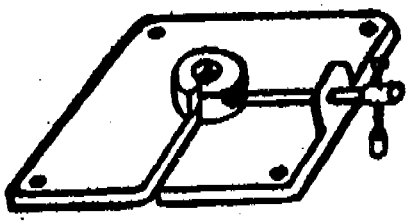


CYLINDER

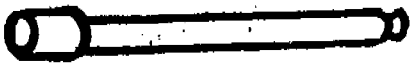


LOWER VALVE SET

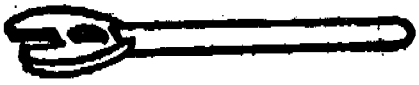
Service Special Tools



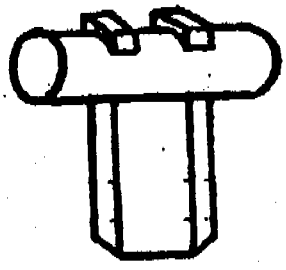
Rod Vice



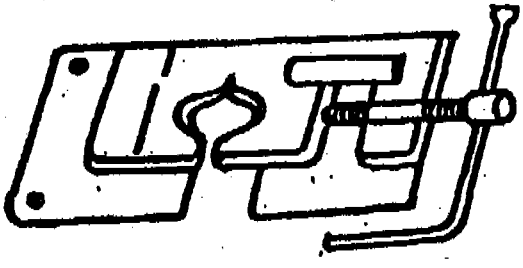
Pipe with Cupling



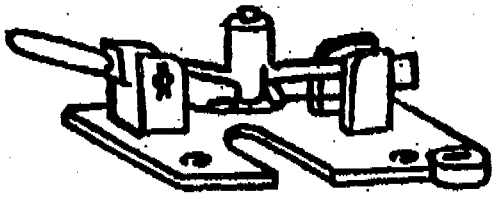
Rod Spanner



Rod Lifter



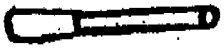
Pipe Vice



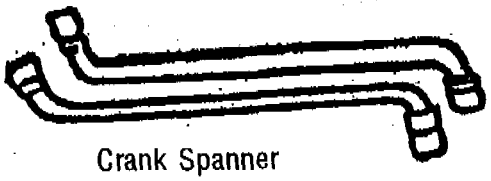
Self locking Clamp

Bearing Setter

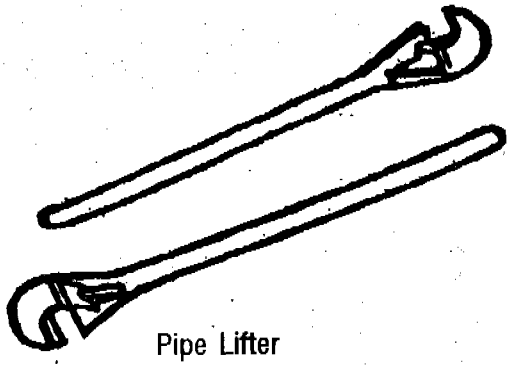
Chain Cupper Support



Axle Punch

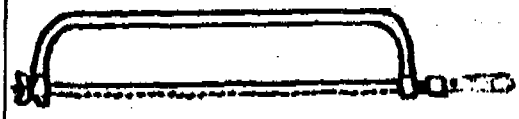


Crank Spanner

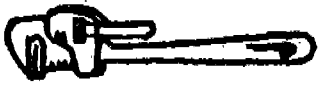


Pipe Lifter

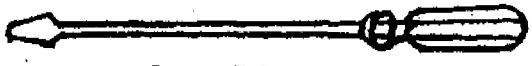
Hand Pump Installation
Standard Tools



Hacksaw Blade

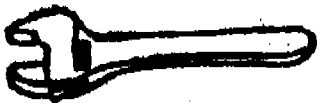


Pipe Wrench

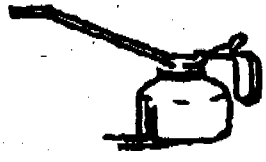


Screw Driver

Wire Brush



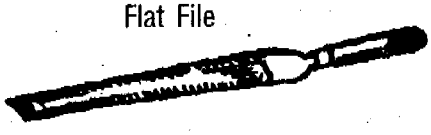
Screw Spanner



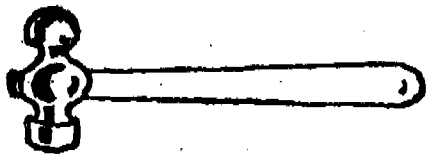
Oil Can

12mm Die Set

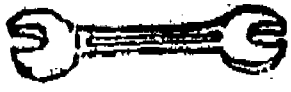
Flat File



Half Round File



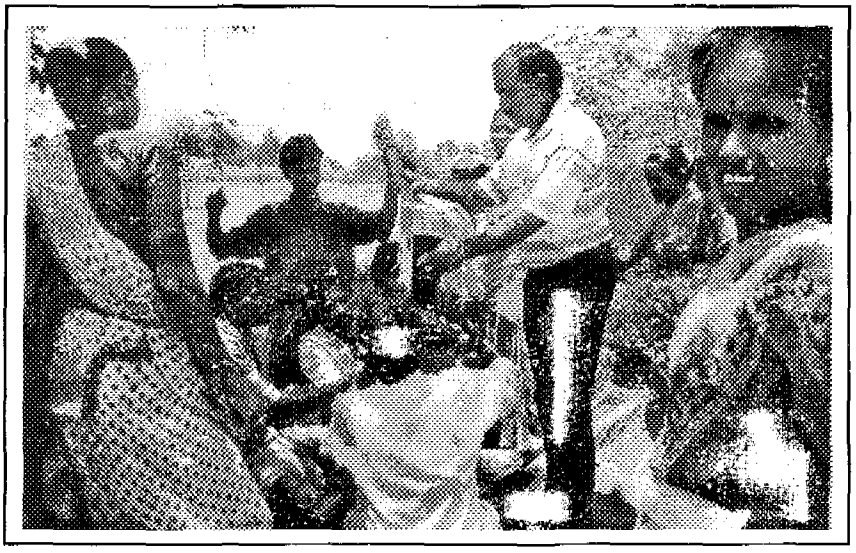
Hammer

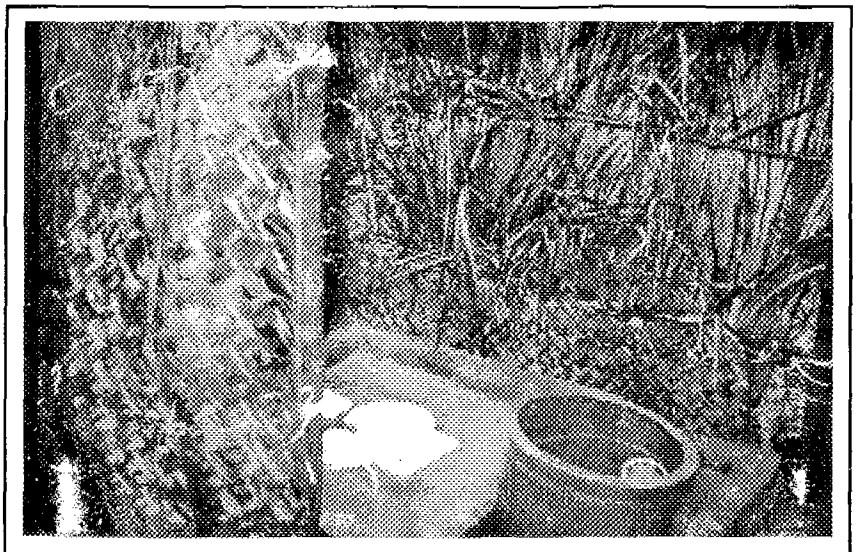


Dobule End Spanner

Die Set - Pipe

Hand Pump Caretaker and Mechanic Training (CTMT) for Village People





Constructed with Coconut Leaves

1.10 INSTALLATION OF INDIA MARK - II BORE WELL HAND PUMP

1.10.1. Site Selection for Drilling

While selecting the site for drilling a bore well the following measures should be kept in mind:

- Site should be away from the latrine - leach pit, compost or garbage pit to avoid contamination.
- Site should be away from the trees to avoid root problems
- Site should be a public place and easy accessible to the whole community
- Site should not be on the road or street
- Site should not be a low-lying area or near to drainage.

1.10.2 Drilling

In general 4.5" bore hole is drilled to install IM-II hand pump. There are different type of drilling rig-machines available like DTH, Rotary, etc., of which any one of them or even manual drilling also can be used for drilling at the selected site.

1.10.3 Installation of Casing Pipe

Either PVC or GI casing pipe can be used for casing the bore hole till the hard soil or rock formation. Casing of bore hole will avoid the topsoil falling to the bore well. GI casing is not much in use because of its higher cost. Since pipe is an important part of the bore well, it is essential to install a good quality PVC casing pipe. The other type of casing called slotted casing which is normally used in sandy areas. While installing the casing pipe, the following measures has to be noted :

- Vertical alignment should be maintained
- After the installation there should not be any movement or shake of the casing pipe
- A good quality and thick PVC casing pipe should be used.

1.10.4 Depth of Drilling

Depth of drilling is decided based on the geophysical survey done at the selected site. While drilling, the community should have to know the total depth of drilling by two of the following methods.

1. Counting the drilling rods used while drilling the bore hole.
2. Measuring the bore hole by using a rope or water level indicator or measuring tapes to find the total depth and the water level.

1.10.5 Flushing

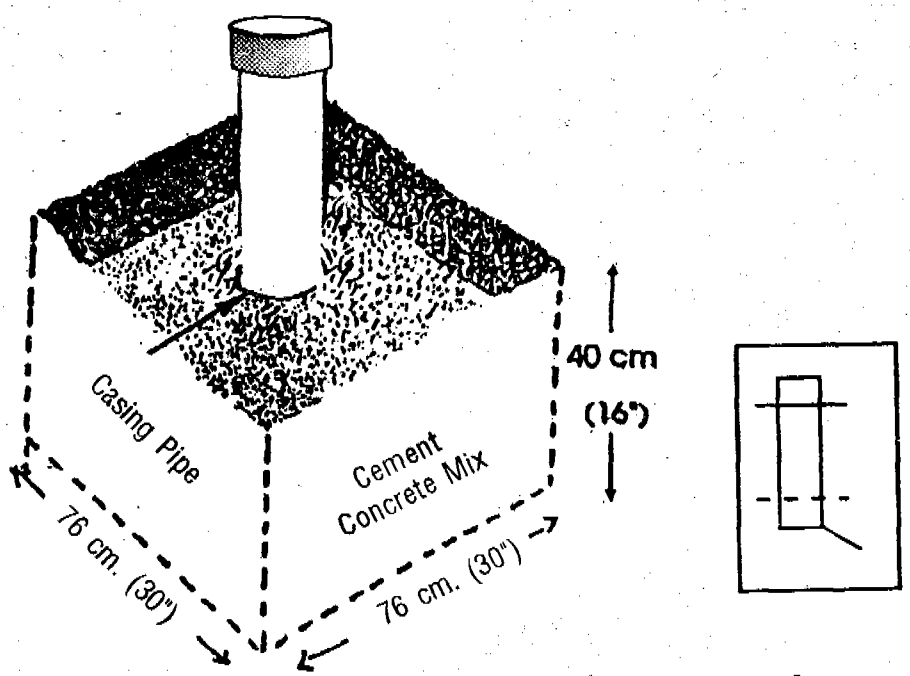
Blowing of high compressed air either with the help of drilling rig or compressor into the bore hole is called flushing. Flushing of the bore hole is an important work to clear all drilled materials for the free flow of water from the aquifer, so that thorough flushing is essential after the drilling work. Flushing is not only clearing the bore hole and also develops for its true capacity of yield. After flushing close and cover the casing pipe to avoid dropping of any material into the bore well.

1.10.6 Installation of Bore Well Hand Pump

Before the installation of Hand Pump, the pedestal has to be installed and the platform has to be constructed around the bore well. Standard moulds are available which can be used for the construction of platform. The following steps shall be followed for the construction of plat form.

FOUNDATION FOR THE BOREWELL HAND PUMP

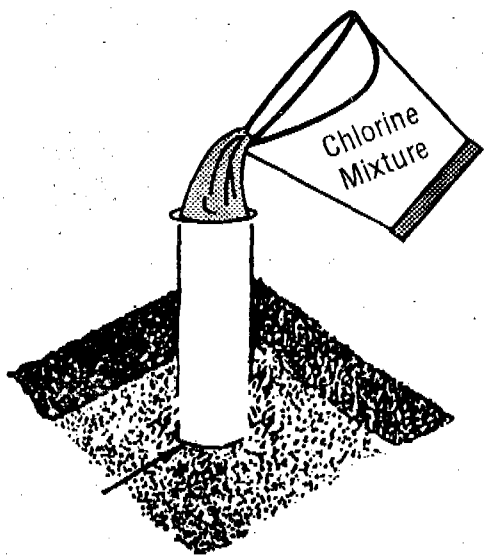
Fig - 1.



Remove casing pipe cover and measure the depth of the bore well and static water level. Ensure that there is no block or any obstruction in the bore well.

Always keep the casing pipe covered. Dig a square pit of 76 *76* 40cm. size around the bore well.

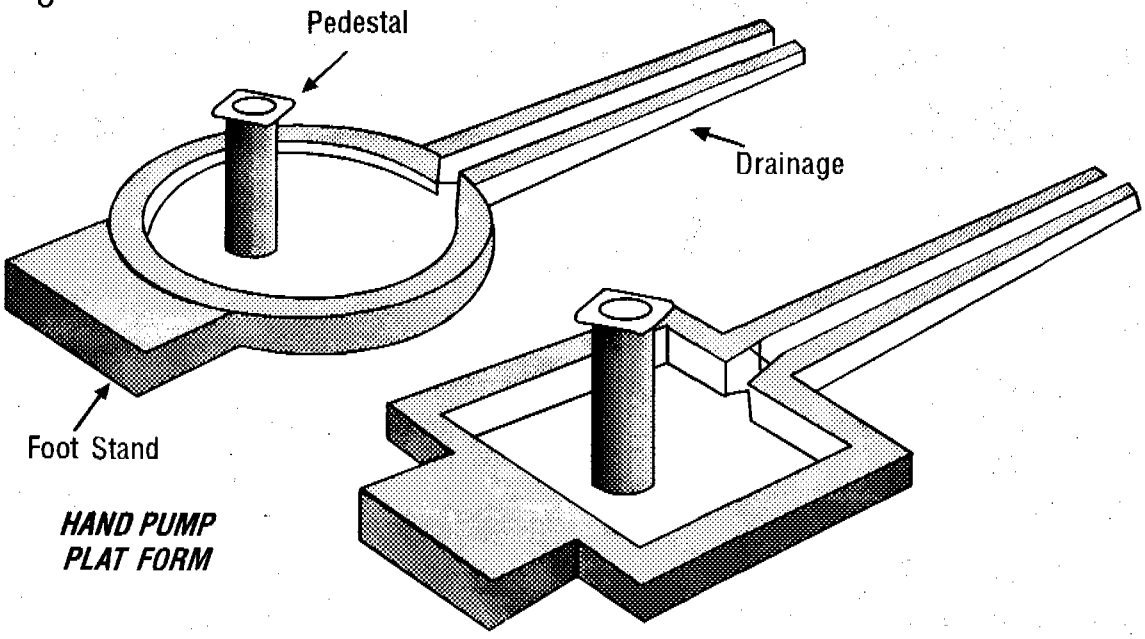
Fig - 2. Chlorinating of Bore Well



Mix 300 grams of bleaching powder in a bucket full of water (40 liters capacity) and pour into the bore well. Close the casing pipe after chlorinating.

CONSTRUCTION OF THE PLATFORM

Fig - 3.

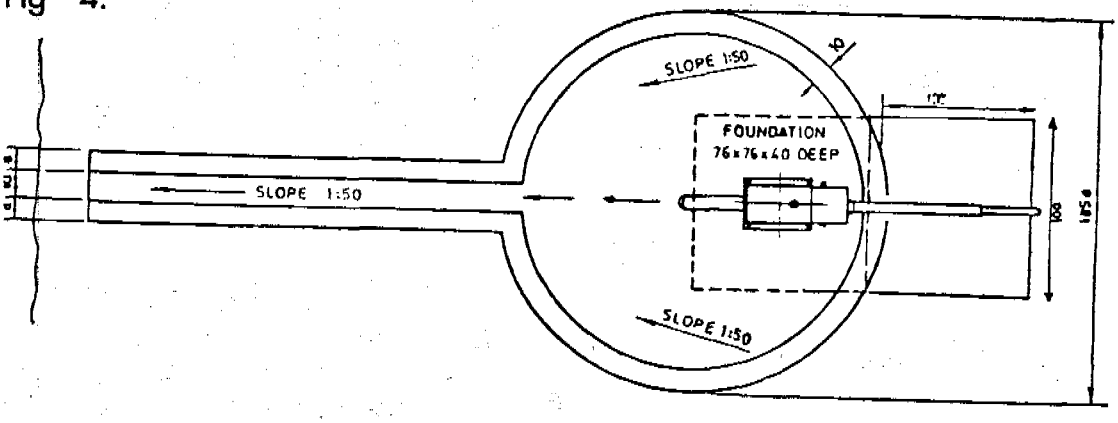


HAND PUMP PLAT FORM

Hand pump platforms shall be constructed as much as conducive for its operation. It shall be constructed according to the soil structure and level of the land site. If it is in low lying area, the level of the platform should be raised up to the level of road and a foot path should also be constructed for easy accessibility. Locally available materials can be used for the construction of raised platform.

Platform shall be constructed either in round shape or square shape by using of shutters.

Fig - 4.



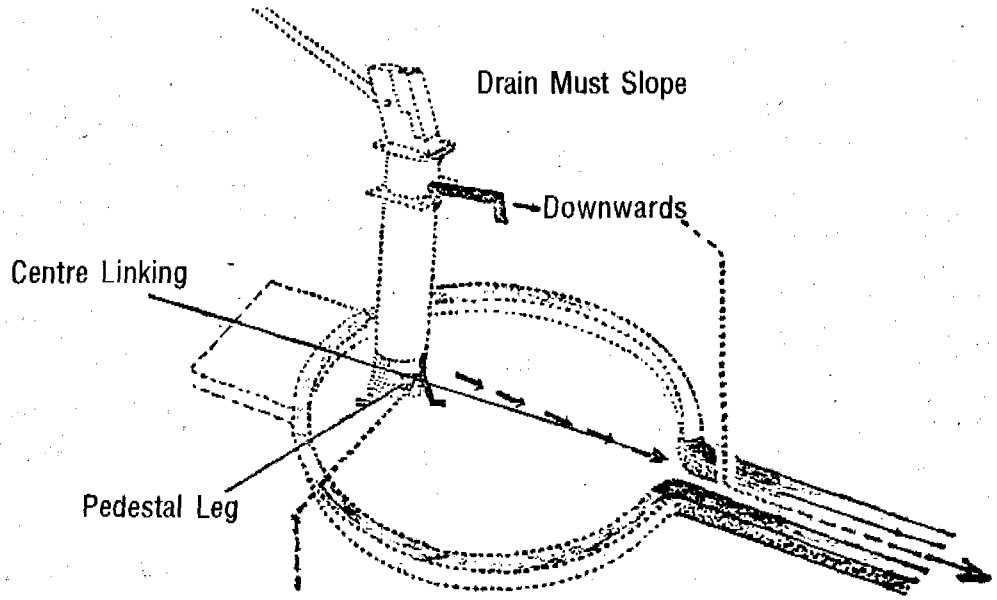
Choose the direction of the drain according to the existing slope and remove the earth for 8 cm. Depth around the square pit to 185 cm. Diameter and rom that 300 cm. long, 26 cm broad for a drain at the slope of 1:50, and 100*100 cm. for the foot stand at the opposite of the drain.

Assemble the shutters in the prepared foundation pit and keep the alignment properly. Shutters should be placed in such a way that the water tank spout of the hand pump should be over the centre of the platform.

CONSTRUCTION OF THE PLATFORM

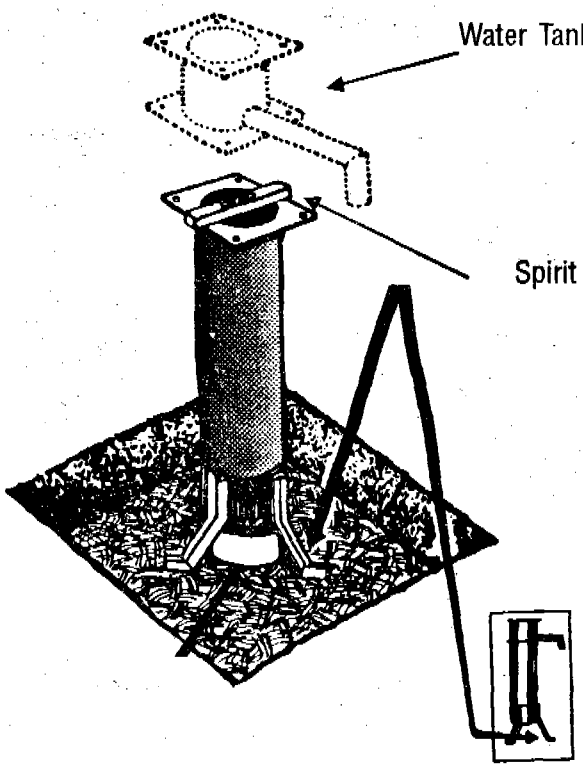
Fig - 5 Installation of Pedestal Stand

Keep the hand pump pedestal vertically over the bore well casing pipe and keep one leg facing towards the drain. Ensure that the pedestal is in line of connecting the centre of the foot stand and the drain.



Check and ensure the pedestal leg and tank spout are facing towards the drain

Fig - 6.

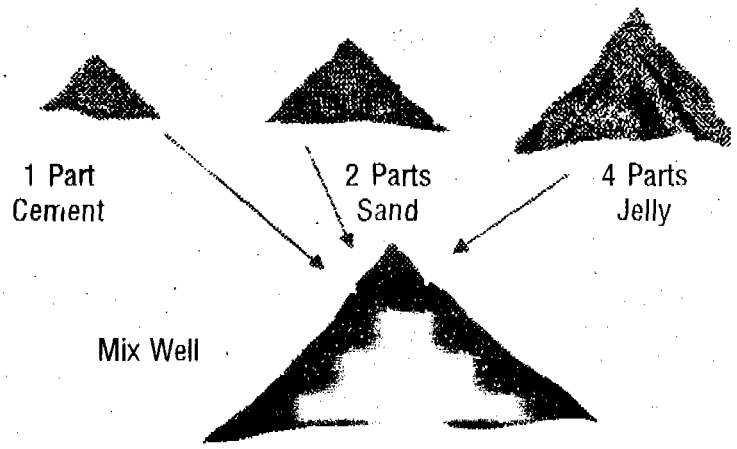


Check and ensure the water tank spout must be over this leg

Use a spirit level to make sure that the pedestal is exactly vertical.

CONSTRUCTION WORK OF THE PLATFORM

Fig - 7 Preparation of Cement Concrete Mix.

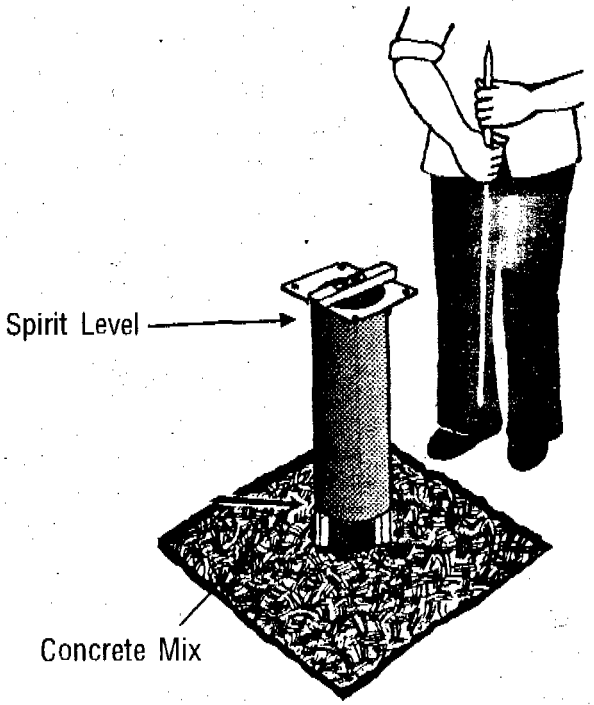


Prepare concrete mix as 1:2:4 (cement:sand:jelly) and ensure that the contents are mixed well.

Materials required for constructing one platform are :

Cement - 6 Bags,	***Sand - 12 Bags or 0.40cum.,***	***Metal Jelly (20mm.) - 24 Bags or 0.80 cum.***

Fig - 8.



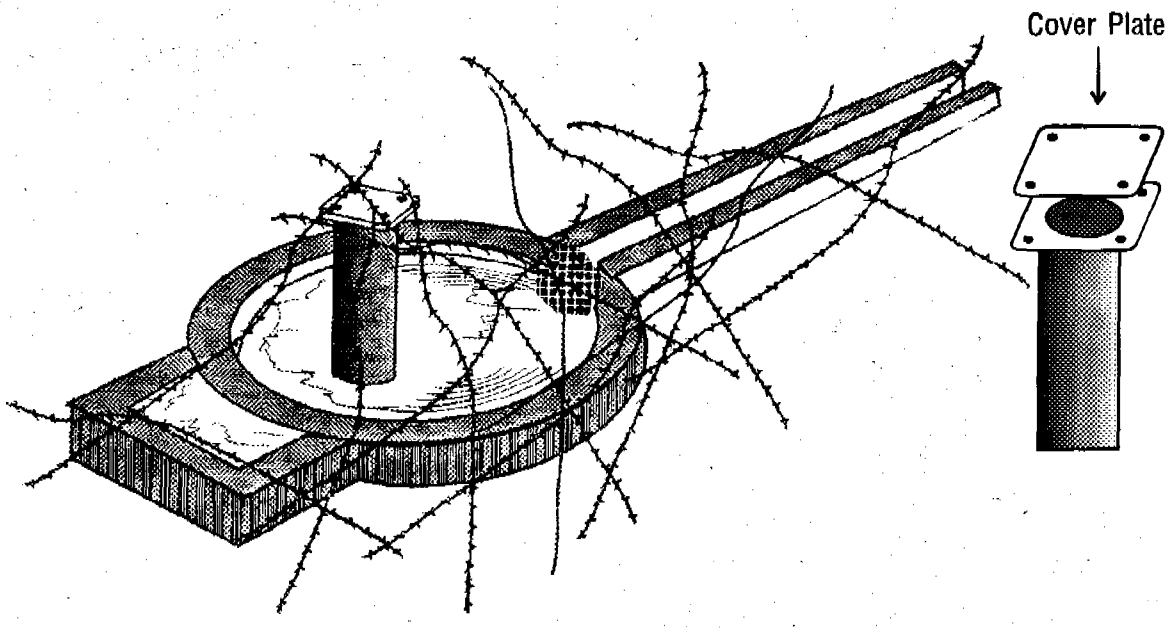
Apply waste oil inside of the shutters

Pour the concrete mix into the pit and fill up to the top of the legs and also check if the pedestal is vertical by using the spirit level.

Construct the platform, foot stand and drain completely while the concrete is still wet.

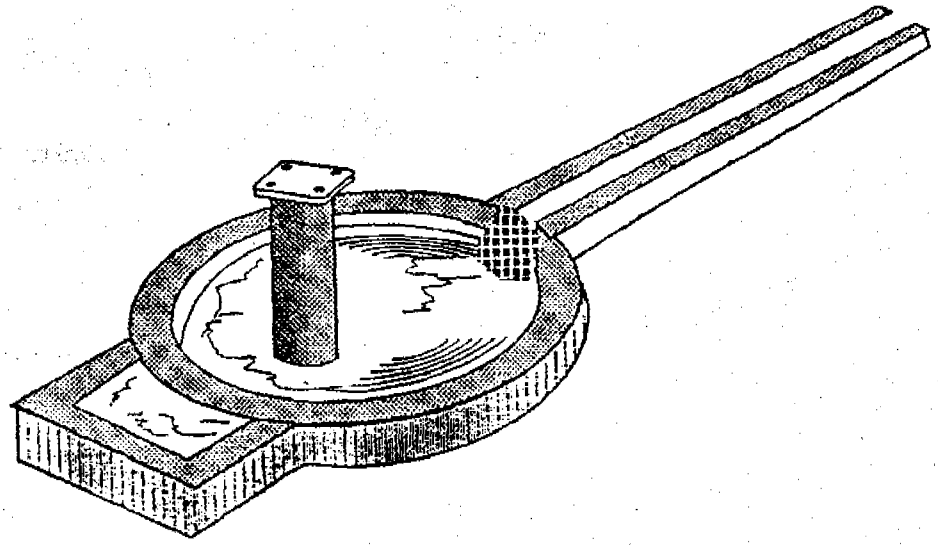
CURING OF PLATFORM FOR SEVEN DAYS

Fig - 9



One hour later remove the shutters and cover the pedestal with metal plate and bolts.
Place thorny branches / Bushes on and arround the platform to safe guard it.

Fig - 10

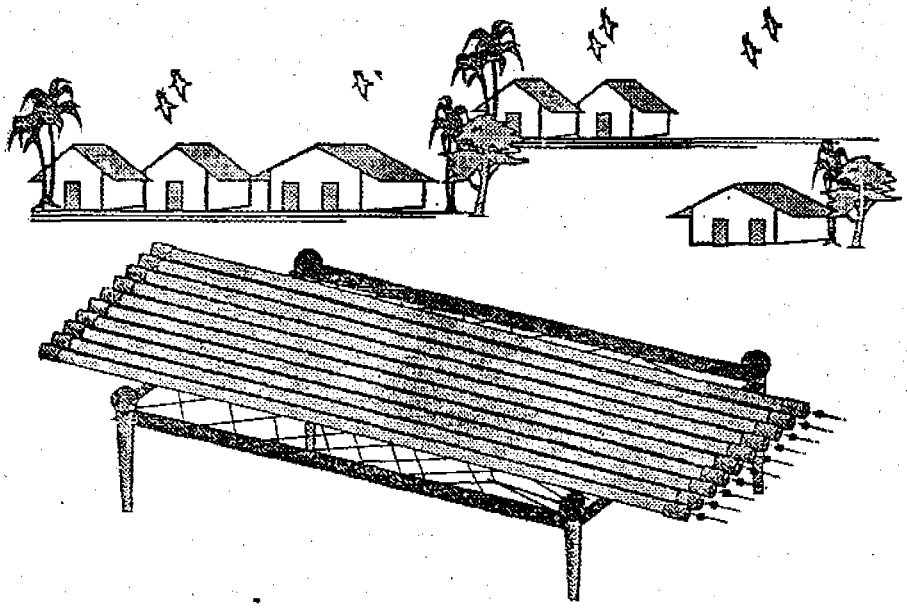


After 24 hours of construction of platform, continuous curing is required for 7 days

For better curing of the concrete, block the drain and fill the platform with water.

Ask the people to keep away children and animals from the platform and allow the concrete to set for 7 days.

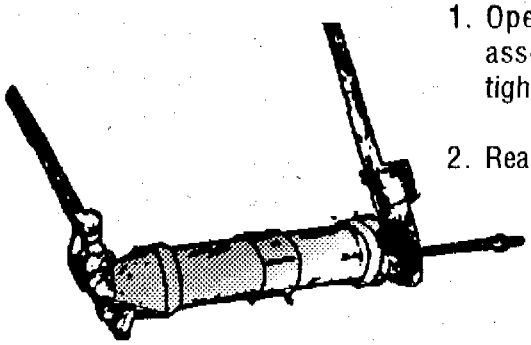
Fig - 11 Seven Days later



Seven days later check the pipes and connecting rods and ensure that all the pipes and rods are threaded properly and clean.

Ensure that all the pipes are fixed with couplings at one end.

Fig - 12 Check the Cylinder Operation

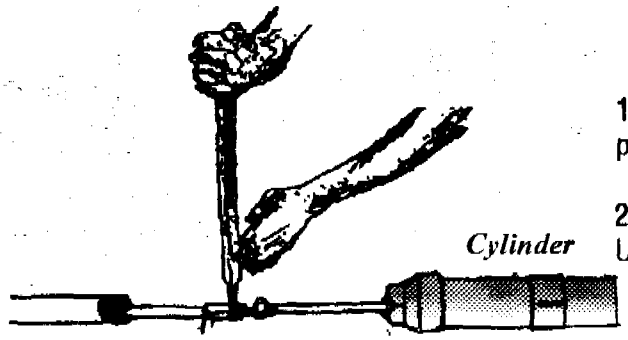


1. Open the cylinder and check the piston assembly and check valve assembly are tight and properly assembled.

2. Reassemble the clyinder

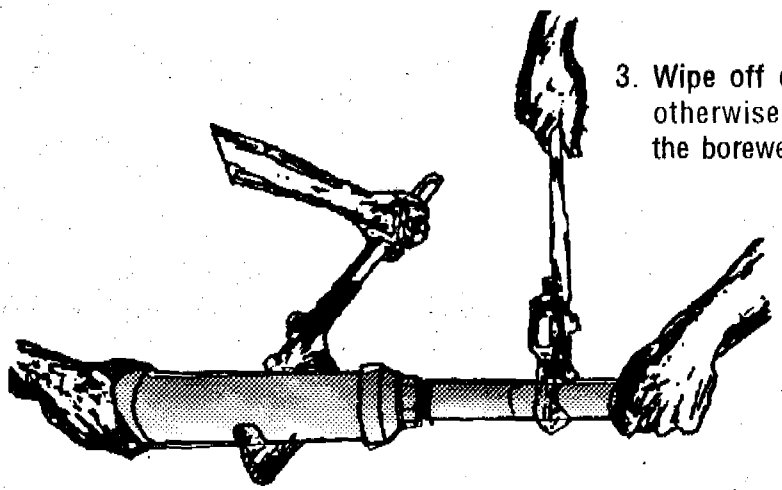
3. Test the cylinder in a bucket full of water.
   If the check valve joint leaks, replace it with a new one.

Fig - 13 Fix the Cylinder to the First Connecting Rod and Pipe.



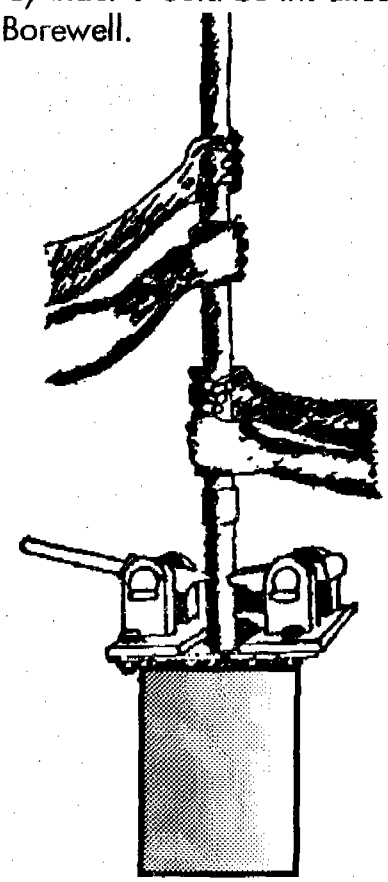
1. Join the first connecting rod to the plunger rod.

2. Screw the first pipe into the cyclinder. Use jointing compound and tighten fully.

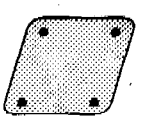


3. Wipe off excess jointing compound otherwise it will spoil the water in the borewell.

Fig - 14 Cylinder should be installed at a minimum depth of 24 meters into the Borewell.

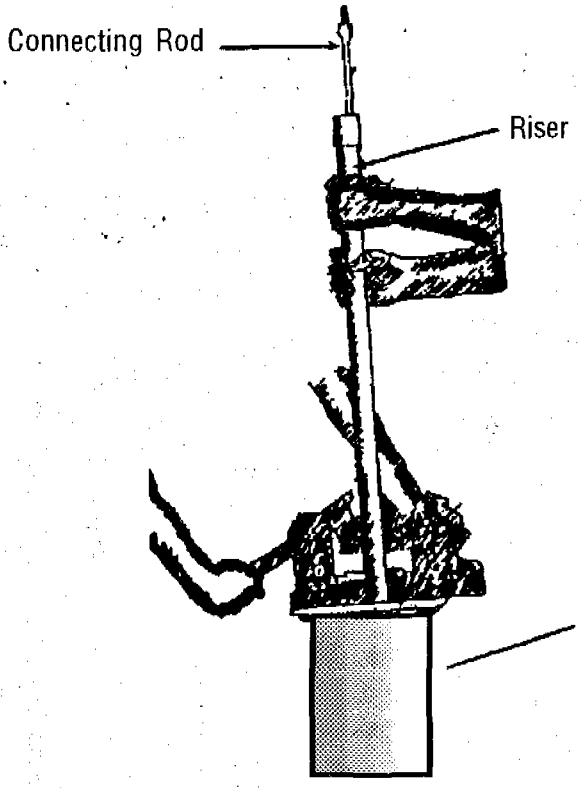


1. Remove the metal cover of the pedestal.



2. Lower the cylinder, first pipe and connecting rod into the borewell. Never install a cylinder less than 6 meters above from the bottom of the borewell.

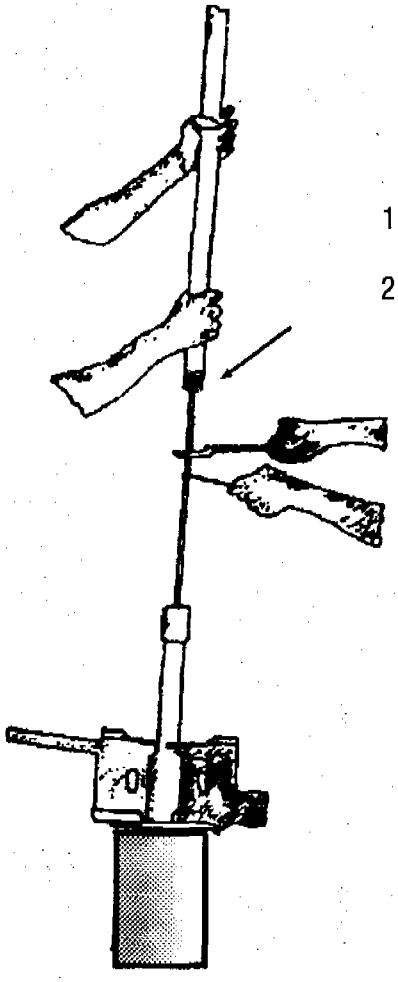
Fig - 15.



1. Insert the self-locking clamp, and clamp the raiser pipe as shown in the figure.

2. Fix the self-locking clamp with the pedestal stand by using bolts and nuts.

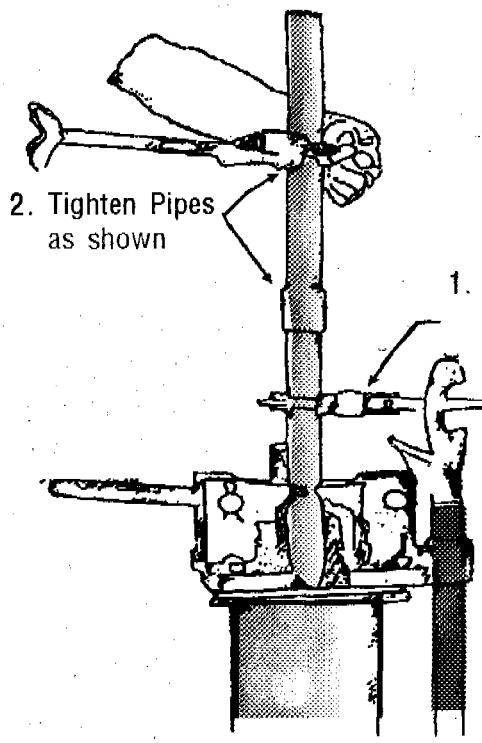
Fig - 16 Fix Successive Connecting Rods and Pipes One by One.



1. Apply jointing compound on pipe threads

2. Join connecting rods together, tighten fully by using coupling spanners.

Fig - 17.

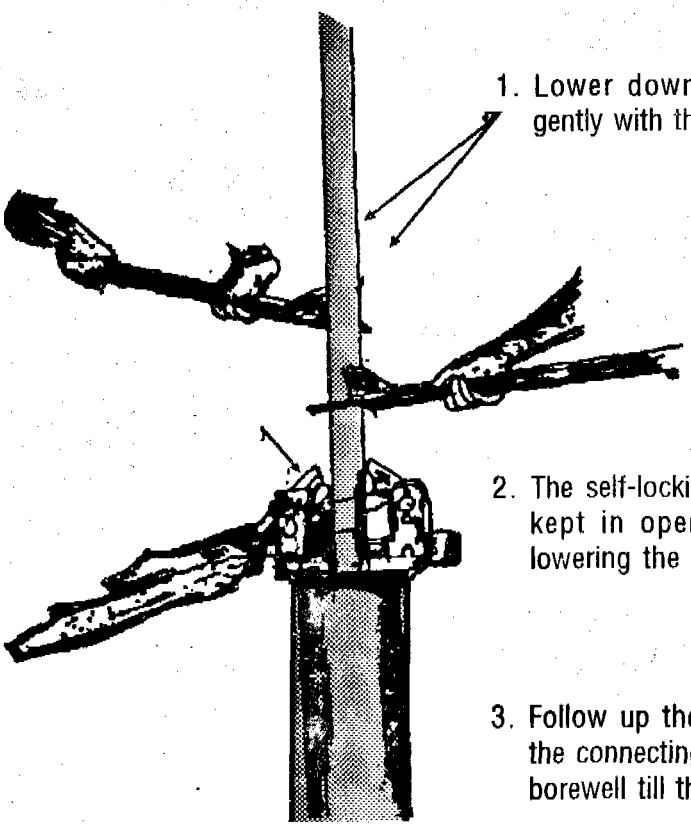


2. Tighten Pipes as shown

1. Lock the bottom pipe with self locking clamp by using lifting spanner and pipe wrench as shown.

3. Wipe off excess jointing compound otherwise it will spoil the water in the bore well.

Fig - 18.

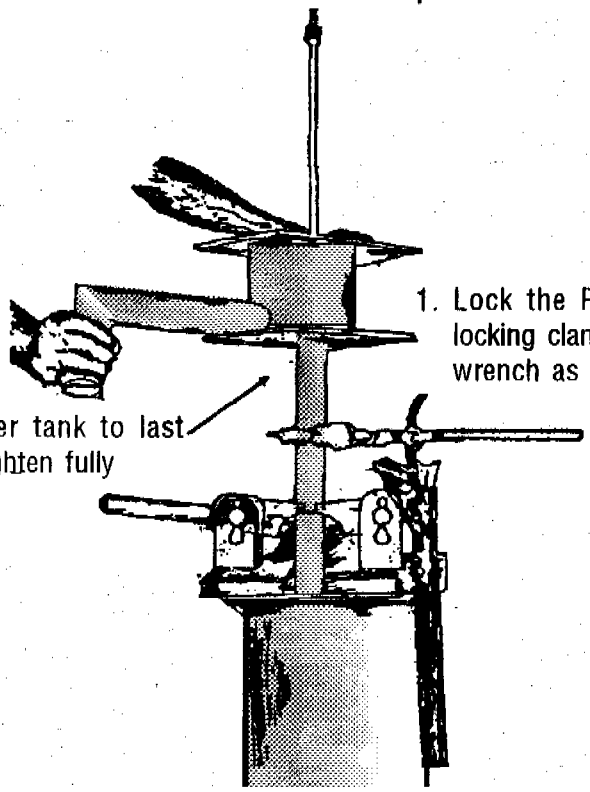


1. Lower down the raising main pipe gently with the help of lifting spanners.

2. The self-locking clamp jaws should be kept in open condition only while lowering the raising main as shown.

3. Follow up the same method as fixing the connecting rods and pipes into the borewell till the last pipe.

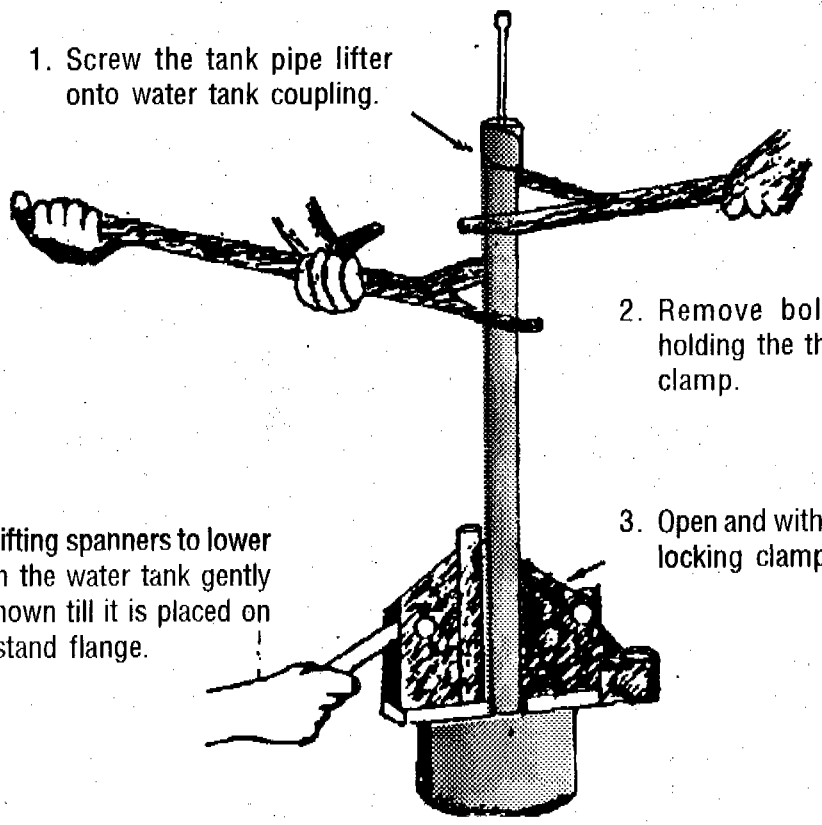
Fig - 19 Fix the Water Tank to the Last Pipe



1. Lock the Pipe with the help of self locking clamp, lifting spanner and pipe wrench as shown

2. Screw water tank to last pipe and tighten fully

Fig - 20.



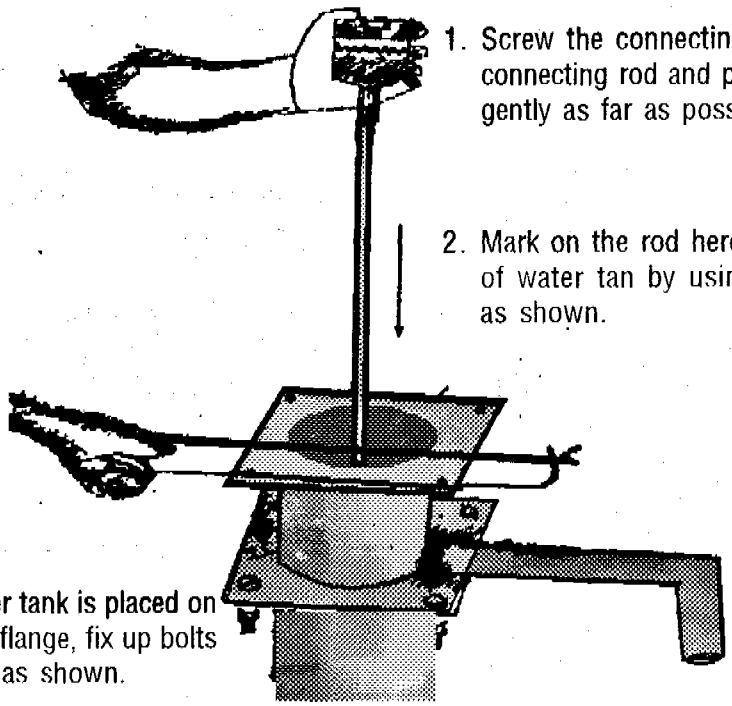
1. Screw the tank pipe lifter onto water tank coupling.

2. Remove bolts and nuts holding the the self-locking clamp.

3. Open and with draw the self-locking clamp as shown.

4. Use lifting spanners to lower down the water tank gently as shown till it is placed on the stand flange.

Fig - 21 Fix Water Tank on Pedestal Stand Assembly.



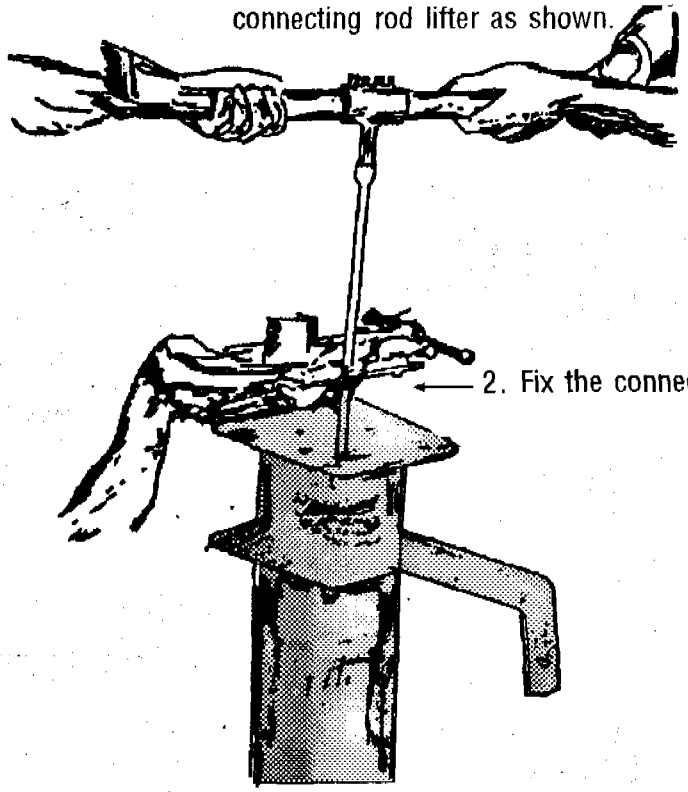
1. Screw the connecting rod lifter to the connecting rod and push the rod down gently as far as possible.

2. Mark on the rod here in level with top of water tan by using hacksaw blade as shown.

3. After water tank is placed on the stand flange, fix up bolts and nuts as shown.

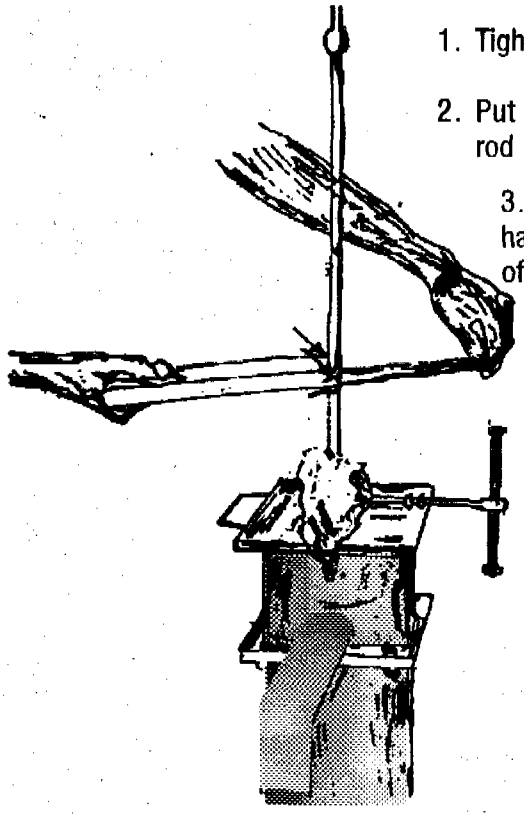
Fig - 22

1. Lift the rod a far as possible with the help of connecting rod lifter as shown.



2. Fix the connecting rod vice as shown.

Fig - 23 Set Piston Stroke Length

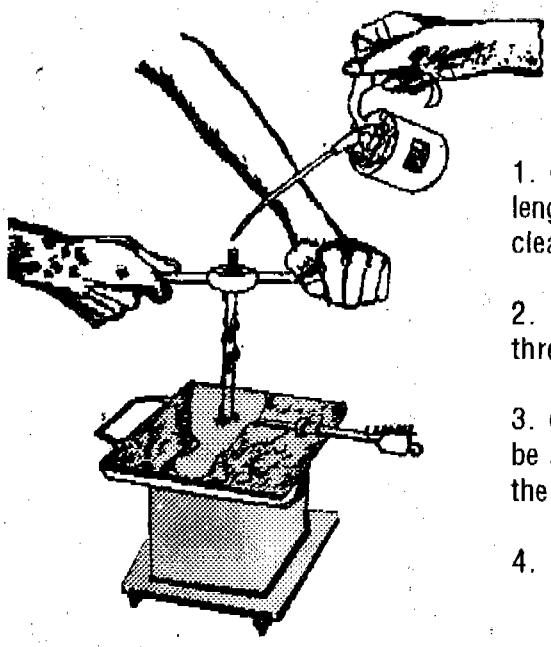


1. Tighten the connecting rod vice as shown.

2. Put a cloth arround the top of connecting rod vice so that cuttings do not fall in.

3. Cut the rod at the mark by using a hacksaw blade as shown and file the top of the rod.

Fig - 24 Cut Thread for Chain Connection.



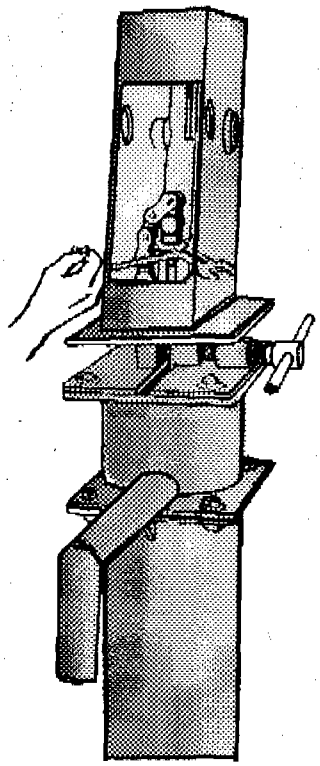
1. Cut thread on the rod for at least 45mm length. Ensure threads are properly made and clean.

2. Lubricate the rod with oil while cutting thread.

3. Check the thread with check nut. You must be able to screw the nut all the way down to the end.

4. Remove the cloth and clean the cuttings.

Fig - 25 Fix the Chain and Head Assembly

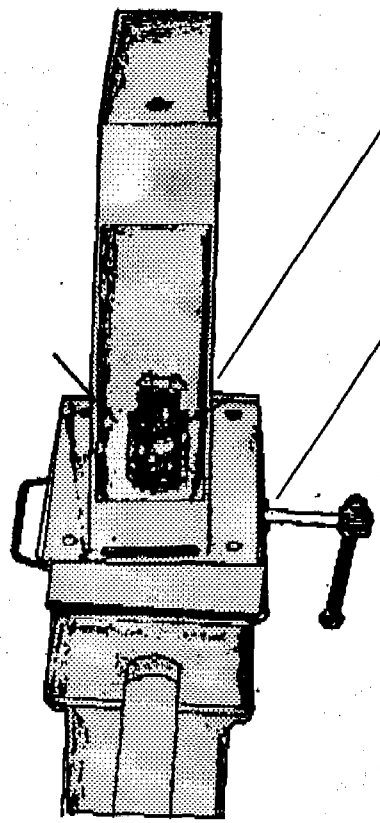


1. Insert the head assembly on to the rod through the guide bush and place the head on the rod vice.
2. Screw the check nut onto the rod till the end.
3. Screw the chain onto the rod by using double end spanners till the chain coupler gets tightened fully.

Note: To Fix the Chain and Head Assembly for the improved Model of IM-II Hand Pump

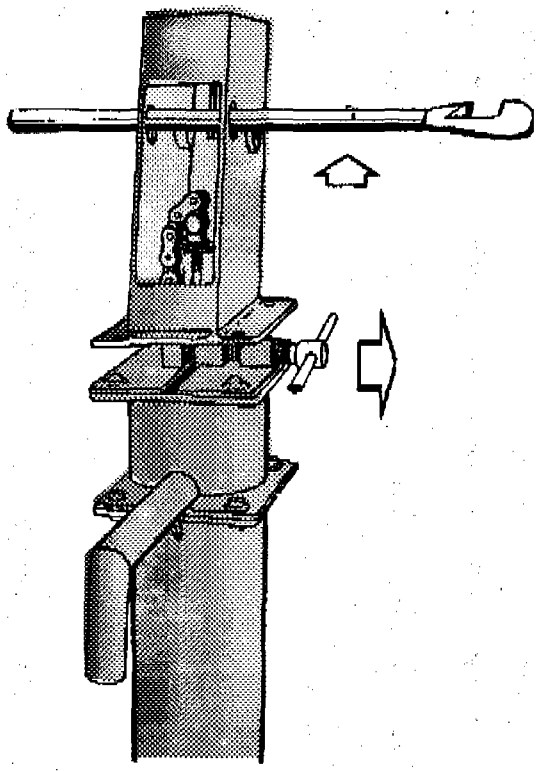
1. Insert the third plate onto the rod through the guide bush and place on the rod vice.
2. Screw the check nut onto the rod till the end.
3. Screw the chain onto the rod by using double end spanners till the chain coupler gets tightened.
4. Insert the head assembly onto the chain and rod place the head assembly on the third plate.

Fig - 26



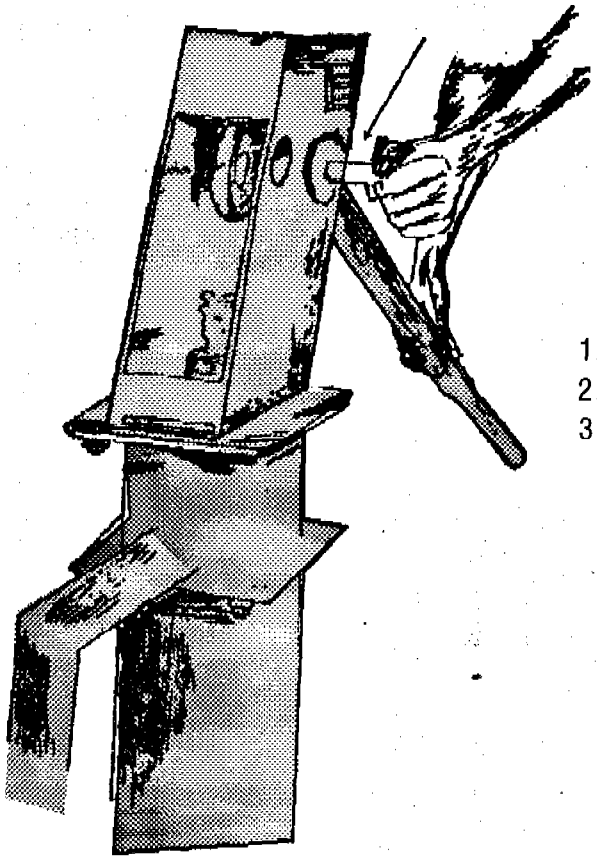
1. Insert the chain coupler-supporting tool.
2. Loosen the connecting rod vice and allow the connecting rod to go down till it sits on the chain coupler supporting tool as shown.

Fig - 27 Place the Head on the Water Tank



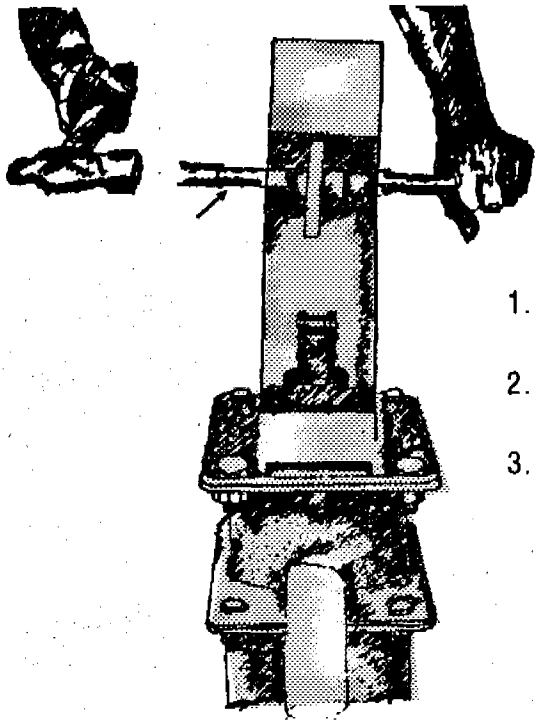
1. Insert lifting spanner as shown and lift the head gently.
2. Withdraw connecting rod vice.
3. Lower the head till it sits on the water tank
4. Fix the head assembly and water tank with bolts and nuts.

Fig - 28 Fix the Handle



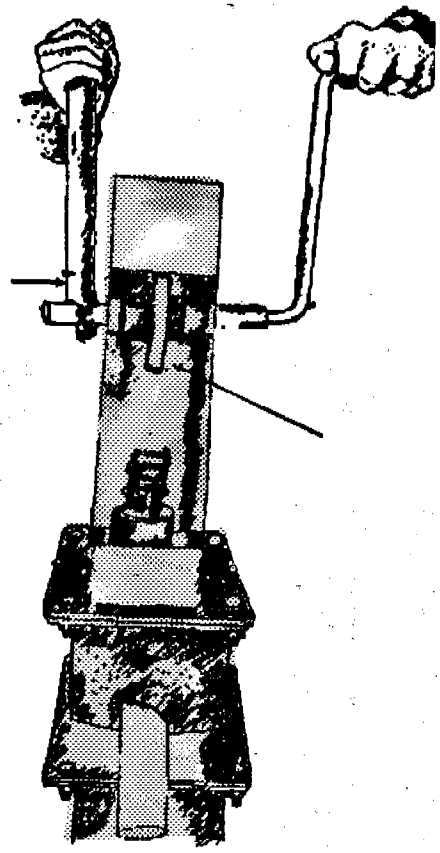
1. Tighten all bolts and nuts as shown
2. Insert handle assembly from front opening
3. Insert handle punch as shown

Fig - 29



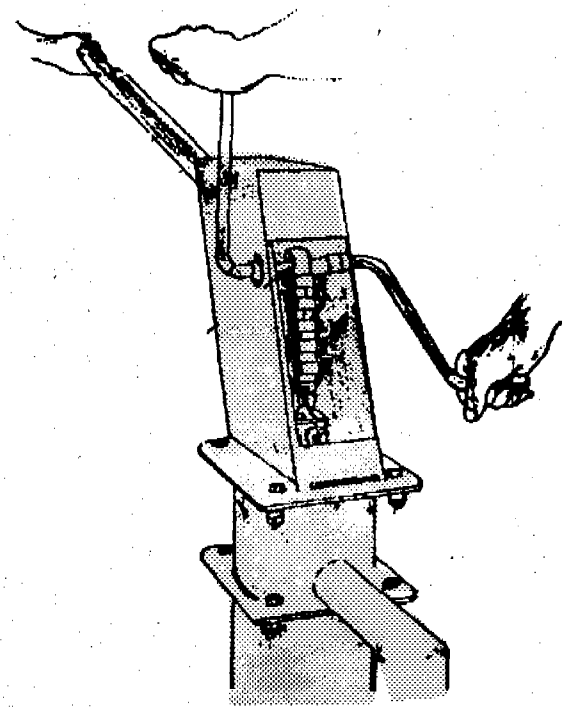
1. Insert handle axle as shown and tap it gently by using hammer as shown.
2. Drive the handle axle till the threaded portion comes out.
3. Remove handle axle punch.

Fig - 30



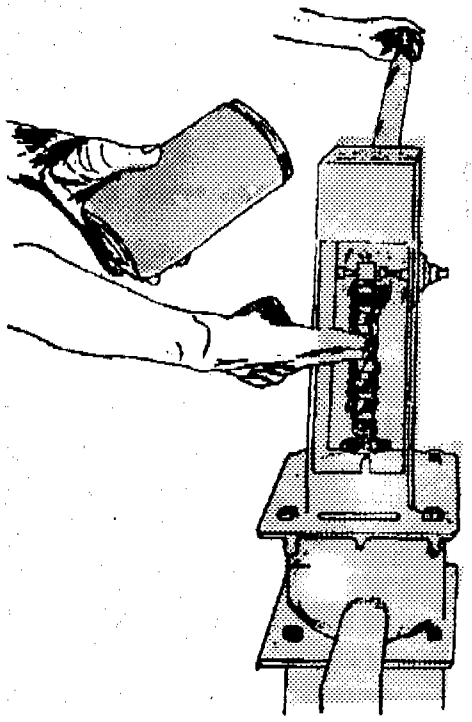
1. Hold the handle axle with the help of coupling spanner as shown
2. Insert 4 mm washers.
3. Tighten nuts by using crank spanner as shown.

Fig - 31 Connect the Chain with Handle



1. Lift the handle for fixing chain.
2. Lift the chain and insert high tensile bolt and washers.
3. Tighten the nylock nut with the help of crank spanners.

Fig - 32 Lubricate the Chain



1. Lower down handle and remove chain coupler supporting tool.
2. Tighten the check nut against the chain coupler.
3. Lift the handle up and apply *Graphite grease on chain as shown.

** If graphite grease is not available, use multipurpose grease.*

Now make sure that .....

© When you strike the handle up and down, the handle touches the top stop and bottom stop of bracket. If it does not, then remove head and check the setting of the top of the water tank and connecting rod. Refer Fig-21.

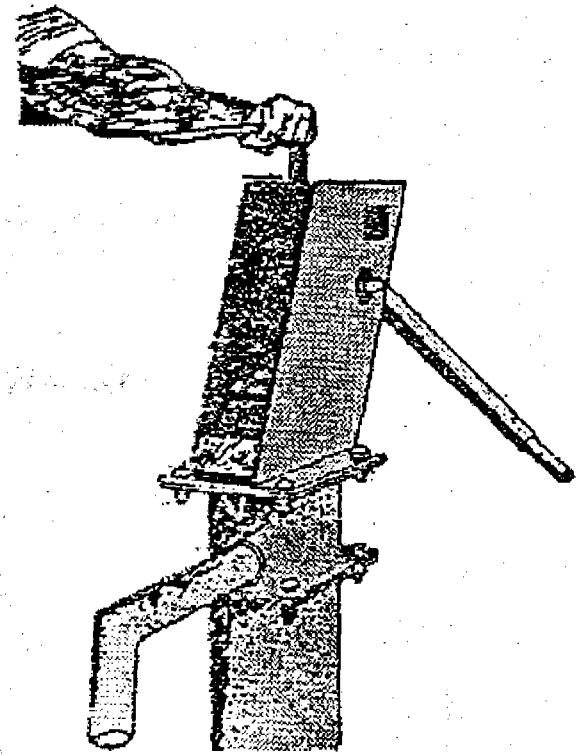
© Connecting rod moves up and down freely in guide bush. If it does not, then the rod must have got bent while threading.

© You have threaded chain coupling fully onto connecting rod and you have tightened the lock nut fully.

© You have tightened axle nut and lick nut fully and the handle is firmly retained.

© All the flange bolts and nuts are tight and you also have to tighten the lock nuts fully

© You have left nothing inside the head assembly.



1. Fix inspection cover.

2. Tighten cover bolt fully by using crank spanner.

- ❑ Operate the pump one hundred times to get clean water.
- ❑ Check the water. Is it free from oil, jointing compound, and dirt? If water is not clean pump hundred times again.

Final Check List

Before you leave, have you.....

- ❖ Explained to the villages about the importance of the hand pump for their better health?
- ❖ Purged the bore well?
- ❖ Checked the quality and taste of the water?
- ❖ Explained to the villagers that the water from hand pump may taste different or strange? You must explain that they should still drink it, because this water is safe and pure. Soon after they will get accustomed to the new taste of water.
- ❖ Given the villagers the address of your office, so that they can inform you if the hand pump breaks down?
- ❖ Made a note of any problems with the bore well hand pump, so that they can report them to the WASAN committee and or Panchayat Union or Block Engineer.

1.11 INSTRUCTION FOR HAND PUMP OPERATION AND MAINTENANCE.

1.11.1. Operation of the India Mark II Hand Pump

- Stand at the back of the hand pump
- Hold the handle of the hand pump
- Strike the handle gently and slowly up and down
- A stroke should not be acute, and
- The handle should be struck without knocking the handle bracket of the head assembly.

1.11.2 Maintenance of the India Mark - II Hand Pump

Hand pumps are to be considered as a community property. A hand pump will be durable and long lasting if it is properly used and maintained by each and every person in the community. Hence, a general awareness and knowledge of hand pump shall be given to the whole community. The community should follow the following instructions.

- While striking the hand pump's handle up and down properly, a good flow of water should come out within 4 to 5 strokes.
- A minimum of 12 litres of water shall be pumped out for every 40 strokes.
- If the flow of the water is slow and the quantity is less, this shows the improper functioning of the hand pump.
- Check and ensure the fitting of bolts, nuts and handle axle of the hand pump.
- Check if the pedestal is firm or shaking during operation.
- Regular application of grease to the chain and axle in the head assembly.
- Remove and clean the dust logged in the head assembly.

Things needed to be done once in 30 days

- Tighten the axle bolt and nut.
- Check the flange bolts and nuts if dismounted or escaped.
- Open the inspection cover and clean the head assembly
- Check and tighten the chain and anchor bolt.
- Clean the chain joints and apply graphite grease.
- Check if any part is rusted. If there is any, paint the rusted part after cleaning of the rust with a brush and emery paper.
- Check the pedestal has any shake and the platform is broken.
- While striking the hand pump's handle up and down properly, a good flow of water should come out within 4 to 5 strokes.
- A minimum of 12 litres of water shall be pumped out for every 40 strokes.

Things needed to be done once in a year

a. Check and ensure

- Proper discharge of water
- Shaking of handle and pedestal
- Depreciation of axle bolt and nut
- Change the worn out bolts and nuts
- Depreciation of chain
- Depreciation of roller chain guide

b. Dismantle the pump and check

- Replace the chain, bearing and spacer if found worn out
- If the roller chain guide is found worn out, replace the chain
- Replace any pipe that is not in good condition
- Open the cylinder and check cup washers, ceiling rings and other parts. If not in good condition replace it.
- Check the condition of water tank and raiser pipe holder. If the threads are worn out change the water tank.
- Check and ensure any part of the hand pump with breakage or any other problem. If any part is found extremely damaged, replace it with a new part.
- Check the pedestal has any shake and the platform is broken. If it is, construct a new platform.
- Reassemble the hand pump as mentioned in this book

Clean and wash the hand pump if it is painted with aluminium paint. Do not rub any of such parts inside with emery paper. After cleaning and rubbing the hand pump, Paint the outside and inside of the head assembly.

1.12. CHLORINATING OF BORE WELL

Some times the bore wells are contaminated due to various reasons as follows.

- During service and repairs of hand pumps
- Dismounting of hand pumps and taking out of pipes
- Flooding and other natural disasters
- Dilapidated condition of the platform

During the above said periods, the bore well water is prone to contamination of pathogenic agents. Hence, it is necessary to inactivate and kill the pathogens in the bore well water. Chlorine (bleaching powder) is one of the agents used for killing such pathogens without any harm to human body.

1.12.1 Chlorinating Method of a Bore Well

1. Mix 300 grams of bleaching powder i a bucket full of water.
2. Dismantle and lift the water tank with head assembly and pour the bleaching powder. -water mixture into the bore well.
3. Assemble the water tank and fix the bolts and nuts
4. Do not use the hand pump minimum for 6 hours.

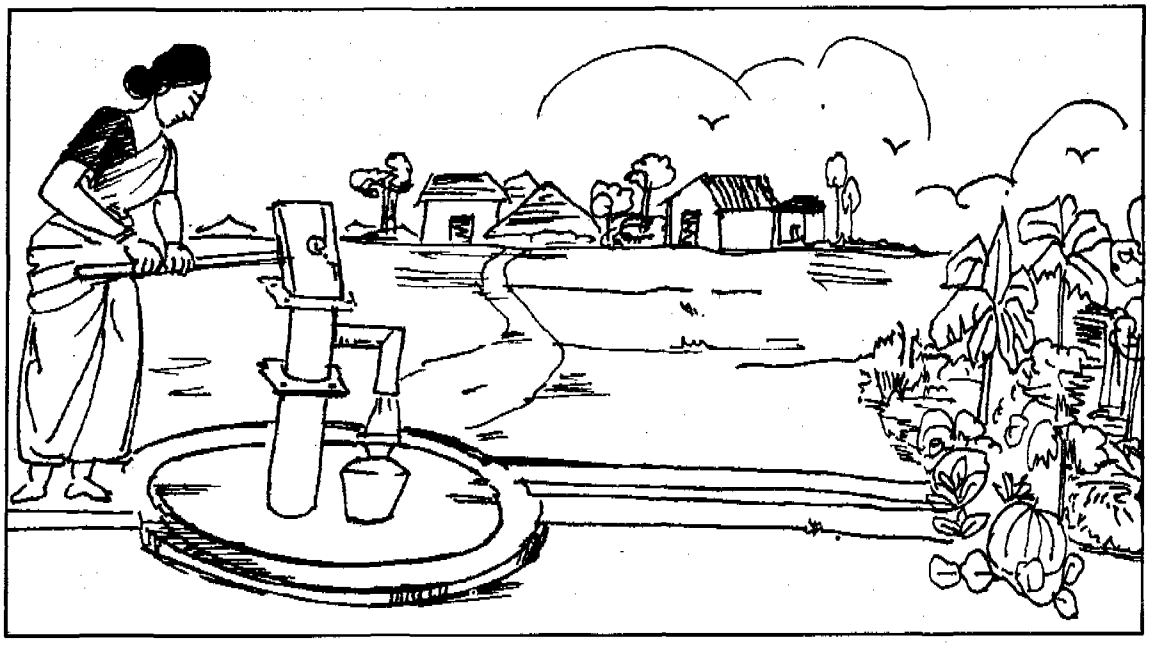
1.13 SOAK PIT CONSTRUCTION AND RAISING OF KITCHEN GARDEN

i. Do not stagnate the wastewater at the hand pump site.

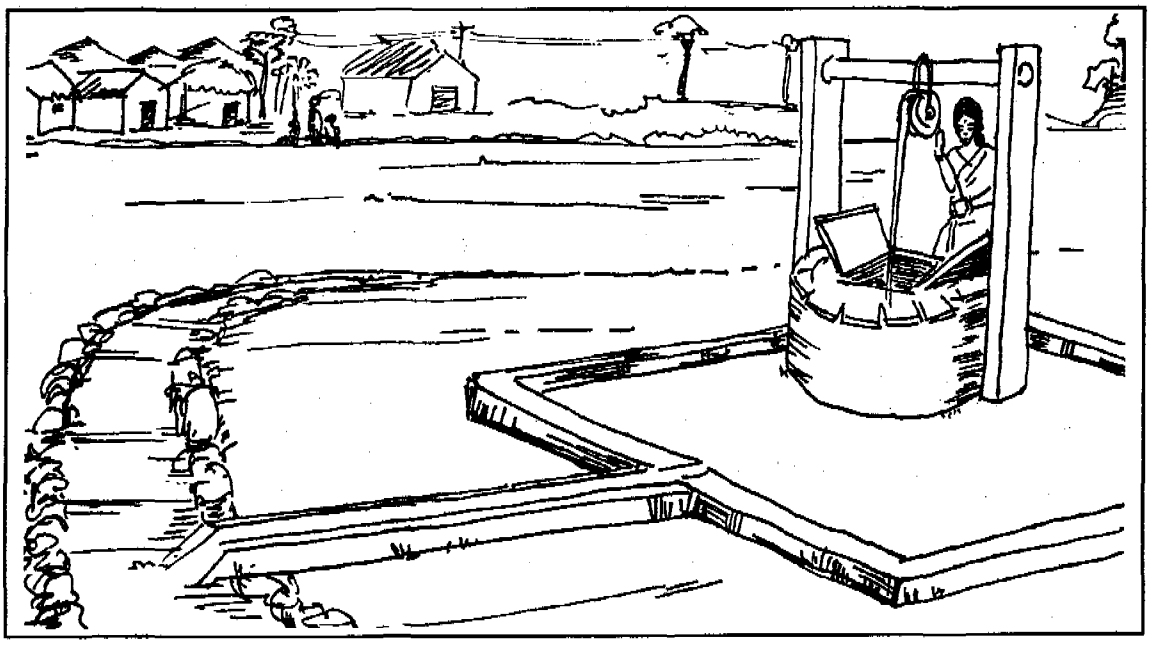
ii. To keep the hand pump area clean and to dispose wastewater, plant tree saplings and raise a kitchen garden. Banana or Plantain is more suitable to utilise more wastewater.

iii. If no space is found for raising a kitchen garden, construct a soak pit as shown in the figure.

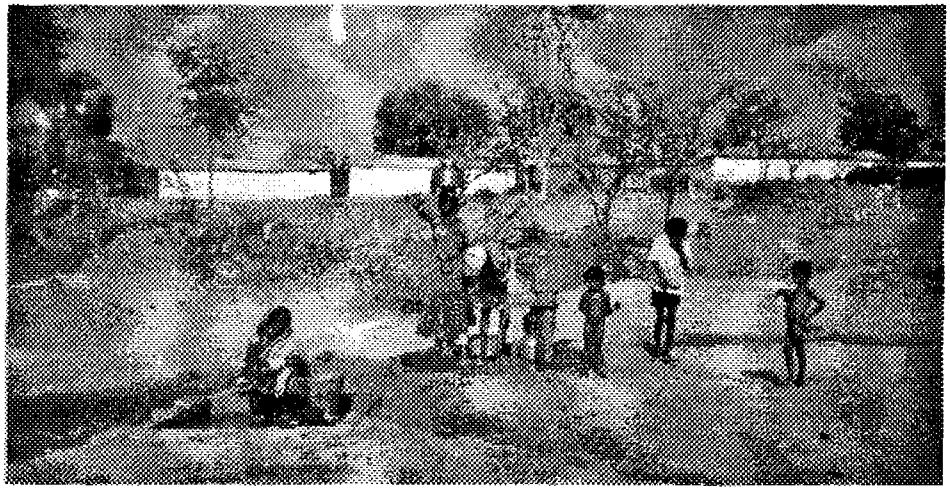
Utilisation of Waste Water



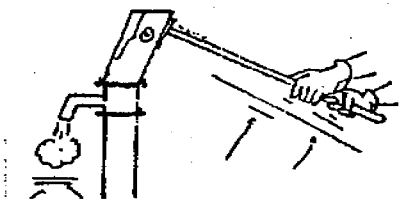
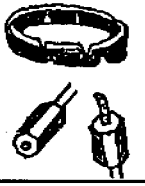
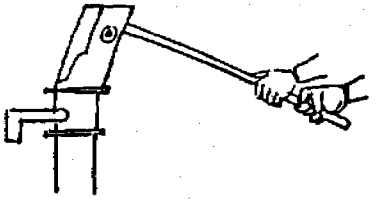
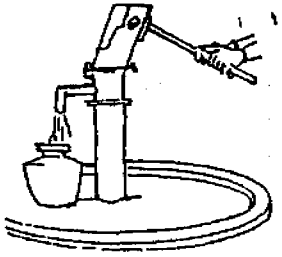
Drain out the Waster water into the Soak Pit or Kitchen Garden

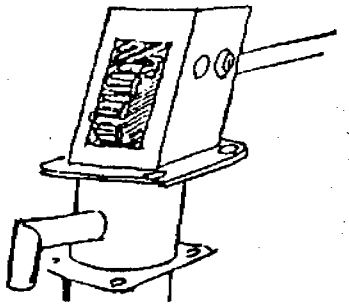
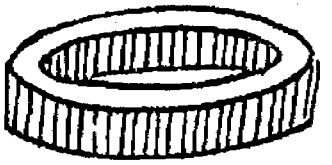
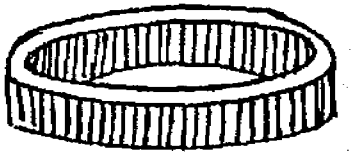
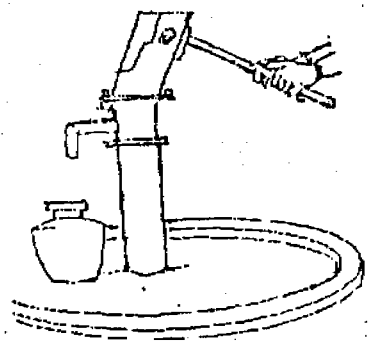
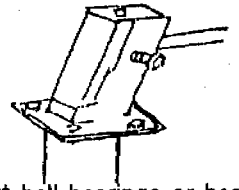
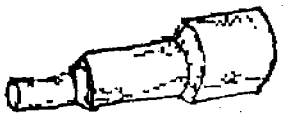
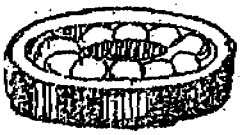
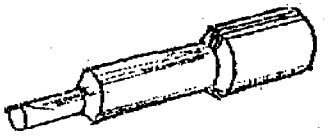


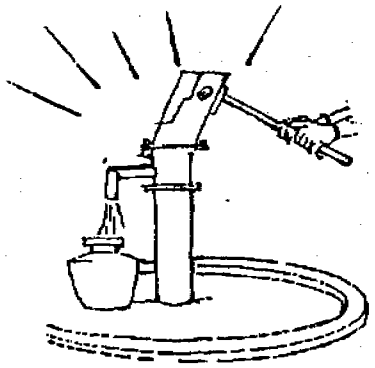
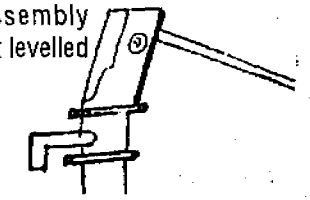
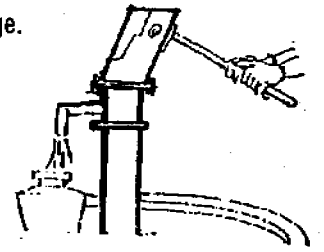
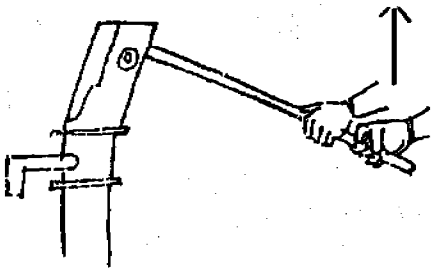
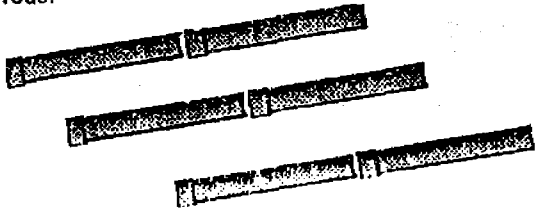
USE WASHING PLATFORM FOR BATHING AND WASHING CLOTHES INSTEAD OF HAND PUMP PLATFORM



1.14. Hand Pump Service and Maintenance

TROUBLE	CAUSES	REMEDY
1. Handle easy to operate, Handle rests at bottom position, No water discharge 	a. Connecting rods got disconnected or the chain got disconnected from the first connecting rod. b. Cylinder got disconnected and fallen inside the bore well (happnes rarely) or the cylinder got cracked. c. Bucket wahers or the valve seats worn out. 	a. Pull out the rising main assembly and reassemble the connecting rod wherever necessary. b. Relpace cylinder assembly. c. Overhaul the cylinder and replace the valve seats and bucketwashers. 
2. No water discharge, handle rests at the top position, Handle is hard to operate. 	Riser main pipes got disconnected. 	Pull out the raising main assembly and reassemble properly. 
3. Delayed or slow or less water discharge. 	a. Damaged rising main joints or loose or perforations in riser pipe. b. Leakage in cylinder check valve or lower valve. c. Bucket washer worn out. 	a. Replace the damaged pipes. b. Overhaul cylinder and replace rubber seats. c. Overhaul cylinder and replace bucketwashers. 

TROUBLE	CAUSES	REMEDY
4. Handle hard to operate and water discharge in less or sporadic.	Leather bucket wahsers bulged.	Replace the leather bucket washers.
5. Folding of chain during return stroke. 	a. Improper erection. b. Leather bucket washers bulged or jammed inside the cylinder. 	a. Adjust the length of last connecting rod. b. Overhaul the cylinder and replace leather bucket washers. 
6. Shaking of pump handle. 	a. Loose handle axle nuts.  b. Worn out ball bearings or bearings loose in the bearing housing.  c. Damaged spacer or short in length. 	a. Tighten handle axle nuts.  b. Replace ball bearings or Replace the handle assembly.  c. Replace spacer. 

TROUBLE	CAUSES	REMEDY
7. Noisy during operation. 	a Stand assembly flange not levelled properly.  b. Bend connecting rod.  c. Hexagonal coupler welded offset. 	a. Level the flange.  b. Change the defective rod.  c. Change the defective rod. 
8. Handle gets kicked back. 	Water level gone below and cylinder in sucking air. 	Pull out rising main pipes assembly. Deeper the bore well for the required water level depth and add sufficient rising main pipes and connecting rods. 

1.15 HAND PUMP SPARES BANK

If we take an account in a Panchayat Union around 350 to the maximum of 600 hand pumps have been installed and maintained to solve the water problem in the villages. Besides, in much number of villages rural drinking water supply system is functioning by the use of river water or over head tank with deep bore well pumps.

Proper maintenance of all the above rural drinking water supply systems of public assets is not an easy work. Even though the Government carries out maintenance works, 100% perfect maintenance of all hand pumps at a time is only possible by having the complete co-operation of the Government functionaries and the people.

From the above one can realise lack of people participation, carelessness on public assets, improper and delayed system of functionaries of the Government, non availability of spare parts, financial constraints, etc., are the route causes for damaging and absurdly using of these kind of public assets.

If we take any one of the panchayat unions in the country, there would be 40 to 75 numbers of hand pumps left damaged and left without maintenance. Moreover many number of hand pumps are found as fossils under the earth. Hence, materials worth for lakhs of rupees were left as waste and useless.

To over come and solve all the above problems, each and every village should be self sufficient and capable of accessing facilities by their own through its Local Self Government and take care and maintenance of public assets without expecting and commenting Government functionaries. If we work in this way of approach, we can make use of our water sources as more productive and sustainable public assets.

Hence, to make a long term and sustainable care and maintenance of hand pumps based on the community's responsibility, we can organise and set up a Hand Pump Spares Bank in our villages. This bank can be set up with the objectives, guidance and consideration of the WASAN Committee for

- providing quality spares at proper cost
- availing spares at the local/village area itself
- facilitating the repair and service works by providing tools.

With this facility, a WASAN Committee shall undertake immediate repair and service of hand pumps by getting the spare parts from the spares bank and do the work with the help of trained hand pump care takers. The required tools shall also be used for doing the repairs and service works. The fund raised from the beneficiaries for the spares bank under this WaterAid Scheme can be used, as the revolving fund for purchasing further spares required. Necessary documents, registers, ledgers, spare parts and price list, stock register, hand pump service register for villages, replaced parts, etc., shall also be maintained by the spares bank.

The following are the required IM-II Hand Pump spare parts shall be procured and used by the WASAN Committee for two years normal operation.

RECOMMENDED SPARES FOR AN INDIA MARK - II HAN) PUMP FOR TWO YEARS NORMAL OPERATION

Sl.No.	Items	Quantity in No.
	Spares for Pump-Head:	
1.	Hexagonal bolts M12*1.75* 40 mm long	8
2.	Hexagonal nuts M 12*1.75 mm	18
3.	Washers M12	10
4.	High tensile bolt M 10*1.58 40 mm long	1
5.	Nyloc nut M 10 *1.5*40mm	2
6.	Handle axle (stainless steel)	1
7.	Washer (4mm thick) for handle axle	1
8.	Bearing (No. 6204 Z)	2
9.	Spacer	1
10.	Chain with coupling	1
11.	Bolt for front cover M 12*1.75*20 mm long	1
	Spares for cylinder:	
1.	Leather cup washers	4
2.	Leather sealing rings	6
3.	Rubber seating (big)	1
4.	Rubber seating (small)	1
	Spares for GI Raiser Pipe:	
1.	Hexagonal coupling M 12*1.75*50mm	2
2.	Pipe sockets for 32mm N.B. Medium grade GI pipes	4

1.16 RECOMMENDED PRICE FOR INDIA MARK - II DEEP BORE WELL HAND PUMP SPARES

Sl.No.	Details of Spares	Price
01.	India Mark - II Hand pump with 10 Nos. of connecting rods	2200-00
02.	Hexagonal bolt M 12*1.75*40 mm long	2-50
03.	Hexagonal nut M 12 *1.75 mm	1-50
04.	GI Pipe 1.25"*3 metre length.	375-00
05.	GI Coupling 1.25"	35-00
06.	Hand pump head assembly with handle	1385-00
07.	Head assembly with inspection cover	625-00
08.	Inspection cover	90-00
09.	Handle	75-00
10.	Handle axle	95-00
11.	Ball Bearing	95-00
12.	Chain with coupling	90-00
13.	Water tank	200-00
14.	Hand pump -pedestal stand	925-00
15.	Connecting rod 12 mm diameter*3 metre length	92-00
16.	Cylinder set (inside brass coating)	825-00
17.	Cylinder set without reducer caps	85-00
18.	Reducer cap	52-00
19.	Upper valve assembly	300-00
20.	Lower valve assembly	300-00
21.	Follower	66-00
22.	Upper valve guide set	50-00
23.	Plunger yoke body	50-00
24.	Check valve guide	42-00
25.	Check valve seat	60-00
26.	Rubber seat retainer	25-00
27.	Pump bucket washer	28-00
28.	Sealing ring	30-00
29.	Rubber seating (big size)	5-00
30.	Plunger rod	185-00

1.17 WATER AND SANITATION (WASAN) COMMITTEE

Aim

The prime aim of the WASAN Committee is to develop a sustainable sanitary environmental condition in the villages and to improve the health and standard of living of people with free from diseases in all the villages. The following are the objectives to facilitate and to achieve the aim of the WASAN committee.

Objective

1. To organise all the people of the village and to make them as members of the WASAN Committee
2. To impart all the members with their family and children to follow good hygiene behaviours and practices for keeping of their healthy life.
3. To make all the members keep sanitation in their houses and surroundings.
4. To execute the development of village sanitation.
5. To keep the village people as the protectors from damaging and polluting the water sources.

Assurance of village people

The public assets given by Water Aid - NGO Organisation or by the Government will be properly maintained. We shall participate in all the training programmes for undertaking all the above said development works and we also assure that we will provide our fullest co-operation for all water and sanitation development programmes in our village.

We, all the undersigned village people have organised and set up a WASAN Committee in association with the NGO under the WaterAid programme.

Regulations

1. Make a person as a member of the WASAN Committee from each and every family in the village.
2. Each member shall remit a membership fee of Rs.2/-to the committee.
3. The membership fee collected from members shall be deposited in a joint account of the president and secretary.
4. The collected membership fee shall be considered as the community welfare fund and it shall only be used for village water, health and sanitation programmes.
5. Each and every member should participate regularly in all the monthly meetings of WASAN Committee
6. All the members should participate in all the activities of WASAN Committee and shall co-operate for executing the water and sanitation programmes.

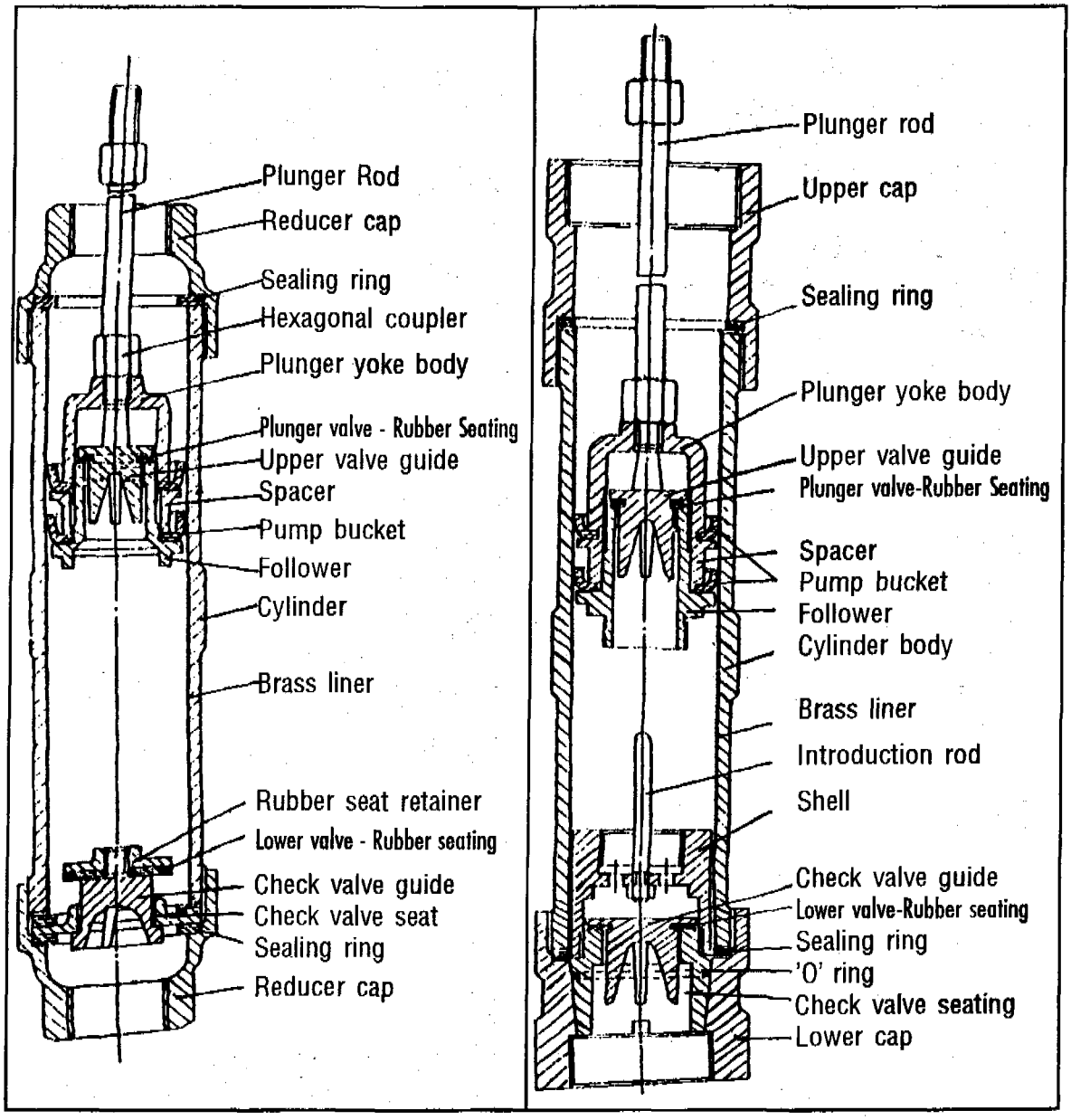
Programme Activities

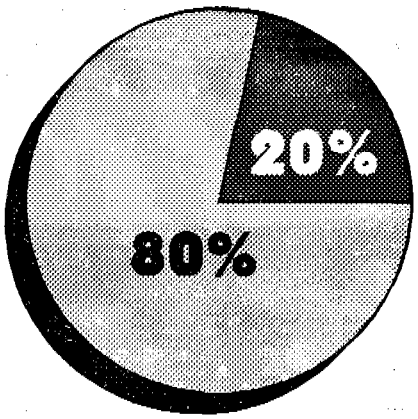
1. Expansion of health and sanitation programme activities to all the people in the village through WASAN Committee members.
2. Selection and participation of village level representatives in all the hygiene education training and orientation programmes.
3. Educating all members to keep best hygiene behaviours and practices for their better health.
4. Motivation of all members to construct soak pits, to raise kitchen gardens, to construct low cost latrines, to construct bio-gas plant, to construct compost pits, to use smokeless chulhas, etc.
5. Creation of interest and integrity in each and every member to take care of village sanitation and to develop a sustainable hygienic village environment.

TECHNOLOGY DIFERENCE BETWEEN INDIA MARK - II AND INIDA MARK - III HAND PUMPS CYLINDERS

Our Indian Government has developed a new IM- III hand pump which can be which can be easily operated by women. It is also too conducive for easy rectification of problems, and for doing repairs and service by women

INDIA MARK - II **INDIA MARK - III**

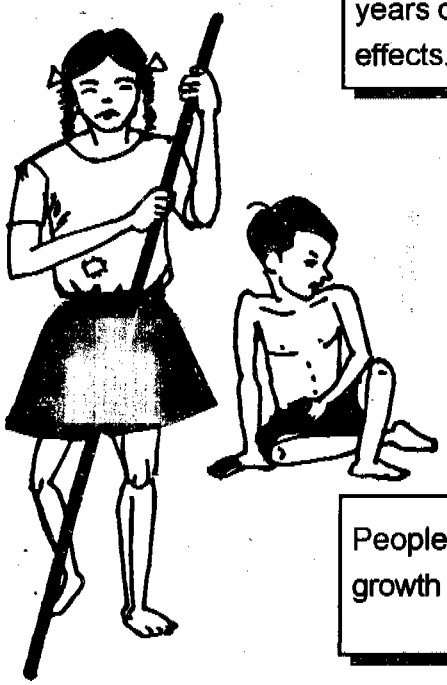




Do you know?

80% of diseases are caused by unsafe and impure water, and unhygienic conditions. Children are particularly affected by those diseases.

Every year in India the child mortality rate below 5 years old is 1.5 million due to diarrhoea and its ill effects.



People are affected with their physical and mental growth due to consumption of unsafe impure water.

PART - 2

Health - Water and Sanitation Related Diseases and Preventive Measures

2.1. INTRODUCTION TO HEALTH AND TRANSMISSION OF DISEASES

Prevention First, Treatment Next...

In India 80% of diseases particularly childhood illness is caused by consumption of impure water and unhygienic living conditions. While we are thinking of diseases we must understand the causes of diseases and follow the preventive measures. Generally when a person goes to a doctor for treatment he says, I am suffering from diarrhoea!, Doctor simply prescribes medicines or gives tablets to intake. These medicines cure diarrhoea at once but revives after few days to the same person or to the next person at home. Neither the patient nor the doctor never thinks of or finds the causes for diarrhoea. Many doctors never find the causes and ill effects of diseases due to their lack of time to treat number of patients. In cities or towns too, well educated people do not find the route cause of diseases. In villages the illiterate people never ask anything to the doctor because of no interest or fear. This has been seen everywhere.

In this situation, How to live a healthy life?... and

How to live free from diseases?...

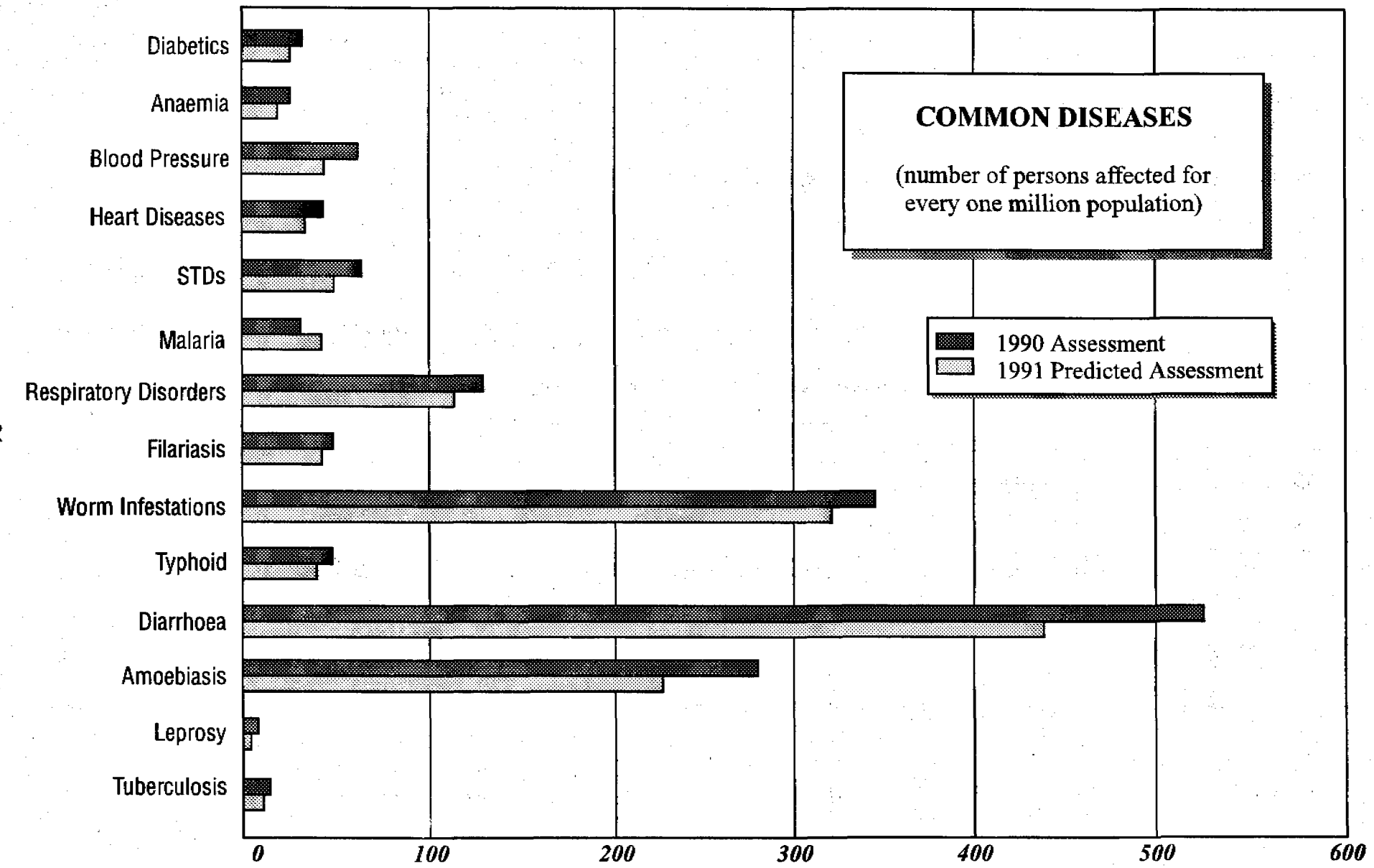
To find answers for all these questions, first we must know and understand what are all the good hygiene behaviours and practices have to be followed in every one's day today life. Consumption of pure and safe water, clean air, nutritious food, and practice of good sleep, physical exercises and good hygiene behaviours will lead to a healthy living.

A human inner body and organs can be said as internal environment and the external environment are soil, air, water, sunlight, vegetation, micro organisms, birds, animals and other human beings. The disease causing agents such as micro organisms and other impurities are transmitted in a vicious cycle as from the external environment to the internal environment and from the internal environment to the external environment...

To prevent and break this vicious disease cycle, the following measures will be useful for a person affected by a disease.

1. What is the cause for the disease?
2. Why the disease affects a human?
3. What is the basic and case history of the disease?
4. What are the symptoms of the disease?
5. How to cure the disease?
6. How to protect oneself from the disease?
7. How to live free from disease?
8. What are all the good hygiene behaviours and practices to prevent a disease?

If we keep all the above said measures in our mind we can protect ourselves from many diseases. The following bar diagram depicts the number of persons affected by common diseases for every one million population in India.


COMMON DISEASES
(number of persons affected for every one million population)
1990 Assessment
1991 Predicted Assessment
Diabetics
Anaemia
Blood Pressure
Heart Diseases
STDs
Malaria
Respiratory Disorders
Filariasis
Worm Infestations
Typhoid
Diarrhoea
Amoebiasis
Leprosy
Tuberculosis
0
100
200
300
400
500
600

DISEASES CAUSED BY CONTAMINATED AND IMPURE WATER

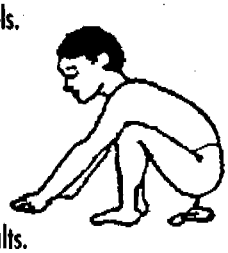
DIARRHOEA

Frequent passing of watery stools.

Thirsty, dry tongue and mouth.

Tiredness and sunken eyes.

Dehydration and lose of vital salts.



GASTROENTERITIS

Patient loses appetite; gets cough with fever.

Vomiting and loose motion; dehydration.

Temperature rises and goes up to

hyperpyrexia,

Peripheral failure and convulsions.

JAUNDICE / HEPATITIS - A

Absence of hungry.

Yellowish eyes, urine and nails.

Drowsy and tiredness.

POLIO

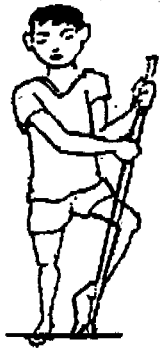
Short term fever.

Pain in hands and legs.

Defunct of limbs.

Paralysis or permanent handicap.

Affects brain.



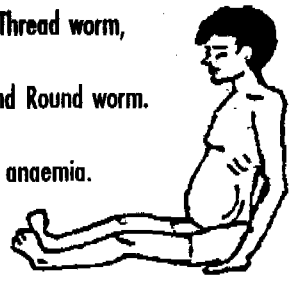
INTESTINAL WORMS

Tape worm, Hook worm, Thread worm,

Pin worm, Whip worm, and Round worm.

Causes stomach pain and anaemia.

Affects children's health.



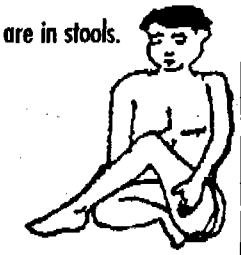
DYSENTERY

Patient has diarrhoea, fever and tenuousness.

In severe cases blood and mucus are in stools.

Tongue becomes dry and coated.

Very serious due to toxaemia.



TYPHOID

Fever with headache.

Tiredness and sunken.

Stomach pain and diarrhoea.

CHOLERA

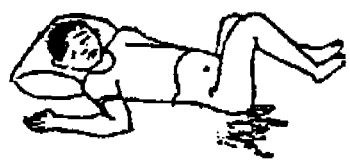
Passing of watery stools as pale yellow rice water with

Bad smell.

Lose of body strength and tiredness.

Severe dehydration.

Leads to death.



2.2. DISEASE TRANSMISSION THROUGH WATER

Water is the basic component of all living cells. All the living beings possess water in its body and it is the prime factor for all the chemical process in the body. Water composes 70% of the human body. Use of contaminated impure and unprotected water causes many diseases to humans such as diarrhoea, dysentery, cholera, jaundice, polio, typhoid, hepatitis-A, gastro-enteritis, intestine worms, etc., are some of the important diseases. Stagnant water is a breeding place for mosquitoes and cause malaria, filaria, japanese encephalitis, dengue fever, etc.

2.3. DISEASE TRANSMISSION THROUGH FAECES

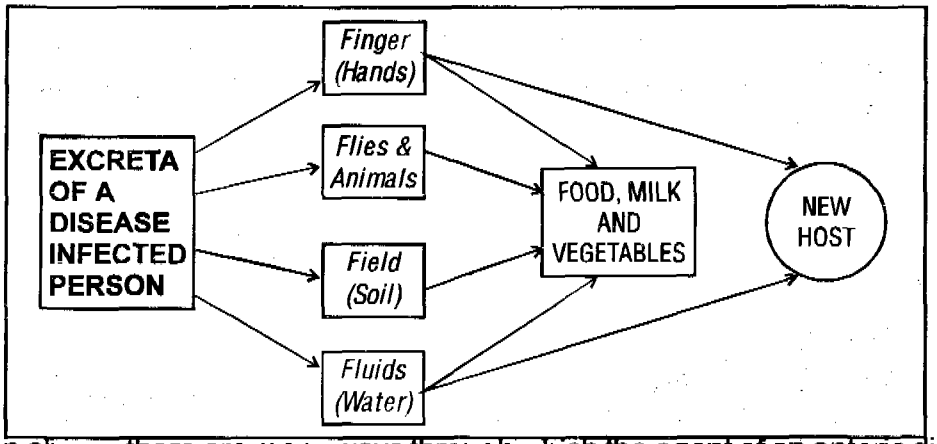
Man is the reservoir of most diseases and since human excreta is the source of many life threatening diseases. All these diseases are controllable through good sanitation practices especially through safe and sanitary disposal of human excreta. Faeces related diseases are carried from one person to another by a variety of routes as follows:

2.3.1. 'F' Diagram: Faecal - Oral Route of Disease Transmission

The health hazards of improper human excreta disposal are contamination of soil, water, food and propagation of flies. The excreta of a diseased person is the main source of infection. It contains the disease causing agents which are transmitted to a new host through various routes such as:

1. Fingers
2. Flies and Pet Animals
3. Fluids (water)
4. Field (soil)

The infection to new hosts happens through various chain reaction of the faecal - borne disease cycle as follows.



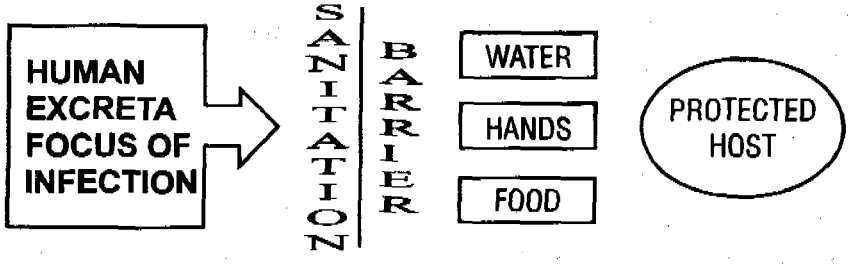
As seen above, there are many ways through which the agent of an enteric disease reaches a new host. Different ways of transmission may assume various degrees of importance, what is most probable is a combination of all, and the health workers must assume that this is the case and guard against all modes of transmission.

2.3.2. Stopping the Transmission of Faecal Borne Diseases by Means of Sanitation

The disease cycle of faecal borne diseases shall be broken at various levels:

- ➜ Safe disposal of faeces
- ➜ Protection of water sources
- ➜ Safe handling of water
- ➜ Food hygiene
- ➜ Personal hygiene
- ➜ Control of flies

Of these, the most effective step would be to segregate and proper disposal of faeces so that the disease causing agents cannot reach the new host directly or indirectly. The safe removal and disposal of faeces by imposing a barrier called the Sanitation Barrier which can simply be provided by a sanitary latrine. The main objective of sanitary disposal of human excreta is therefore to isolate faeces so that the infectious agents in them cannot possibly get into a new host.



2.4. COMMUNITY PARTICIPATION

A programme of rural sanitation, of which particularly sanitary disposal of human excreta is an essential one which cannot be successful without the participation of local community. Social scientists have listed the reasons why the villagers do not accept latrines. Some of the reasons found in the surveys are:

- Latrines are associated with bad smell.
- Latrines are something foul and dirty and hence one should not have them close to the house.
- Latrines are the breeding place of flies, mosquitoes and other insects.
- Latrines are costly and beyond their means to construct.
- They do not know the technology of low cost latrine construction.
- Their ignorance of how faecal borne diseases spread.

To be truly effective, environmental sanitation programme which is a basic function of every integrated health promoting activity which needs the understanding, the support, and the active participation of the community concerned. Mere technical improvement in the environmental condition and provision of sanitation facilities without proper hygiene education based on the local customs, traditions and beliefs - has again and again proved futile.

One measure of the success of a rural sanitation programme is its power to sustain itself and grow. In order to achieve this success, it is necessary to find the means and ways of gathering popular support and of overcoming popular objectives. In both, effective hygiene education to the community plays a vital role. This is the most difficult task on the evolution of a sanitary latrine construction scheme. Once it is successfully passed the programme will be effective and will move at a faster pace.

2.5. WATER AND SANITATION RELATED DISEASES

2.5.1. POLIO

Poliomyelitis is an acute viral infection caused by Polio Virus. It is primarily an infection of the human alimentary tract but the virus may infect the central nervous system in a very small percentage of cases, resulting in various degrees of paralysis and possibly death. The virus infects all children below 5 years old.

Causes

The causative agent is the polio virus which can survive for longer periods in the external environment. It can live in water for 4 months and in faeces for 6 months. It is therefore well adopted for faecal-oral route of transmission. The infection may spread directly through contaminated fingers, where hygiene is poor or indirectly through contaminated water, milk, foods, flies and the articles of daily use and droplets of the infected person.

Symptoms

1. Patient will be suffering from high fever, headache, pain all over the body and a cold feeling.
2. Restlessness and drowsiness.
3. Stiffness or rigidity of neck or spine and tightness of hamstring muscles is present.
4. Pre-paralytic stage as the limb seems to be loose and flake and inability to raise the arm and straighten the leg.
5. When muscles of larynx and pharynx are involved then it is always fatal.

Effects

Permanent muscular paralysis, atrophy of limbs and deformity of joints and various degrees of paralysis. Affects brain and leads to death (10 - 20)%.

Preventive Treatment

Immunisation is the sole effective means of preventing polio. It is essential to immunise all infants by 6 months of age to protect against polio by giving oral polio vaccine drops. Report the case to the health authorities at once. Give proper nursing care, observe the patient carefully and treat for signs and symptoms, and complications. Massaging is done for a long time to help weak muscles grow and become useful again. Use of sanitary latrines, and keeping of personal hygiene and environmental sanitation will prevent the incidence of polio infection.

2.5.2 CHOLERA

It is an acute, serious infectious diarrhoeal disease which is communicable for 7 to 14 days. From the affected places it spreads along the lines of communication and may reach to remote areas and causes widespread epidemics. Typical cases are characterised by the sudden onset of profuse, effortless, watery diarrhoea followed by vomiting, rapid dehydration, muscular cramps and suppression of urine.

Unless there is a rapid replacement of fluid and electrolytes, the case fatality may be as high as 30 to 40 percent. The organism that causes cholera is Vibrio Cholerae or Spirillum. It is prevalent in late summer and autumn; but usually fades away with the disappearance of the cold season. Polluted or contaminated water is the main reason for infection. The disease can be recognised by the following signs and symptoms.

1. The patient starts purging and has violent vomiting and cramps in the muscles.
2. Stools are loose, copious and watery which appear like rice water.

Patient rapidly develops dehydration and collapses. In this stage the patient shall be hospitalised at once for proper treatment. Necessary preventive measures shall be taken with immediate notification to the health authorities about the occurrence of the case or of a suspected case. Investigation is necessary to find out unreported cases., contacts and carriers of this disease. Also find out other sources of infection, such as contaminated water, food, milk, etc. and destroy them immediately. Follow preventive and control measures strictly, because it is a most dangerous disease.

2.5.3. TYPHOID

Typhoid fever occurs in all parts of the world where water supplies and sanitation are substandard. The term 'enteric fever' includes both typhoid and paratyphoid fevers are the result of systemic infection mainly by Salmonella Typhii found only in man. It is prevalent through out from July to October and during early fall of winter. It is transmitted by direct or indirect contact with the patient. This disease is mainly spreading through the contaminated water, milk, food, drinks, raw vegetables, flies, faeces and urine. The patient complains of severe frontal headaches and general weakness, constipation

and have nose bleeding, dry tongue and coated, at first red at tip and edges with a whitish fur. Slow fever starts, which goes on increasing by about one degree every day and within a few days the temperature may reach a maximum of 104° F to 105°F. Patient must get enough diet (soft, liquid nourishing and easily digestible) to prevent destruction of tissues. This disease lasts for longer period and if proper diet and treatment is not given to the patient, he will not have enough energy to pull on with his life.

2.5.4. JANUDICE OR HEPATITIS - A

Hepatitis literally means inflammation of the liver and it can have many causes. Hepatitis - A or epidemic jaundice (meaning going yellow) is an acute faecal-oral infectious disease caused by Hepatitis - A virus for which there is no specific treatment. The disease is heralded by non-specific symptoms such as fever, chills, headache, fatigue, general weakness and pains, followed by anorexia, nausea, vomiting, dark urine and jaundice. The illness lasts from six weeks up to several months but goes away and never recurs.

The best means of reducing the spread of infection is by promoting simple measures of personal and community hygiene, e.g. Hand washing with a cleaning agent before eating and after toilet; sanitary disposal of excreta which will prevent contamination of water, food, etc., keep finger nails cut short and clean. Young children's faeces are the most dangerous and the most likely to be a source of hepatitis for the rest of the family and community.

Ensure that drinking water is as clean as possible and is stored safely at home. Encourage building and use of sanitary latrines, otherwise encourage people to defecate far from residential areas and preferably bury faeces. If all these preventive and control measures are properly implemented, a substantial reduction of Hepatitis - A or Jaundice infection can be expected.

2.5.5. DRACUNCULIASIS OR GUINEA WORM

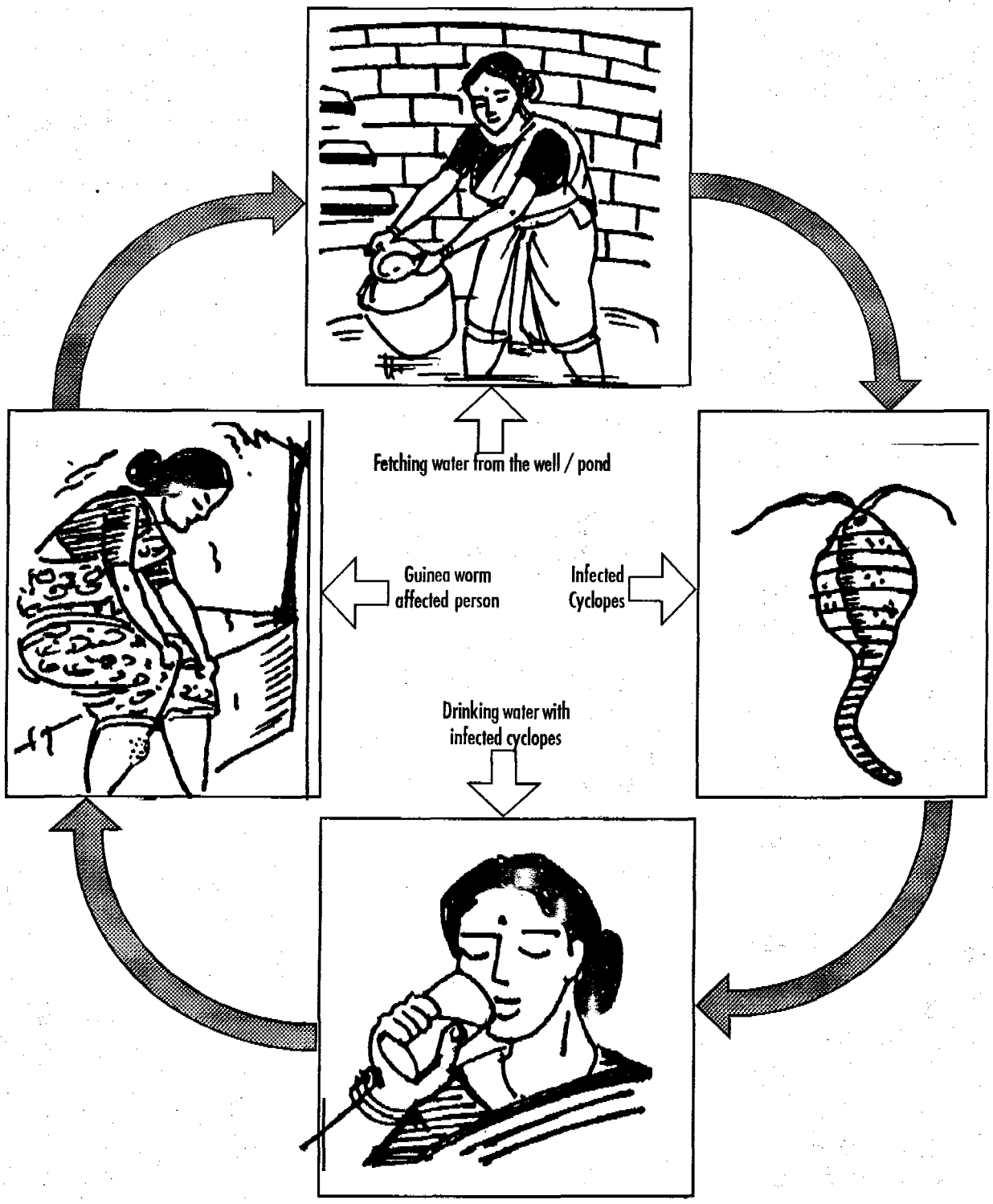
Guinea worm is a vector parasitic disease, mainly of the leg and foot tissues caused by the nematode parasite, Dracunculus medinensis. Its susceptibility is general and multiple, and repeated infections occur to the same person. Its local prevalence varies in some localities, very few inhabitants are infected and in others nearly all persons are affected.

The female worm generally lives in the subcutaneous tissues (usually leg and foot) of the affected man. It appears like thread and nearly the whole of the worm is occupied by uterus stuffed with embryos, i.e. (about 3 million embryos). At this site, it secrets in an irritant substance, which gives rise to a blister, then it breaks the uterus of the worm and it discharges a milky looking fluid, which contains myriad of embryos, when the leg has contact with water.

These larvae pass into the water, from where they are taken by minute cyclops. In these cyclops, they undergo larval development in about five weeks time. When a healthy person drinks water, which is contaminated with the infected cyclops, then he gets infected. When these cyclops reach the stomach, gastric juices kills them and sets free the larvae, which find their way in to the subcutaneous tissues, where they bury themselves. About a year is required for the worm to mature. Male worm dies after fertilisation, but the female worm continues the above cycle.

The disease is transmitted through the consumption of water containing cyclops harbouring the infective stages of the parasite

TRANSMISSION CYCLE OF GUINEA WO .M



2.5.6. MOSQUITO - BORNE INFECTIVE DISEASES

1. MALARIA (An Uncontrolled Disease)

Malaria is a protozoan disease caused by infection with parasites of the genus Plasmodium and transmitted to man by certain species of infected female anopheles mosquito. A typical attack comprises three stages.

a. Cold Stage:

This is characterised by sudden onset of fever with rigor and sensation of extreme cold. The patient desires to be covered with blankets. This stage lasts between fifteen minutes and one hour.

b. Hot Stage:

The temperature may rise up to 41°C (106°F). The patient feels burning hot and casts off his clothes. There is intense head ache. This stage lasts from two to six hours.

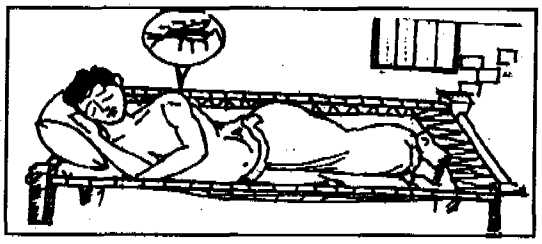
c. Sweating Stage:

Fever comes down with profuse sweating. This stage lasts from 2 to 4 hours. This occurs with definite intermittent periodicity repeating every third or fourth day and may last several weeks or months.

The disease has a tendency to relapse and is characterised by enlargement of the spleen and secondary anaemia. Malaria is transmitted by mosquitoes (Anopheles) which bites from dusk until dawn and which breed in clean water, e.g. Rice fields.

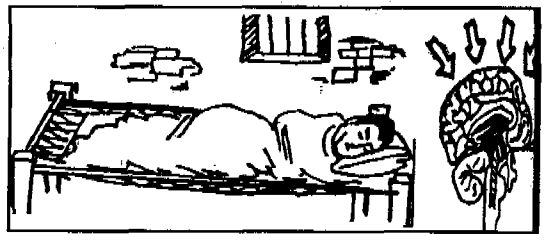
MALARIA...Still an Uncontrollable Disease

About Malaria



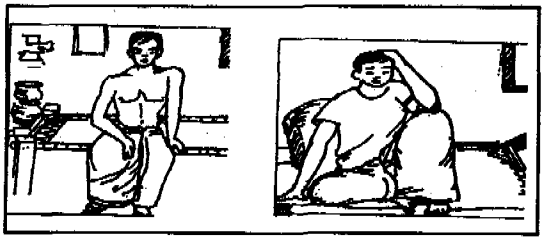
- Every year 300 million people are infected by malaria and 3.5 million people die because of malaria.
- The disease caused by malarial parasite, a protozoa named plasmodium of malaria. It lives in the red blood corpuscles of the peripheral blood.
- It is mainly transmitted by an infected anopheles mosquito.
- Man is the reservoir of infection, but the source of infection is mosquito. The infected person gets fever within one or two weeks.
- Incidence is high in the areas where rice is cultivated.
- It is common in those places where mosquitoes are present in large numbers and people who live in over crowded ill ventilated areas.

Signs And Symptoms



- Fever occurs every day or in alternate days with or without cold shivering.
- In this stage patient feels vomiting headache and then starts shivering with teeth chattering, in spite of giving him hot water bags and blankets.
- After oncor two hours the patient begins to feel hot, with severe headache. Pulse becomes rapid and high fever from 100 to 106F develops.
- After the high fever the patient's skin becomes dry and hot. Then it rapidly becomes moist by sweating. And after perspiration the temperature falls to normal.
- Follow preventive measures strictly and keep recommended drugs with you while working in infected places.
- These stages occur after certain intervals which depend upon the type of malaria and malaria parasites.
- The duration of untreated primary attack varies from a week to a month or longer. Its relapses are common and may occur at intervals for several years.

Malaria - A Dangerous Disease



- Patient suffers from progressive anaemia and enlargement of spleen and liver.
- Chronic and acute malaria causes complications in brain as cerebral malaria.
- Myocarditis with capillary obstruction in the myocardium may occur.
- In such cases the patient may subject to die. Hence, if any case found, he must be hospitalised immediately.

Preventive Measures

- Avoid stagnation of rain water near the dwelling places.
- Sanitary improvement such as filling all the pits of depressions, etc. to eliminate breeding and hiding places of mosquitoes and larvae.
- Keep all the water storage tanks and overhead tanks clean and covered.
- Infected places and water bodies should be disinfected by spraying effective insecticide
- Protect against bite of mosquitoes by using repellents, mosquito nets, screening ventilation.
- Spray insecticide on the inside of walls of houses and surfaces where mosquito habitually rests.

2. FILARIA OR ELEPHANTIASIS

Filaria is caused by bite of mosquito, but the causative organism are of two common species in India. These belong to nematode worms, Wucheria bancrofti, and Wucheria (Filaria) malayi. Reservoir of this disease is blood of an infected person which contains micro-filariae in it and the source of infection is mosquito (Culex fatigans). The disease mainly transmitted through the bite of infected mosquitoes to other persons.

This disease affects on the lymphatic vessels and due to obstruction of the lymphatics that part of the body become enlarged and deformed. If patient suffers from secondary bacterial infection (due to other organism) then patient may die due to this infection.

Signs and Symptoms

- Patients get periodical attacks of fever with lymphangitis.
- After prolonged or repeated infection flow of lymph obstructs and patient may suffer from hydrocele (males) and elephantiasis of limbs, breasts and genitalia.
- The embryos exhibit nocturnal periodicity (during the night) as they enter in the peripheral circulation at night and they remain in lungs and larger arteries during day time.
- Thick blood smear on a slide is taken at night (10 p.m. to 2 a.m.) usually when patient is sleeping, to detect presence of micro filariae in the blood of the patient.
- Once elephantiasis occurs, no filariae are found in the blood because all the embryos get blocked up in lymphatics.

Preventive Measures

- Filariasis is transmitted by mosquitoes which breed in dirty (black) water, open sewers, and dirty washing tanks. Therefore keep drains running freely and clear obstructions, and try to drain any sort of collections of black water.
- People should prevent themselves from the bite of mosquitoes by using mosquito nets on the bed and screening the house.
- Anti mosquito measures shall be taken to destroy by using insecticides to destruct larvae breeding places of mosquitoes.
- Educate people about mode of infection, methods of prevention and control of filaria.

3. DENGUE FEVER

Dengue viruses are arboviruses capable of infecting humans and causing disease. These infections may lead to:

(a) Classical Dengue Fever, or (b) Dengue Haemorrhagic Fever.

The reservoir of infection is both man and mosquito. The transmission cycle is Man - Mosquito - Man. Aedes aegypti mosquito is the main vector becomes infective by feeding on a patient from the day before onset to the 5th day of illness.

After an extrinsic incubation period of 8 to 10 days, the mosquito becomes infective, and is able to transmit the infection. Once the mosquito becomes infective, it remains so far its life.

(a) Classical Dengue Fever

Classical Dengue Fever or Break - Bone Fever is an acute viral infection caused by dengue virus. Dengue fever can occur epidemically explosive and often start during the rainy season when the breeding of mosquitoes is generally abundant.

All the ages and both sexes are susceptible to dengue fever. The onset is sudden with chills and high fever, intense head ache, reddish eyes, muscle and joints pain which prevent all movement. The patient may feel vomiting, hungry less, tasteless, tiredness, etc. Fever lasts for about 5 days, rarely more than 7 days after that recovery is usually completed.

(b) Dengue Haemorrhagic Fever

It is a severe form of dengue fever, caused by infection with more than one dengue virus. The severe illness is thought to be due to double infection with dengue viruses: the first infection probably sensitizes the patient, while the second appears to produce an immunological problem. The disease is confined exclusively to children less than 15 years of age, with fatalities.

The onset is acute , continuous fever and lasting 2 to 7 days. Some of the other haemorrhagic manifestations are gum bleeding, gastrointestinal disturbances, enlargement of liver, haemoconcentration, etc. Rapid and weak pulse with narrowing of the pulse pressure with the presence of cold, clammy skin and restlessness.

Curative Treatment

Proper treatment should be given as prescribed by the Doctor in time and in correct dose based on the condition and symptoms that are seen in the patient. In severe cases, intravenous injections, blood, saline and oxygen shall be given as special curative treatment. Without proper prescription 'aspirin' and other pain killer medicines should not be fed to the patient that will increase acidity and bleeding complications.

Preventive Treatment

Isolate the infected patient in a well screened room or in mosquito bed net to prevent spread of this disease. Infected places should be disinfected by spraying effective insecticide. Antilarval measures be taken to destroy them to destruct larvae by using DDT or Abate in breeding places of mosquitoes. Keep environmental sanitation, home sanitation and maintain cleanliness in around the house, and eliminate any sort of stagnation of water that are the breeding places of mosquitoes. Follow up preventive and control measures carefully and help Physician and Health Authorities to carry out the control measures with out interruption.

4. JAPANESE ENCEPHALITIS OR BRAIN FEVER

Japanese Encephalitis (JE) is a mosquito-borne disease caused by a Group B Arbovirus (Flavivirus) and transmitted by Culicine mosquitoes. It is mainly infecting animals and incidentally man. Unlike the dengue viruses, there is no record of man to man transmission but JE virus infects several extra human hosts, e.g. animals and birds. The disease cycle of transmission are:

(a)

(b)

The disease is transmitted to man by the bite of infected mosquitoes and affects brain. If people get the disease one third die, one third are left with permanent brain damage and only one third recover.

Among the animal hosts, pigs have been incriminated as the major hosts for JE virus. Infected pigs do not manifest any symptoms of illness but circulate the virus so that mosquitoes get infected and can transmit the virus to man. Cattle, Buffaloes and horses may also be infected with JE virus. JE is transmitted by mosquitoes which breed in clean water, e.g. rice fields. The mosquito must have first bitten any infected pig to pass the JE virus to man. People sleeping and living close to pigs are most at risk. There are outbreaks during most rainy seasons, amongst communities who keep pigs.

Signs and Symptoms

The disease appears with onset of acute fever, headache, malaise and prostration in some patients. The acute phase lasts more than a week and leads to severe cases. The average period between the onset of illness and death is about 9 days.

Preventive Measures

1. Sleeping under bed nets.
2. Covering on long clothes at dusk.
3. Using mosquito repellents.
4. Keeping pigs as far as possible away from the residential areas.

2.5.7. DIARRHOEA

Children below five years old are the most common victims of dehydration and death due to diarrhoeal diseases. Each and every one child is affected by diarrhoea twice or thrice in a year. Apart from diarrhoea, children are also affected with amoebic or bacillary dysentery and worm infections. In general, if an infected person passes watery stools more than one time, can be known as affected with diarrhoea. All the above said diseases are caused by unhygienic environmental conditions and consumption of impure water.

Diarrhoea and Dehydration

Diarrhoea is a common symptom of various diseases. Some times it happens often to children and even to adults due to infection of pathogens. Therefore it should be taken seriously since it can prove to be fatal especially for malnourished weak young children and adults. So if any person passes watery stools, the treatment shall be given immediately.

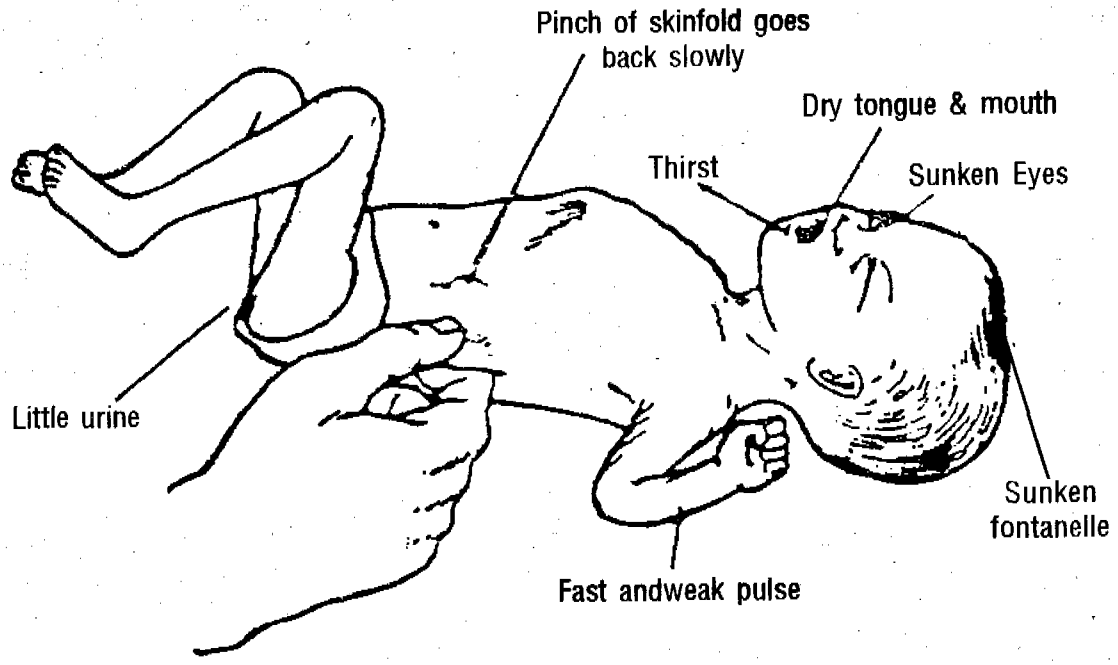
During diarrhoea the patient loses much water from the body leading to dehydration. Diarrhoea with vomiting accelerates dehydration. Dehydration means that water in the body is drained out. During diarrhoea, much amount of water and vital salts are lost along with every stool passed out. These have to be supplied back to the body along with more water, otherwise patient becomes weak. Most children die of diarrhoea because of immense loss of water from their body.

Signs and Symptoms of Dehydration

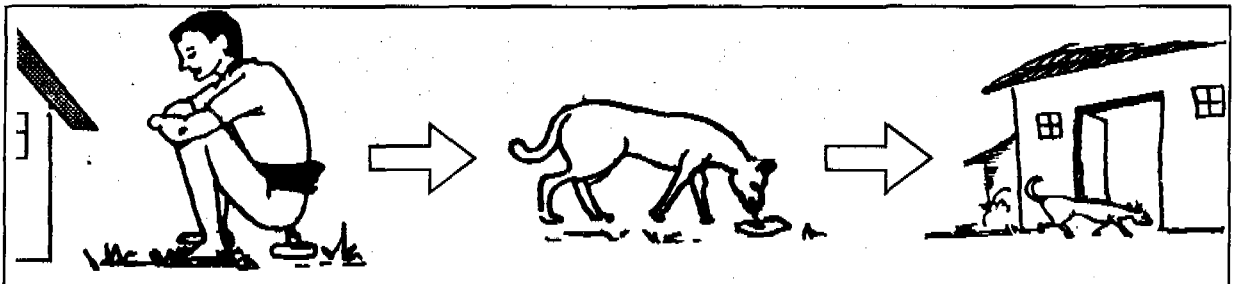
The signs of dehydrated child or adult as per the degrees of increasing dehydration are as follows,

1. Dry tongue and mouth with more thirst.
2. Sunken eyes.
3. Dark and little or no urine pass.
4. Pinch of skin fold stayed and goes back slowly.
5. Dry eyes and no tears.
6. Fast weak pulse.
7. Drowsy and unconscious.

A SEVERLY DEHYDRATED CHILD



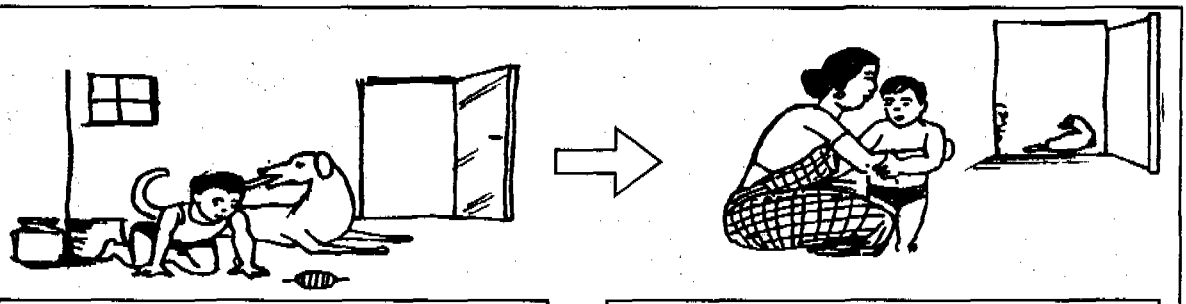
HOW DOES DIARRHOEA SPREAD?



A person affected with diarrhoea goes for open defection near to house.

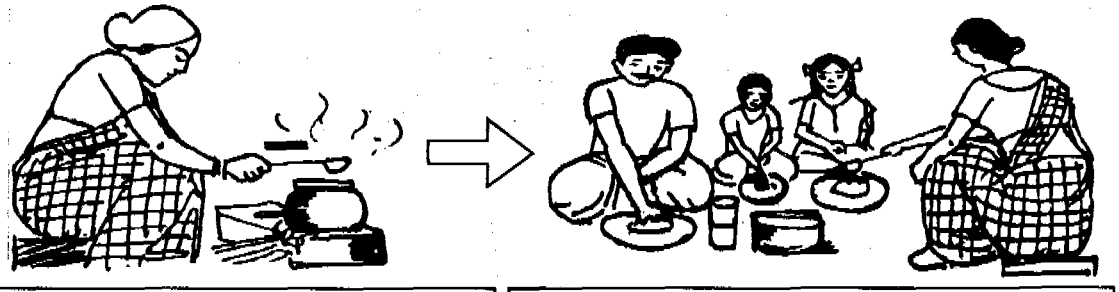
A dog eats the faesces and get stuck with part faeces on its nose and legs.

The dog enters the house.



A child plays on the floor inside of the house, starts playing with dog and gets contact to faeces

The child starts crying. Mother comes and takes the child at her hand.



Then the mother leaves the child and cooks food without washing her hands. The food gets contained.

The mother serves the food and all the family members eat contaminated food.

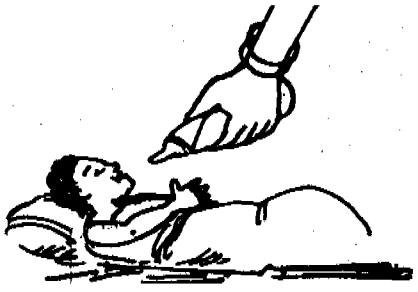
All the family members are affected by diarrhoea.

Besides the above said example, the other pet animals, hen, pigs too contribute transmission of diarrhoeal diseases to infect a new host.

CAUSES FOR DIARRHOEA

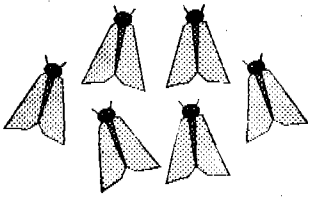
Dirty Hands and Nails

Cooking, serving or eating food with dirty hands. Do not grow nails, otherwise dirt gets inside and attracts germs.



Feeding Bottles

If feeding bottles which are not kept clean, attracts flies and germs and cause infection to children.



Flies

Flies sit on faeces or decayed wastes and again sit on food, so that food gets contaminated.

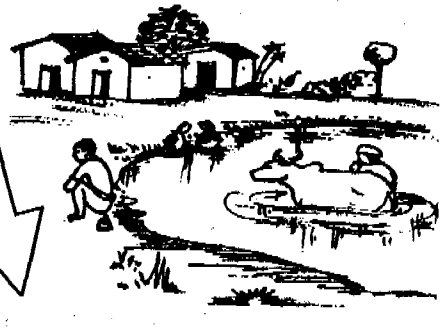
Spoilt Food

Eating of unwashed vegetables & fruits, half way cooked food, openly kept food. stale food, etc.

CAUSES FOR DIARRHOEA

Impure Water

Consumption of unsafe dirty water drawn from the streams, ponds. etc.



Open Defecation

People go for open defecation near to house or water sources.

Treatment for Diarrhoea

People used to think that only doctors could treat diarrhoea, but doctors say that if treatment is begun at once for diarrhoea at home itself, the patient will be cured faster.

Treatment for diarrhoea is very simple at less cost. All we have to do is replacing the water lost during diarrhoea. With extra drinks. Give the patient fluids available at home like gruel (mixture of cooked cereals, rice and dal with water), milk, fresh fruit juices, salted butter milk, lassi, coconut water, or even plain water, and ORS (Oral Rehydration Solution) along with continued routine feeding. In the case of young children continue breast feeding as for ever.

As soon as a person or child passes a watery stool, give plenty of home available fluids which will prevent loss of water in the body. Immediate treatment not only makes the body stronger but also saves life.

Unless when diarrhoea and dehydration is more serious than unusual and lasts for more than 2 or 3 days to a week or if there is blood in the stools or with fever, seek trained persons help or a doctor. But in general 90% of diarrhoea cases could be managed at home by giving home available fluids.

ORT (ORAL REHYDRATION THERAPY) FOR DIARRHOEA

ORS... A Life Saving Solution...!

During diarrhoea the body loses vital salts and water in excess through watery stools. If it is not makeup for this loss, severe dehydration may lead to death or acute malnutrition. So that ORS (Oral Rehydration Solution) should be given within 4 hours to the patient who found with diarrhoea.

Diarrhoea does not need any medicine. Timely and correct rehydration only cures diarrhoea and saves life. ORS supplies back all the vital salts such as Sodium Chloride (common salt), Potassium and Bicarbonates along with Glucose. Glucose helps the absorption of salts by the intestines. Feed ORS minimum six times a day during diarrhoea or feed a patient each time passes watery stools according to the following table. The amount of ORS differs according to the age of a person.

Age	Dosage	Quantity in 200ml glass
Less than 2 years	50-100 ml.	¼ - ½ glass
2 - 10 years	100-200 ml.	½ - 1 glass
Above 10 years	Give as much as the patient can drink.	

For more specific below is the table that tells how much ORS should be given within 4 - 6 hours after diarrhoea. The amount of ORS differs according to the weight or age of the person as mentioned in the table.

Weight in Kilograms	Age of the person	Amount of ORS to be given 4 - 6 hours
Up to 6 Kg.	0-7 months	200 - 400 ml. (Approx. 1 - 2 glass)
6 - 9 Kg.	7-12 months	400 - 600 ml. (Approx. 2 - 3 glass)
9 - 13 Kg.	1 - 3 years old	600 - 800 ml. (Approx. 3 - 4 glass)
13 - 20 Kg.	3 - 8 years old	800 - 1000 ml. (Approx. 4 - 5 glass)
20 - 40 Kg.	8 - 15 years old	1000 - 2000 ml. (Approx. 1 - 2 litres)
More than 40 Kg.	16 years old and above	2000 - 4000 ml. (Approx. 2 - 4 litres)

How to Prepare 1 litre of ORS Solution?

1. Get the ORS packets at free of cost from the local Primary Health Centre or from the Village Health Nurse, and ensure the expiry date mentioned on the packet.
2. Take a litre of boiled, pure drinking water to make the solution. Take a clean glass of 200 ml. capacity and a clean tea spoon.
3. Pour five glasses of pure drinking water in to a clean vessel to make one litre of ORS solution.
4. Open a packet of ORS and pour all the contents into the water.
5. Stir with a clean spoon until the contents are completely dissolved. Now the ORS - Life Saving Solution is ready.
6. Take the required amount of the solution in a clean glass. Feed the child or the person frequently with small doses of ORS.

Home Preparation of Salt - Sugar Solution?

When the above said ORS packet is not available you can prepare the Salt-Sugar Solution instead of ORS. It is also an ideal ORS and effectively helps to rehydration. Salt - Sugar Solution is encouraged to mothers who can easily prepare at home.

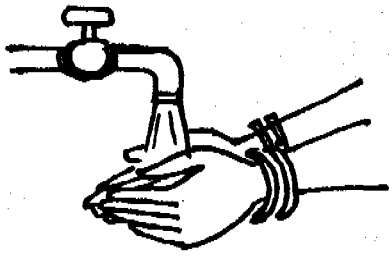
1. Take a clean glass of 200 ml. capacity and a clean tea spoon and fill the glass with boiled pure drinking water.
2. Take a two finger pinch of powder salt and add it into the 200 ml. of water. Remove any extra salt that is stuck to your fingers pinch and throw it away. If the salt is coarse, grind it first until is very fine.
3. Stir the mixture with a clean spoon until the salt is dissolved.

4. Taste a spoon full of the solution. It should be less saltier th ın your tears. If you taste it is too salty, throw it away. Mix the solution again using little less salt.
5. Next, add a spoon full (or a four finger scoop) of sugar in to the salt solution. If you do not have sugar use powdered jaggery or ghur (palm sugar) or Khandsari or even honey.
6. Stir the Mixture with a clean spoon , until the sugar is dissolved.
7. Feed the child or the person frequently with small doses of Salt - Sugar Solution.
8. Mix a fresh glass full of Sugar _ Salt Solution and Give it to the infected person after every loose motion. Give the young children to drink in small sips. If the child vomits mix the solution again and feed slowly.

How to Prevent Diarrhoea with Hygiene Behaviours?

1. Use sanitary latrines.
2. Wash hands with soap with more water before eating, before cooking and after defecation or contact with faeces.
3. Drink pure and safe water. Store it in a clean vessel.
4. If there is no safe water supply, drink only boiled water.
5. Wash well and eat raw food. Eat hot and well cooked food at once.
6. Do not leave food open. Warmed up food should be thoroughly reheated. Do not eat spoilt food.
7. Cover and store food so that flies do not sit on it.
8. Burn or bury house hold wastes.
9. Bury children's faeces away from the home.

HOW TO PREVENT DIARRHOEA?



Wash Hands

Wash hands with soap in plenty of water after defecation, before contact with food & water, and before feeding children, practicechildren to wash their hands after playing in soil. Keep nails cut and clean

Breast Feeding

Breast feed the children as long as possible. Mother's milk is the clean, pure, rich, and safe food for children. It gives best immunity to children.

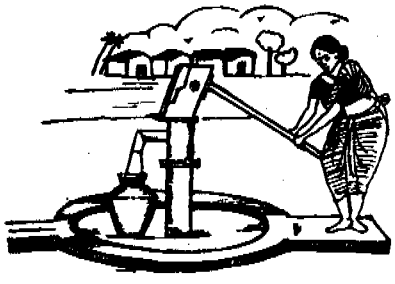
Food Hygiene

Eat vegetables and fruits after good washing and only hot and well cooked food. Do not eat spoilt food. Cover and keep food at safe which will prevent flies and animals contamination.

Safe Disposal of Wastes

Do not keep or store animal waste and household waste near to house. Store it in a garbage pit or compost such wastes to avoid breeding of flies and rodents.

PREVENTIVE MEASURES OF DIARRHOEA



Safe Drinking water

Use drinking water only drawn from covered wells and hand pumps. Store it in clean vessels. Keep hygienic handling of water. Do not wash clothes or vessels and bathe near to hand pump.

Use Sanitary Latrine

Use latrines for defecating. If there is no latrine, use an open field far away from the houses and water sources. Bury and cover the faeces with soil in a pit. Children's faeces should be safely buried away from the houses.

2.5.8. DYSENTERY

Dysentery is an acute bacterial or amoebic infection which is characterised by diarrhoea. It can be differentiated by the presence of blood and mucus (jelly like substance) in stools. Small children below five years old suffer more and in severe form than adults. People who are living in unhygienic conditions suffer more from this infection.

Causes

1. Using of impure contaminated water for drinking.
2. Consumption of unwashed raw, cold and moist contaminated vegetables.
3. Consuming food, milk or water, fruits and vegetables, contaminated by infected persons or flies.
4. By using of articles which are contaminated with the faeces particles of the infected person.
5. By hand to mouth transfer of contaminated dirty hands and nails.

Signs and Symptoms

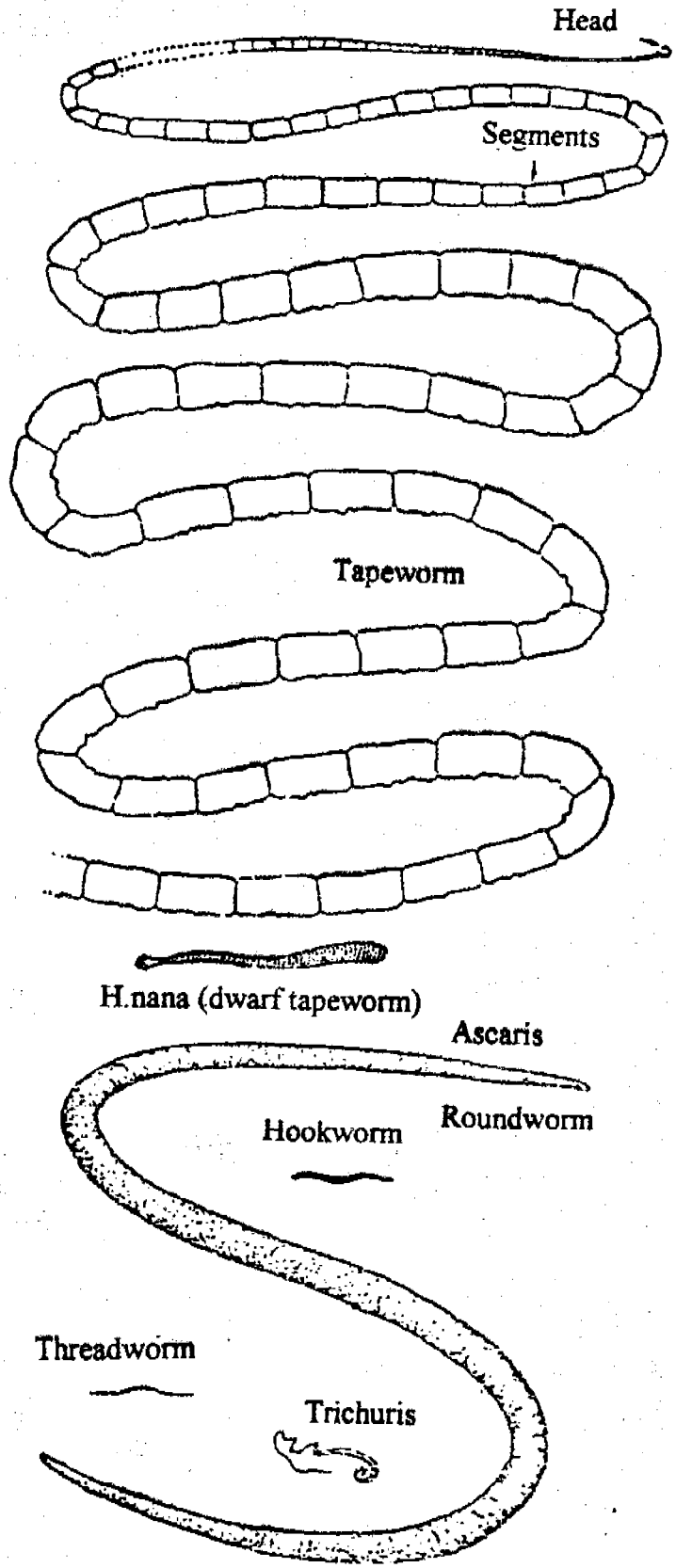
1. Stomach pain and diarrhoea.
2. Blood and mucus present in stools.
3. Showing signs of dehydration.
4. Tongue becomes dry and coated.
5. Temperature may rise up to 103 °F and increase of weak pulse rate.

Preventive Measures

- Human excreta must be collected and disposed off safely or use of sanitary latrines.
- Drink always protected safe and pure water, and drink only boiled water during epidemic season.
- Milk and milk products must be boiled properly before consuming.
- Control of flies by using screened doors and windows.
- Protect food from contamination and eliminate all breeding places of flies.
- Do not consume spoilt or stale food.
- Wash vegetables and fruits before raw consuming or cooking.
- Keeping of food hygiene, personal hygiene and environmental sanitation.
- Feed infants only breast milk up to 4 months.
- Give plenty of ORS to dysentery cases.

2.5.9. WORM INFESTATIONS

It is a common chronic intestinal infection by round worms, hookworms, whip worms, pin or thread worms, and tape worms. It is more common in children than in adults. Worm infections caused by poor practice of personal hygiene and unhygienic environmental sanitary conditions. People with these worms contaminate the environment when they defecate. After some days worms and eggs in the faeces become mature and infect new hosts when they eat contaminated vegetables or drink contaminated water. Open defecation near to houses and water sources, and along the road sides are the prime causes for worm infections.


Head
Segments
Tapeworm
H.nana (dwarf tapeworm)
Ascaris
Roundworm
Hookworm
Threadworm
Trichuris

1. ROUND WORM OR ASCARIS

It appears like earth worm and lives in intestines. It is a large round worm which is cylindrical and pointed at both the ends of its body with pinkish grey colour. Adult male worm measures about 3 to 10 inches long and female worm measures 12 to 14 inches. It lays about 200,000 eggs in a day. Eggs comes out with faeces when an infected person goes for open defecation and they live in soil under favourable condition for months and years together. Matured eggs are ingested by the person by contaminated food, fingers and vegetables. When these are swallowed, they enter in to the duodenum and perforate the mucous membrane of the intestine of the person and through this they enter into the veins, and pass in the right side of the heart then to lungs. After entry of eggs in the body it takes about 2 months to reach maturity of worms to lay eggs which comes out with faeces and contaminate soil.

Young children are suffering frequently and with repeated infection than the old children and adults. Some times the symptoms of this disease are variable and often vague or absent, but in general the patient has general weakness and body becomes pale. Patient has digestive disturbances such as loss of appetite, occasional vomiting. Some patients may have severe stomach ache and even symptoms of dysentery.

Mode of Infection

The main source of infection is faeces which contains eggs. It may spread by:

1. Direct or indirect transmission of eggs from the soil or other contaminated matters to the mouth.
2. When contaminated soil is carried by foot or foot wear in to house.
3. Consumption of raw, unwashed contaminated greens, vegetables and fruits.
4. Children touch or play in contaminated soil and take food or keep fingers in mouth without washing their hands.
5. Some times children directly eat contaminated soil.
6. Ingesting food or water which is contaminated by worm eggs.

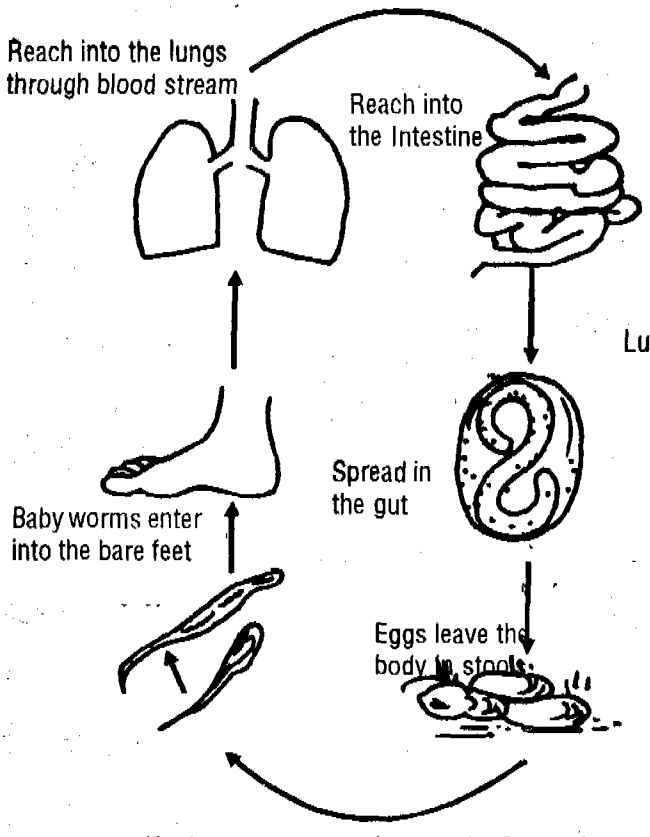
2. WHIP WORM

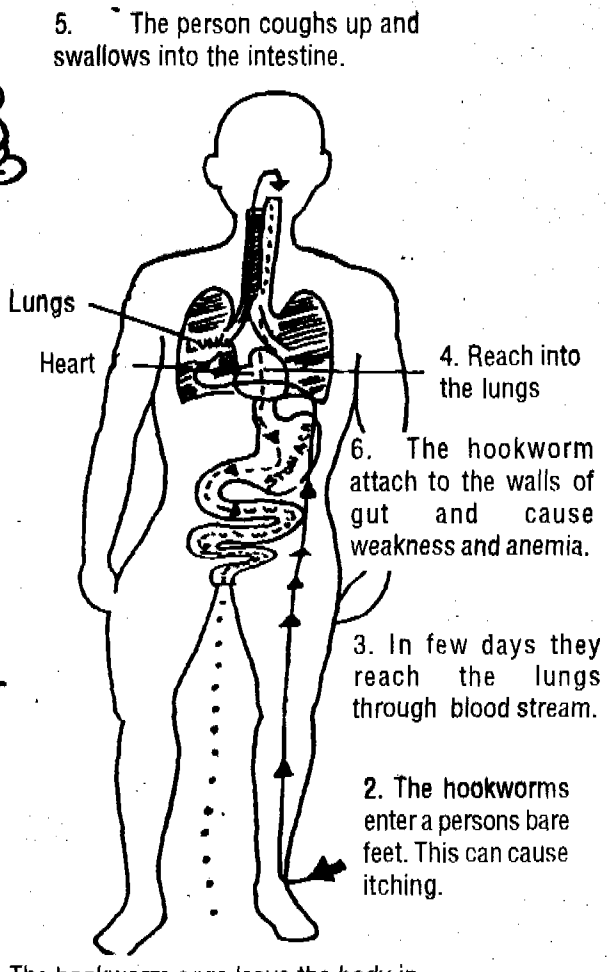
Whip worms are also transmitted like round worm. It does not give much trouble to the infected person but it may cause diarrhoea. These worms are living in the human intestines. The eggs which comes out with faeces are transmitted to a new host.

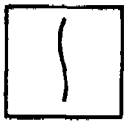
3. THREAD WORM AND PIN WORM

It is thin and small worms. It lives and creates some problems in the human intestines. During night time it comes out to the anus part and lays eggs which makes irritation. When the person scratches anus they get in to the nails and fingers and cause repeated infection. It also pass out with faeces. Washing hands thoroughly before contact with food, water and after defecation, and cutting nails will prevent infection. Children are suffering often with repeated infections. Therefore, parents have to take care of children to cut nails very short, to wash hands and anus after defecation, and to keep trousers clean.

LIFE CYCLE OF HOOK WORM







Size of the hookworm

4. HOOK WORM

It is a chronic debilitating infection where faeces is not disposed of properly. Infected persons remain potential spreader of infection, so long as they are infected. It is 1c.m., long thread like red colour body, head conical shaped, large oval mouth with 4 hook like teeth. By these the worm fixes itself to the wall of the intestines.

An infected person passes very large number (40,00,000 or more) of ova in faeces. These ova are laid on moist soil. Under favourable conditions, in about 5 days, the larvae move actively which can be seen crawling over the blades of grass. These larvae survive in moisture and shed for months together, but die in dry condition. When a person get contact to the larvae, it enters through bare foot or sweat glands or hair follicles of skin., they fix themselves on the skin and then give rise to itch. After reaching tissues, they enter in to the veins or lymphatic vessels, from here they reach to the heart, then reach in the lungs through blood stream. They may cause dry cough. When the person coughs up (rarely with blood), they come in the mouth where they are swallowed, they reach in the stomach. Then they pass in to the intestines where they develop as adult worm within 4 weeks.

The worms attach to the walls of the gut. A few days later the infected person may have diarrhoea or stomach ache. When hook worms fix itself in the intestines, it causes haemorrhage which gives rise to anaemia. Blood sucking activity of the worm predisposes malnutrition. Patient may have debility or weakness, puffiness of face, constipation with alternate diarrhoea. Marked anaemia cause pallor of the whole body, tongue and conjunctiva. Their tongue usually appears like a sheet or white blotting paper. Infected children may have retarded mental and physical development. Women may have sterility, abortions and impaired lactation. This disease is not fatal because it very rarely causes death, but in severe cases, patient may die due to severity of the disease.

Mode of Infection

The only reservoir of infection is faeces of an infected person. Common source of infection is contaminated with larvae and transmitted through the skin or food. People should have a habit of wearing foot wears and should not go out barefoot especially while going for open defecation to prevent the infection.

5. TAPE WORM

Tape worms live in the intestines. Tape worms are long and flat like tape and grow several metres long (4metres), and are white or yellow in colour. They consist of a minute head, a neck and rows of segments. The small flat white pieces (segments) usually about 1cm. long and or eggs found in the infected person's faeces. Occasionally a segment may crawl out by itself and be found in the under wear. When the faeces with segments or ova which retain their vitality for some time are eaten by some animals who act as intermediary host

(pig, cattle, fish). These continue their development in their intestines and penetrates in to the solid tissue. When a person eats raw or halfway cooked pork (pig meat), beef(cow meat) or fish gets tape worms as a definitive host. In the stomach of an infected person, its capsule is dissolved by the action of gastric juice, but the segments or head goes in to the intestines, and with the help of its hooks it fixes in the wall of intestines and gets developed tape worm within 8 weeks. After this again the same cycle is repeated.

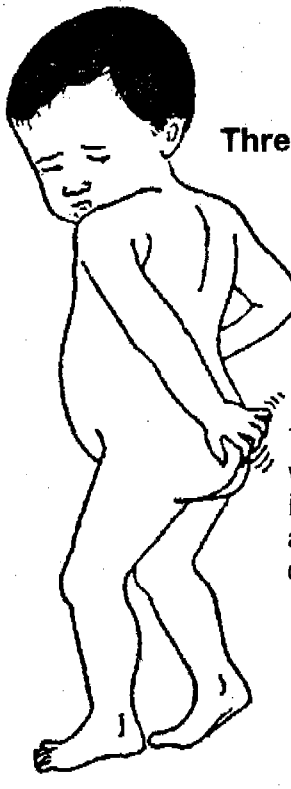
Tape worms in the intestines causes mild stomach ache, diarrhoea, headache, and fits due to toxins of the worm infection. When larvae develop in the tissues, they grave consequences ensure, where they localise in heart, eye or central nervous system. The greatest danger exists when the cysts (small sacs contain baby worms) get in to the infected person's brain. This happens when the eggs pass from his stools to his mouth and leads to chronic case, then the ultimate fatality rate is higher than in other cases. The patient may also have pernicious anaemia due to lack of blood in the body and form convulsions. For this reason, any one with tape worms must follow the instructions carefully and get treatment immediately. People must be careful that all meat is well cooked, especially pork. Make sure no parts in the centre of roasted meat is still raw or inadequately cooked.

Mode of Infection

1. Transmitted by eating raw or inadequately cooked pork, beef or fish which contains eggs or larvae.
2. Direct transfer of eggs which are in the faeces, by hand to mouth.
3. By ingesting food or water, which is contaminated with eggs.

PREVENTIVE MEASURES

- People must maintain personal hygiene and cleanliness.
- Avoid indiscriminate open defecation and make use of sanitary latrines.
- Proper disposal of human excreta is necessary to prevent contamination of soil and water.
- People must have habit of proper hand washing and washing their feet after defecation or coming from out side and before taking food.
- Greens, vegetables and fruits must be washed properly before eating and cooking. Special care is required when these are eaten raw.
- Do not allow people to go for open defecation near to river banks, lakes, ponds, and hand pumps to avoid contamination.
- Use always boiled water for drinking.
- Avoid eating raw meat or half way cooked meat.
- Deep burial or incineration of dead animals must be ensured.
- Any human or animal waste is to be used as manure , it should be properly composted prior.
- Keep environmental sanitation.



Threadworm

Thread/ Pin worms cause itching at the anus of children

2.5.10. SKIN DISEASES

A whole human body considering all parts from head to toe is completely covered with skin layers. The skin is very effective barrier to infection and protects us very well from diseases. Cleanliness of the skin is of most important in preventing infections. If the skin is wounded or punctured, there is a risk of infection. Germs resting on the skin enter after mosquitoes and other insects bite, or when you scratch the skin which cause infective wounds.

There are many number of skin diseases are caused by contagious infections. The most common and important of them, which are caused by poor personal hygiene behaviours are discussed as follows.

1. SCABIES

Scabies is a highly contagious and spreads between people who are sleep together in the same bed or sit together long time or share clothes. It is an infection with tiny itch mites which burrow under the skin. They cause severe itching and the sufferer scratches and often damages their own skin. It commonly affects the finger webs, fronts of the wrist, the buttocks and genital organs. It never attacks the head except in babies. It is more common in children and may infect all the members of a family at the same time.

Preventive Measures

1. Improved good personal hygiene behaviours reduce this infection.
2. Keep out wearing clothes, bed clothes, and beds under the sun will kill mites.
3. Keep clean of scratched skin will reduce secondary infection.
4. Prompt treatment of the whole family.
5. A good method of control is treatment with Benzyl benzoate or some other medicine which kills the mites.

2. IMPETIGO

It is a highly contagious skin disease, characterised by golden weeping sores. This is spread by touch and can spread to face, can also turn into a deep infection and even affect eyes. It occurs more often when the body and face is not kept dry and clean, and in poor environmental hygiene, like when there are many flies around. Flies feed on the secretions of small wounds and introduce bacteria in to them.

Rub any wound or patch of impetigo, two or three times a day with a piece of clean cloth or cotton wool which is dipped in a weak solution of a few crystals of potassium permanganate dissolved in water. this is cheap and effective. Gention violet is also good. Apply of salt solution is also a slightly effective treatment.

3. FUNGAL INFECTION (Including Round Worm)

Ring worm is a fungal infection which can best be cured with white field ointment or other antifungal medicines. Gention violet is also good. Often the foot and the heel are the more neglected parts of the body. The inter toe spaces are a common site for fungal infections. Most people in villages working in fields complain of fungal infections due to continuous exposure to dirt and moisture.

As a practice one should always keep body cleanliness especially hands and foot to avoid infections. It is also most important to maintain cleanliness of the genital areas simply by baths and regular washing. It is good to wash with water after urination. For women they should take care to use clean towels and other personal cloths, and change or wash often as required to prevent skin infections.

FOR YOUR HYGIENE ONLY

- Use safe and protected drinking water.
- Wash and clean hands before handling of water and food.
- Avoid children to defecate in and near to house.
- Avoid open defecation, build and use sanitary latrines.
- Keep food and water pots closed to prevent contact of flies and pet animals.
- Use clean vessels for drawing and storing of drinking water.
- Protect and keep clean of water sources from contamination.
- Prevent waste water stagnation around the house.
- Construct soak pit or raise a kitchen garden for the safe disposal of waste water.
- Keep cattle and poultry at some distance from the house.
- Dispose animal wastes safely store it in a manure pit.
- Compost the domestic wastes (solid wastes and kitchen wastes) in a compost pit with animal waste.
- Keep your home and village environmental sanitation.

2.6. WATER AND SANITATION IN RELATION TO HEALTH

DISEASES AND PREVENTIVE MEASURES...To Keep in Every One's Mind...

Sl. No (1)	Diseases (2)	Mode / Route of Transmission (3)	Safe And Protected Drinking Water (4)	Water & Food Hygiene (5)	Personal Hygiene (6)	Safe Disposal of Human Faeces (7)	Safe Disposal of Waste Water (8)	Safe Disposal of Animal and Solid Wastes (9)	Home & Environmental Sanitation (10)
1	All diarrhoeal diseases including dysentery, gastro-enteritis, typhoid, etc.	Faecal-oral: Faecal contamination in water, fingers and hands, food, vegetables, soil, etc. Even pet animals like dog, pig poultry also cause transmission.	●	●	●	●		●	●
2.	Poliomyelitis	Faecal-oral: Caused by polio virus spread mainly by poor personal hygiene behaviours. Leave people partially paralysed. Paralysis is more common in children who have had an infra-muscular injection during the infection (to treat fever for e.g.)	●	●	●	●			●
3.	Hepatitis A/E or Jaundice	Faecal-oral: Hepatitis or jaundice (meaning Yellow) are viral infections. Transferred through faecal contaminated water and poor environmental hygiene.	●	●	●	●			●
4.	Round Worm Whip worm	Faecal-oral: The worm cysts spread in soil through open defecation and transmitted by unwashed vegetables, dirty hands and nails, working or playing with soil, conveyance and other faecal contamination matter.	●	●	●	●			●

Sl. No	Diseases	Mode / Route of Transmission	Safe and Protected Drinking Water	Water & Food Hygiene	Personal Hygiene	Safe Disposal of Human Faeces	Safe Disposal of Waste Water	Safe Disposal of Animal and Solid Wastes	Home & Environmen -tal Sanitation
5.	Hook worm	Foot and Skin: Infects through bare foot and skin. Cysts left in the soil from faeces become larvae which survive in moist soil and in grasslands for months together.		●	●	●			●
6.	Tape Worm	Meat of cow and pig: Cysts with faeces eaten by the pig or the left out cysts eaten by cattle develop and survive in the tissues of host animal. Man eats inadequately or half way cooked pork or beef which contain larvae or cysts.		●	●	●			●
7.	Bilharzia or Schistosomisas is (Pass urine with blood)	Faeces or Urine – Water resources: When infected people defecate or urinate in fresh water bodies parasites enter snails. New victims infected when contact with water – bathing, etc. The swimming parasite then penetrates the skin and causes 'swimmers itch'.		●	●	●			●
8.	Guinea Worm	Skin – Mouth: Larvae is discharged into water through the skin of an infected person. Then the larvae is swallowed by cyclops. When people drink contaminated water with cyclops become infected.	●	●	●				●
9.	Tetanus	Dung - Wounds: Infection with bacteria lives in the dung of cows, buffaloes, horses, etc., and also in water logged soil. People become infected when dung enters a wound. New born babies are at a great risk as cow dung is put on the umbilical cord.			●			●	●

Sl. No	Diseases	Mode / Route of Transmission	Safe and Protected Drinking Water	Water & Food Hygiene	Personal Hygiene	Safe Disposal of Human Faeces	Safe Disposal of Waste Water	Safe Disposal of Animal and Solid Wastes	Home & Environmental Sanitation
10.	Malaria	Man-Mosquito-Man: Mosquito borne infection transmitted from an infected person to a new person by mosquitoes which breed in clean water, e.g. rice fields, etc., bite from dusk until dawn.		●			●		●
11.	Filaria or Elephantiasis	Man-Mosquito-Man: Transmitted by mosquitoes which breed in dirty black water, open sewers, etc. bite from dusk until dawn.		●			●		●
12.	Dengue Fever	Man-Mosquito-Man: Mosquito borne virus infection. Mosquitoes breed in drinking water tanks and other collections of fresh and rain water that bite during the day.		●					●
13.	Japanese Encephalitis or Brain Fever	Pig-Mosquito-Man: Mosquito borne virus infection. Mosquitoes breed in clean water. e.g. rice fields have first bitten infected pigs and pass the infection to new person at night.		●			●		●
14.	Trachoma	Eyes-Flies-Eyes: Highly contagious (spread by touch) infection, transferred between people through flies and fingers.		●	●			●	●
15.	Skin Diseases – Scabies, Impetigo, Ring worm, etc.	Skin-Skin: It is spread by touch and transferred between people by sleeping or sitting together and sharing of clothes, soap, etc.		●	●				●
16.	Lice and Dandruff	Person-Person: Directly transferred when sleeping together, sharing of clothes, combs, etc.			●				●

PART - 3

Environmental Sanitation and Waste Disposal

3.1. ENVIRONMENTAL SANITATION

Environmental Sanitation or environmental health is a general term which comprises all phases of programme for improving environment and health. Specifically sanitation is intended to prevent diseases by creating favourable conditions of such conditions of living which will not result into serious out break of epidemic. It is a preventive measure for the preservation of health of the community in general and individual in particular.

According to the National Sanitation Foundation, "Sanitation is a Way of Life. It is the quality of living that is expressed in the clean home, the clean farm, the clean business, the clean neighbourhood and the clean community. Being a way of life it must come from within the people. It is nourished by knowledge and grows by obligation and an ideal in human relations". The WHO defines environmental sanitation as "the control of those factors in man's physical environment which exercise or may exercise a deleterious effect on his physical development, health and survival".

In the developing countries, 30% of environmental hazards is caused by ill maintenance of home sanitation and its surroundings, and 75% of people are largely affected by using unsafe water and due to unhygienic living conditions. Therefore, the attainment of healthy environment is becoming more and more complex.

The term sanitation means "the disposal of sewage and refuse from the houses". Disposal of human and animal excreta which are considered to be hazardous to the health of a community if not disposed of safely and adequately. Hence sanitation is so important as food, cloth and shelter to an individual or community in their day to day life.

3.2. CAUSES FOR DEFECTIVE ENVIRONMENTAL SANITATION

- Disposal of wastes such as garbage, refuse, trash, etc.
- Discharge of waste water in to drinking or fresh water sources.
- Defecation of human excreta and urinating in open grounds.
- Disposal and decay of dead animals.
- Discharge of domestic waste water.
- Discard all wastes anywhere.
- Storage of farm yard wastes, garbage, rotten vegetables, ash, etc.
- Pollution of air, water and noise due to motor vehicles and industries.
- Disposal of sewage, industrial and chemical waste water.
- Disposal of human excreta and animal waste.
- Low ventilation and poor lighting at houses.
- Congested and close dwelling conditions.

3.3. ILL EFFECTS OF DEFECTIVE ENVIRONMENT

Stagnation of rain water, domestic waste water and sewage become hosts and generate mosquitoes, insects and germs. Contamination of such water in food and drinking water causes gastro-enteritis, diarrhoea, typhoid, polio, jaundice, dysentery, cholera, etc.

Disposal of garbage and other solid wastes becomes host for flies insects, rats and other rodents, and in turn causes many number of killer diseases, and water and soil pollution.

Motor vehicle's exhaust, industrial smoke and chemical fumes perishable solid wastes, germs exhausted from the coughing and sneezing of man, etc., contaminate the atmosphere and cause air pollution.

3.3.1. How to prevent the ill effects of a defective environment?

1. Keep clean surrounding of water sources, control and supply of protected water.
2. Construction and clean maintenance of latrines and urinals.
3. Proper disposal of waste water and solid wastes.
4. Construct soak pits and kitchen gardens.
5. Recycle or burn the non biodegradable wastes (e.g. plastic, poly bags, glass, etc.)
6. Preservation, clean handling and sale of raw foods.
7. Control of treatment and safe disposal of all wastes, such as, garbage, refuse, night soil and dead animals.
8. Control of treatment and disposal of sewage drainage, flood or storm water, industrial and chemical waste water.
9. Pest control of insects, flies, mosquitoes, fleas, lice, etc.
10. Control and cleanliness of public places, and supervision of hotels, factories, schools, theatres and dwelling places.

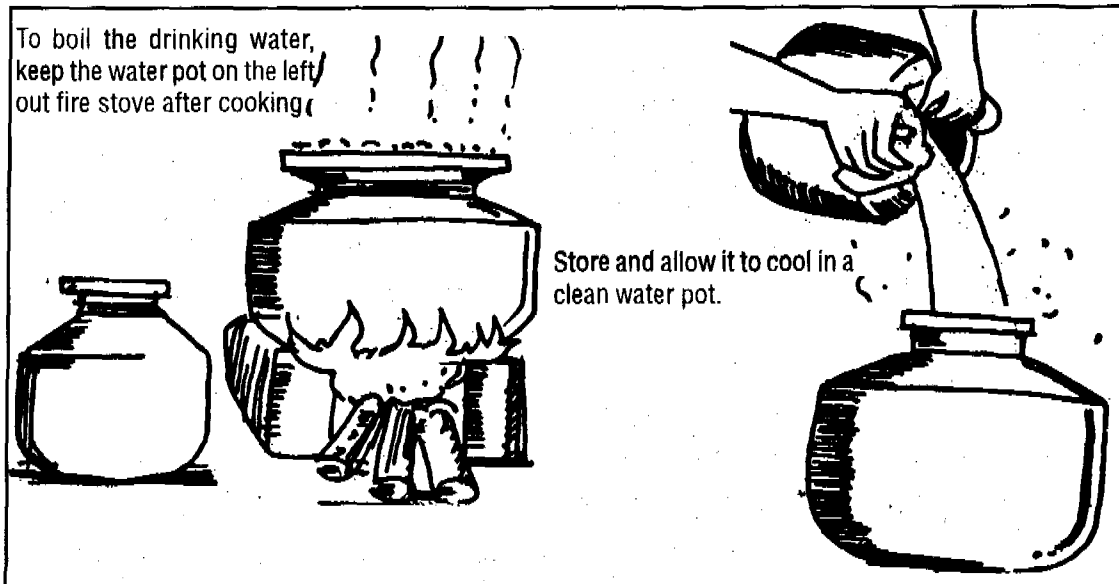
3.4. SAFE DRINKING WATER AND HAND PUMP SANITATION

Safe and clean drinking water and a clean environment are the two important factors for the disease free healthy life of people. The water from the deep bore well hand pump is more safe and clean for drinking directly and so keeping of hand pumps surroundings clean and dry is very essential. Bathing on or near to the hand pump platform should be avoided. Washing of vessels, bathing of animals, washing of clothes, etc., on or near the hand pump platform cause stagnation of waste water in the surrounding area and attracts animals, mosquitoes and contaminate the water source.

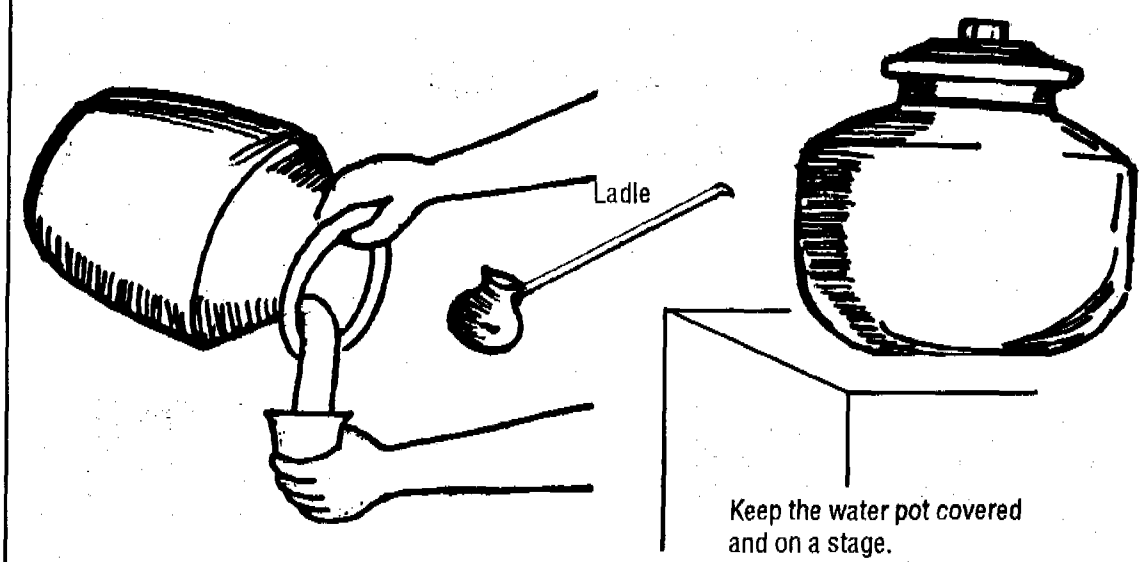
Open defecation and waste water drainage, disposal of refuse and garbage near to the hand pump area attracts pigs, insects and rats which will cause dangerous diseases and unsanitary conditions. Hence to avoid all those complications construct a soak pit or garden near the hand pump and do not practice any work except drawing water. People should take bath and wash clothes at the provided space or washing platform.

We can also get good drinking water from the wells, but it should be a covered one. Well water, river water and pond water should be properly filtered by using a clean cloth and should be boiled before drinking. Keep the boiled water in a clean pot and close it. It is more safe to drink boiled or chlorinated water to prevent diarrhoeal diseases such as cholera, diarrhoea, etc., Neither children nor adults should be allowed to draw water from the drinking water pot by using barren hands. If all the above measures are followed we can keep a barrier between the diseases and human life.

3.5. CONTROL OF DISEASE TRANSMISSION BY WATER HANDLING



During rainy and flood seasons, drink filtered and boiled water. In rainy seasons the faecal-oral transmission of diseases are at higher rate and so boiling of drinking water will destroy the disease causing germs.



Do not touch or draw water from the water pot by using your unclean hands. Slant the pot and pour the water or use a ladle as shown in the figure. Keep the drinking water pot closed and on a stand.

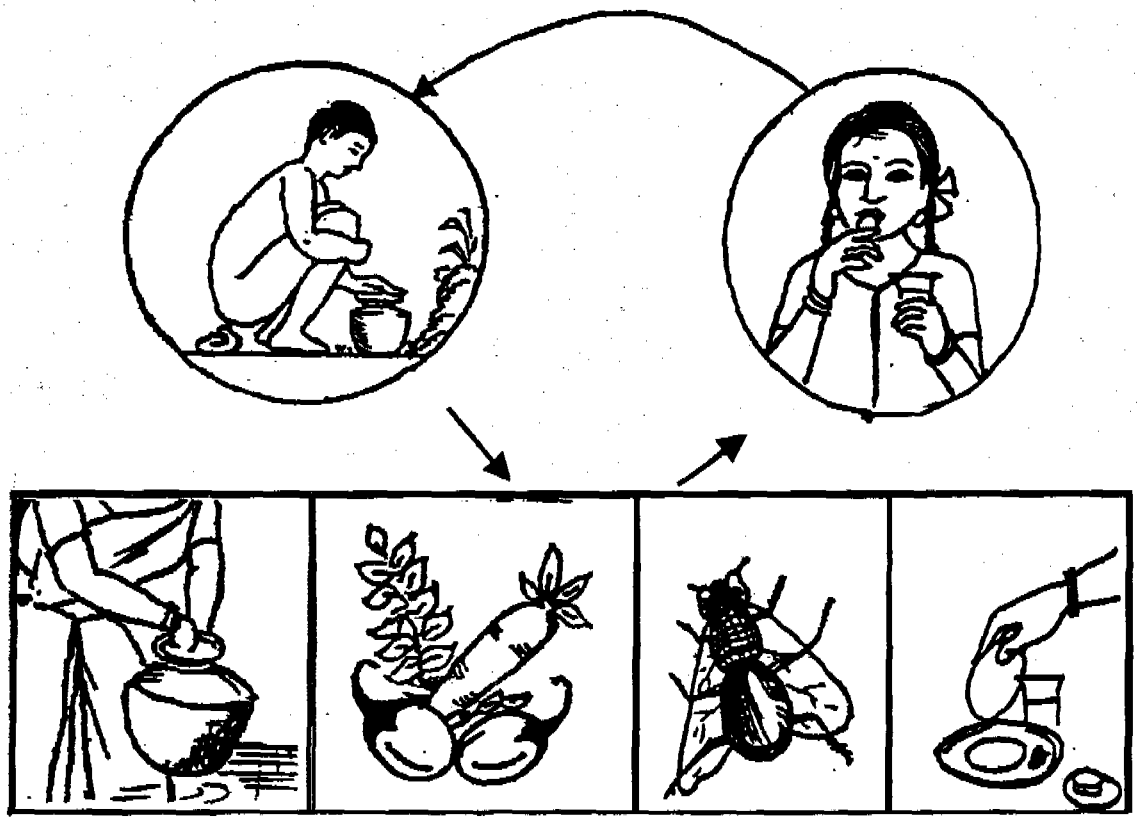
3.6. HOME SANITATION

Keep your home neat, clean and tidy. Do not discard the wastes on the street. The refuse collected have to be properly disposed off so that the house environment remains clean and healthy to live in. The accumulated refuse contains organic matter which gets decomposed and favours fly breeding. Garbage attracts rats, dogs, etc. Refuse is a source of pathogens which are carried to man through flies and dust. Piles of refuse act as a nuisance to the community which adds to the ill health of man, by spreading several diseases. Therefore the collected refuse must be safely filled in a manure pit. It can also be composted by filling on layers of cow dung, garbage, rotten vegetables, etc. This manure can be used for crops as well as kitchen gardening.

The domestic waste water (sullage) can be used for kitchen gardening. Stagnant pools of waste water around houses, on streets and in choked drains are a health hazard. They smell foul, make the area slushy and provide place for mosquitoes to breed. People bitten by mosquitoes can get diseases like malaria, filaria, dengue fever and brain fever. This could be prevented by constructing soak pit and or kitchen gardens.

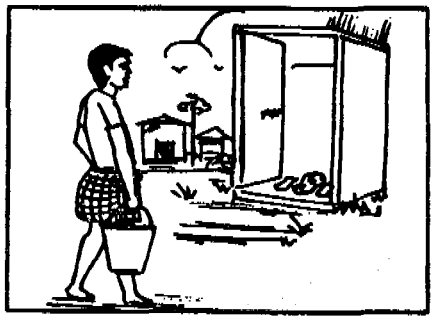
- Do not allow waste water stagnation around the house.
- Use the best methods of obstructing mosquito breeding.
- Construct soak pit and or kitchen gardens.
- Kitchen gardens can be constructed in front or in the back yard of the house.
- Plant vegetables, papaya, drum stick (murungai), plantain, greens, etc., in the garden.
- If there is no place for kitchen garden the domestic waste water must be disposed through a soak pit.

3.7. DISEASE CYCLE



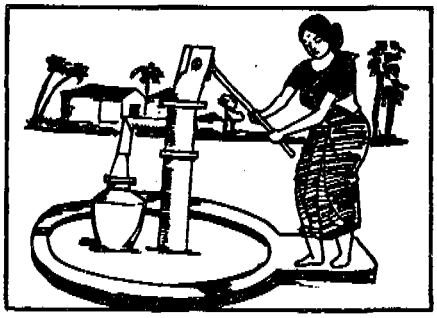
3.8. FOR YOUR HYGIENIC LIFE

Do's

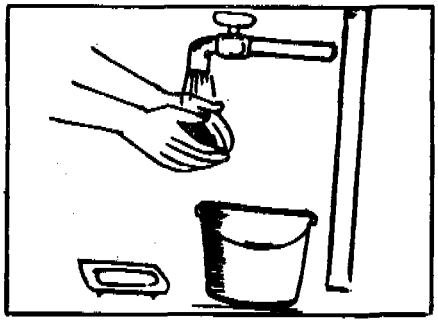


Use latrine

Construct a manure pit and compost the waste and prevent flies, rats and animals, etc.

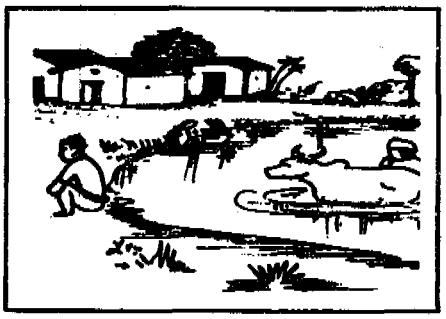


Use hand pump water for drinking and cooking

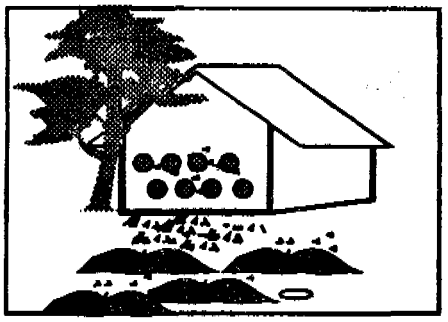


Wash hands with soap after defecation

Dont's



Open defecation particularly near to water sources



Discarding waste materials anywhere

Use of contaminated dirty river and pond water

Open defecation in public places

3.6. PERSONAL HYGIENE

Personal hygiene deals with an individual's own health. It is a branch of hygiene in which an individual learns to preserve, improve and maintain the health of his/her body and mind. Personal hygiene and health are greatly affected by heredity and environment, they play a vital role in maintaining the health of an individual. Physical and social environmental factors which have marked influence on the human and other organisms in day to day life are clear to everybody, but in the villages people usually think to go and get treated with a local-traditional healer or astrologer and they do not think of the causes behind the disease. People are commonly found with superstitious beliefs and taboos in all villages.

Hence, to make them clear and aware on health and hygiene, hygiene education shall be provided to all in the villages. Health workers or hygiene animators should go to each and every village to find and understand the behaviours and practices of people. The following are some of the important factors in keeping personal hygiene. People should be made aware of their personal hygiene and endure it as their day to day practice.

3.6.1. Cleanliness of the Body

Cleanliness of the body includes bathing, care of hair, teeth, eyes, ears, nails, skin, feet, genital areas and hands.

Bathing

Bathing is almost a habit for most of the people. It refreshes the body, cleans it and stimulates the circulation of blood and gives the feeling of well being. People should be made aware of taking bath daily and using of soap or herbal powders for body cleansing. Taking bath daily and wearing clean clothes shall be made as their behaviour.

Care of the hair

Hair should be washed at least once a week. In rural India where children and women have long hair, proper combing and fixing is important factor for appearance. Dandruff is a result of improper care of hair and scalp. It can be removed by washing hair with vinegar or lemon juice, or soap nut powder. Lice grows ideally in moist, dirty hair. The severe itching of scalp caused by lice causing finger nails scratch which results in ulceration and dandruff, soreness and infection. Children found with lice and dandruff shall be cleared at once since it can affect their studies and health.

Care of the teeth.

Oral hygiene acquires greater importance in which brushing the teeth with a tooth brush and paste is a common practice but in villages people also use neem tree or banyan tree twigs which is also good for the teeth cleaning. Various other substances like coarse brick powder, ash, mud, etc., may not be good, but use of fine ash and salt can be

encouraged. However the need for cleaning twice a day at bed tir ıe and in the morning, and developing these habits as early as in childhood is beneficial. Good nutrition for healthy teeth by taking more of green vegetables and citrus fruits.

Care of the eyes

Since our eyes are a highly specialised organ, they require more care and attention. Daily bathing and washing of the face are sufficient to keep the eyes clean. Eye infection is very common in villages where there are more dust, heat, flies and dirty hands, and the infection is easily transmitted through direct contact. Care should be taken and treatment is needed if the infection is severe. Children should study in proper light to prevent undue strain.

Care of the ears

Ears can get infected frequently and there is a danger of deafness. Even wax can cause partial deafness. Therefore, ear should be cleaned periodically. Pencil, pin or straw should never go into the ear for cleaning. The clotted wax in the ears can be removed by putting a drop of olive oil or coconut oil for a few days. This softens the wax and can be conveniently removed by an applicator. Any nose infection may also affect the middle ear and so these have to be treated immediately.

Care of the nails

Nails should be cut and trimmed every week so as not to let them grow to harm us by germs and dirt. Do not bite nails, all the hidden dirt and germs would get into your mouth and cause ill effects.

Care of the feet

In the villages people are not using foot wear but they do not realise that the soil is contaminated with human and animal excreta. It will cause them to various infections like hookworm and tetanus. Hookworm enters by piercing the skin of the feet, enters the blood stream and travels to the stomach where it multiplies. Tetanus is caused by germs in dirt which enters through cuts or abrasions in the skin. Most people in villages working in fields complain of fungal infections at inter-toe spaces due to continuous exposure to dirt and moisture. Feet are also subject to excessive perspiration, therefore daily washing and drying of the feet are essential.

Care of the skin

The skin is very effective barrier to infection and protects us very well from diseases. If the skin is wounded or punctured, there is a risk of infection. Daily bathing by using soap or soap nut powder or other herbal powders keeps the skin clean and fresh.

Care of genital areas

It is important to maintain cleanliness of the genital areas simply by baths and regular washing. It is good to wash with water after urination. For women they should take care to maintain hygiene of their genital areas especially during menstruation periods.

Care of hands

Hands get dirty very often in our daily life. Dirty hands not only pass infection to oneself, but unknowingly also to others. The hands and nails hide dirt and are store houses for harmful bacteria. Therefore hands should be kept cleaned at all times. Special washing and cleaning is necessary before contact with the food and after contact with faeces and dirt.

3.6.2. Hand Washing

Hand washing is probably the single most important activity in breaking the disease transmission chain, especially in preventing various water related and faecal related diseases. Hand washing is not that simple and it involves some techniques and unless you follow them all, you are not really hand washing. How we do wash our hand and when we do wash the hands are important.

1. How to wash hands?
   (a) Use sufficient water
   (b) Rub hands vigorously
   (c) Use any washing agent - soap, ash, soap nut powder, etc.

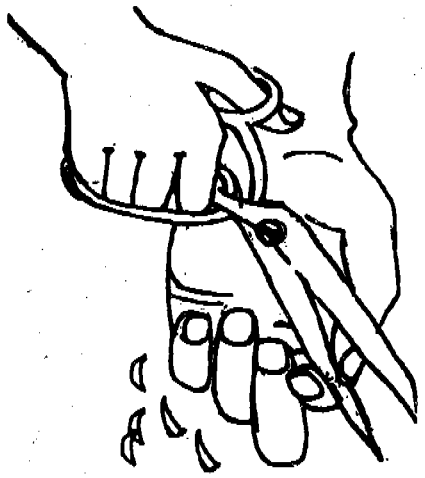
   All the three together will help to destroy more bacteria rather than just washing with water.

2. When to wash hands?
   Hand washing is considered as most essential at the following occasions.

- After defecation and anus cleaning - washing agent and water must be provided inside the toilet. Hands can be washed again after coming out of the toilet.
- After cleaning children's bottom.
- After disposing children's faeces.
- Before touching any food items that is before cooking and eating.
- Before feeding children and wiping of children's faces.
- After work especially after handling soil/mud, wastes and animal excreta.
- Any person infected with diarrhoea, cold, skin, eye infections, etc., should frequently wash their hands. They should not be involved in handling food and water.

Children's hands should be taken care by washing and cutting nails regularly. The dirt rests in the nails and hand will cause diarrhoeal diseases, jaundice, etc., to children. Wearing of chappal / slippers should be practised by all when ever going out of the house.

Keeping of fingers in mouth and biting of nails cause diseases.



Cut the nails regularly and keep it clean.

Brushing of teeth with tooth brush or neem twig every morning and before going to bed.

- Wash your hands properly and clean by using soap or any other washing agent after defecation.
- Wash your hands before cooking, eating and feeding children.
- Cut your nails regularly and keep it clean
- Do not eat food items that are kept opened
- Eat plenty of green vegetables, greens, cereals and other nutritive foods
- Wash the vegetables and cereals properly before cutting and cooking
- Clean your teeth twice daily - in the morning and before going to bed
- Wear properly washed and clean clothes
- Wear chappals always when going out of the house
- Keep a clean environment for a healthy life

3.11. NEED FOR A LATRINE

In ancient days kings and emperors and their family members only used latrines. In villages rich land lords facilitated latrines for their female family members. At present, people living in urban areas use latrines, but in villages 90% of the people do not have latrines and they go for open defecation on open grounds, fields and roadsides. Open defecation practice causes many dangerous diseases and unhygienic condition in the village. The government facilitates the people to construct and use latrines by giving subsidy scheme to each house hold latrine construction. There were no people's participation and proper acceptance to this scheme during the starting period, but now people are willing to construct and come forward to have their own sanitary latrine. The various problems found in general among the people who do not have a latrine for their own are as follows.

3.11.1. Problems in Open Defecation

There are many problems in open defecation and women in particular face the worst part of the problems like - finding a place for privacy... may be behind a bush, day time constraint... they have to go either at dawn or at dusk and they stand with shyness at the road side for long periods of time to let tress-passers pass on. This situation makes them to get mental stress and loose much time.

Generally people found much difficulty during rainy seasons and illness days, especially during diarrhoeal diseases they are unable to go for open defecation during the day time as well as in the night. To avoid such problems each and every household should own a latrine in the village.

3.11.2. Problems in Open Defecation at Agricultural Fields

People going for open defecation at agricultural fields causes faecal-oral infection through crops, vegetables and greens.

People having disease who goes for open defecation in fields excretes more pathogens and worm cysts which are transmitted to others through vegetables and crops. Hookworms enter a persons bare feet and pathogens are infected through wounds.

Pigs and chickens eat faeces and also intake the worm cysts. When people eat improperly cooked meat of pig or chicken they get infected. Tape worm cysts become tapeworms in their intestines. Besides this, the dogs, pigs, cattle and chickens get contact with the faeces in the field and later enter the house premises infecting or passing on the persons by touching food, water, and direct contact.

3.11.3. Problems of Defecating on the River Banks and Ponds

Open defecation near to or on the river banks, streams, ponds, etc., causes enhanced chances of transmitting diseases. During rainy seasons the storm water carries all these faecal matters in to these water sources and contaminates the water. People using those water sources for drinking get infected with diarrhoea, cholera, typhoid, jaundice, etc. People who are drinking water from such sources, should filter and boil the water before drinking.

3.11.4. Problems of Open Defecation at Bushy Fields and Grasslands

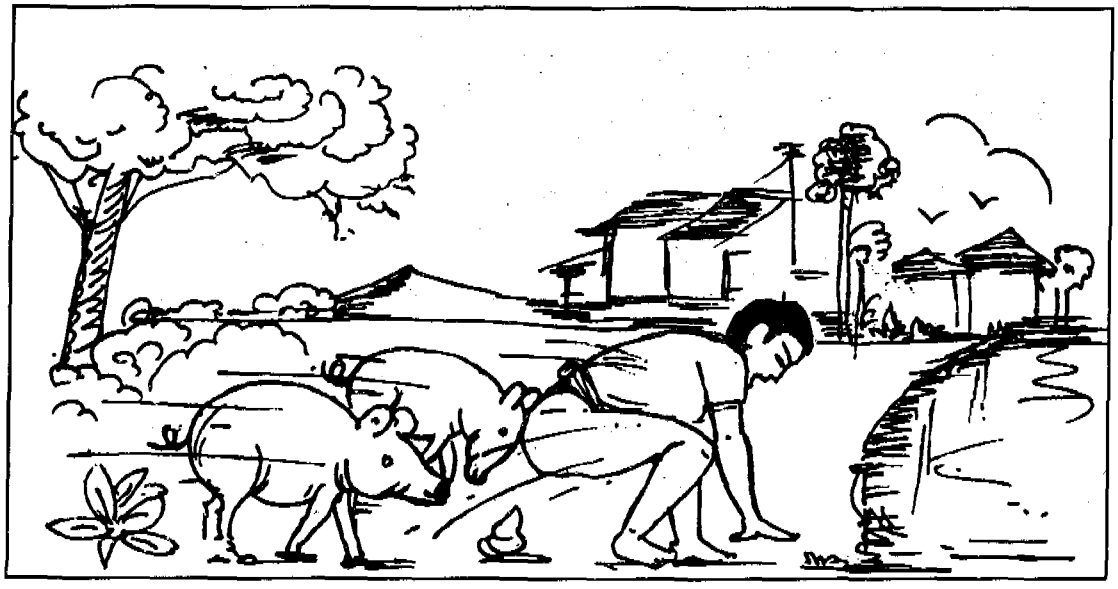
People in villages have to walk bare feet for minimum of half a kilometre for open defecation to far away bushy open fields and grasslands. In these areas people usually get bitten by poisonous insects, pests, leaches, snakes, scorpions, rodents, etc. Apart from this people encounter dangerous animals, wild bushy thorns, etc. Children and even adults go for open defecation to these places during night time in fear.

3.11.5. Problems of Open Defecation Near Houses

During the night and at times of illness, children and even adults excrete near to houses. Pathogens and disease causing micro-organisms such as bacteria, virus, parasites, worms, etc., present in these faeces are transmitted to others by different ways and causes dangerous diseases and fly breeding. It also causes unsanitary conditions around the house.

The Need of a Latrine

Open defecation is always a danger to a person



3.11.6. Problems of Open Defecation along the Roadsides

Generally poor people living in rural and urban areas go for open defecation along the roadsides. During rainy seasons the storm water carries all these faecal matters and stagnates on the road. This causes easy infection to the people using the road. Sometimes during heavy rains the storm water may get into the roadside low lying houses. The faeces along the roadside attract animals and insects and create problems for the tress-passers. People who walk on the roads also find difficulties while others going for defecation and by getting contact with faeces in their legs.

During summer the dust from the dry faeces also carry virus and other pathogens which are transferred by winds to other areas, transmit diseases by infecting a new host.

3.11.7. Wait Until Dusk (A True Story)

Manakkal, is a village located 20kms East of Trichy. In this village, a woman called Dhanalakshmi, thirty three years old and mother of three children, used to go for open defecation in open field. One early morning when she had gone for open defecation, it was still dark, she had to thread her way through sticks and thorns and just as she sat down she screamed out in pain. She noticed that a protruding stick had pierced her genital organ. On hearing her scream the nearby people had come to enquire on what had happened, but the lady due to privacy and shyness replied that a thorn had poked her leg. Later she had gone home with much pain and related the incident to her husband. He was shocked and took Dhanalakshmi to her mother's house in Trichy, instead of getting her treated at the local doctor due to shyness. Dhanalakshmi was admitted in a private hospital and spent Rs.3,500/- for treatment.

Is it needed for such a situation to happen in the 21st Century ? You should not get strained for your natures call.

Do you need to wait until dusk?
You shall construct a latrine!.

FOR A DISEASE FREE LIFE - CONSTRUCT A LOW COST LATRINE AT YOUR HOUSE

Nowadays, many Non-Governmental Organisations and Government Agencies like CAPART, HUDCO, etc., have promoted different schemes for constructing sanitary latrines. They provide financial support with subsidy and technical support to build a low cost latrine at your house. For this support contact your Block Development Officer, District Rural Development Agency or the NGOs in your area. Based on your economic condition and interest you can construct a suitable model of low cost sanitary latrine yourself. The training and the technical support will be given by the NGO for constructing your prescribed latrine.

3.13. SANITARY LATRINES

Now you are well aware of the many dangerous diseases caused by faeces. To prevent all such disease and to keep the environmental hygiene, each and every household should have a sanitary latrine. It is the responsibility of each individual to keep their personal hygiene and village sanitation. Hence it is the basic need of a family to have a latrine at their house. Some years ago constructing a sanitary latrine was felt much costlier, but now a number of different models have been developed with low construction methods and technology by the Government and NGOs.

These low cost latrines require less space and time for its construction. It takes less amount of water to flush out the waste in to the leach pit. The water seal in the latrine closet and sealing of leach pit prevents the contact of faeces and transmission of diseases, and prevents fly and mosquito breeding. Construction of different models of leach pits for different soil structures have also been developed by the Government, UNICEF and NGOs. All these organisations are executing and implementing low cost sanitary latrine construction programmes in the villages. It is the responsibility of the people to utilise these schemes.

3.13.1. Need for a Latrine in Each House

From the above discussions it is well understood that having a latrine for each household is the basic need of a family. Hence by constructing a latrine for each house we lead a hygienic life and we help other people in the village for their healthy life.

3.14. CONSTRUCTION OF A LATRINE

Different models, designs, low cost structures and technologies are available for constructing a latrine in our rural or urban areas. Fifty square feet area is required to construct a modern sanitary latrine and leach pit. The leach pit which can be constructed with 3.5 feet (1 meter) width and 5 feet to 8 feet depth, will be used for 15 years and more without any foul smell and drudgery.

The following measures shall be adopted for constructing a low cost sanitary latrine:

1. Selection of site, i.e. 30 - 50 feet away from the water sources depending on the soil type. It must not be a shallow place as in rainy season it will be filled with water.
2. The place must not be very far from the house and should have sufficient place for pit, and kitchen garden if necessary.
3. The selected place to be marked with lime powder and pit for foundation dug.
4. Pit should be deep enough to avoid quick filling. Circular pit has to be dug for a depth of 8feet and 3.5feet diameter. This size will last for a life time for a family of 5 members.
5. Lining of the pit is only to prevent caving in of top soil. In hard soil formations, pit lining for the top 1feet with bricks or rough stones is sufficient and honey comb lining may not be required. In loose soil conditions, lining will have to be made for the full depth. (Note: up to this level the beneficiary can contribute labour and materials).

6. Foundation for latrine has to be laid up to 1feet above the ground level. Rough stones and mud or lime or cement mortar can be used for construction.

7. The pan and the P trap must be fixed in level with packing of sand by using a spirit level.

8. The foot rests must be placed close adjacent to the pan in such away that will be convenient both for children and adults. Care should be taken to the length of the pan, the foot rests must be centrally paced.

9. After fixing the stone ware pipe to the P trap, it must be seen that it is protruding into the pit at least for 3 inches.

10. The top of the pit must be raised at least for 3inches above from the ground level and close with a cement or stone slab, and plaster the joint.

11. The basement must be slightly raised to prevent storm water or waste water flowing into the latrine.

12. Inside of the pit the night soil is in contact with soil and subject to anaerobic decomposition process. The gases produced and water are absorbed by the soil and there is no need to provide ventilation pipe.

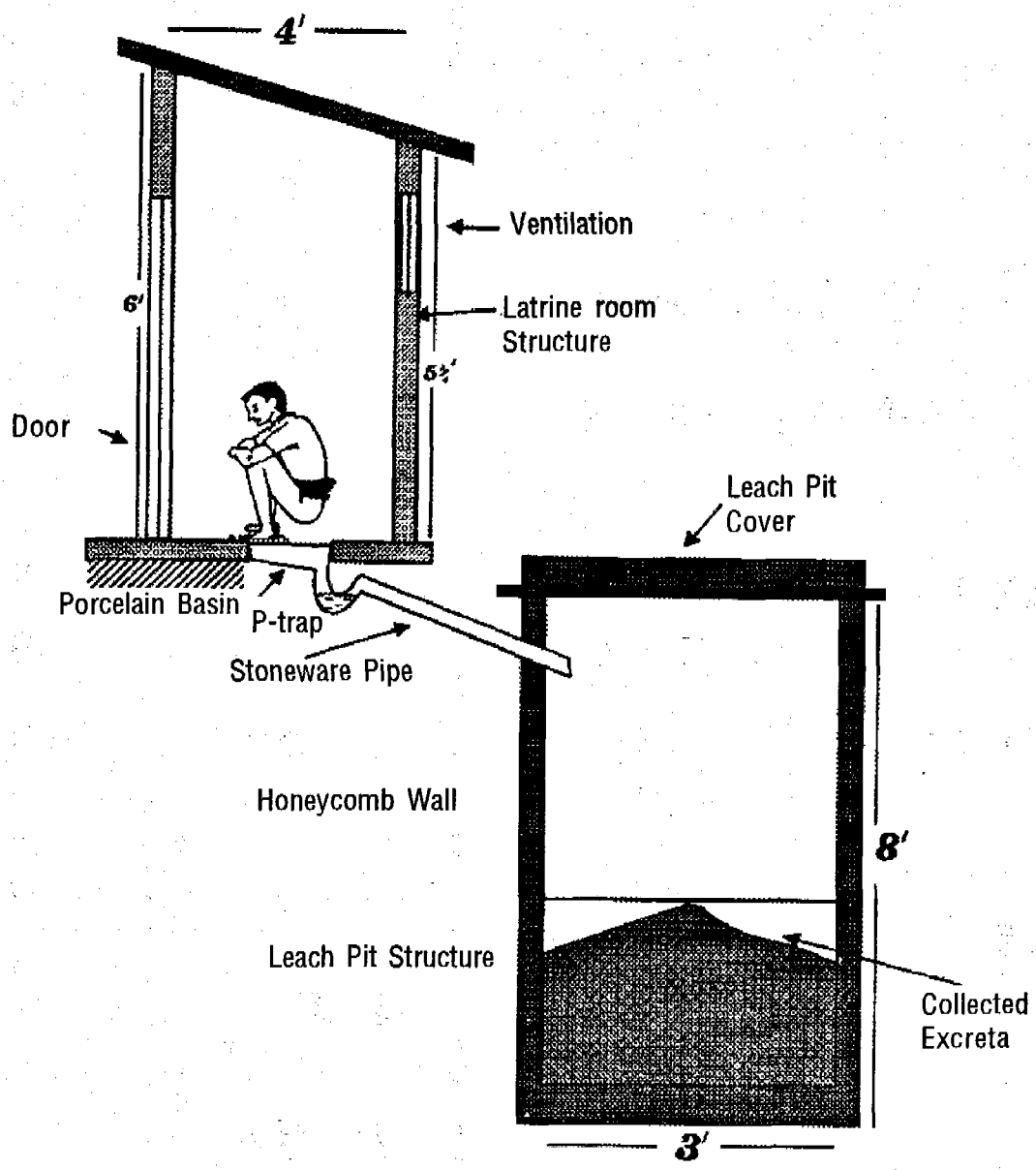
13. Once the pit is filled (in the case of less than 8 feet deep pit), another pit shall be dug out and connected to the P trap.

14. The filled up leach pit must be allowed to compost for six months. Then the leach pit shall be opened and desilted. The composted waste can be used as a good manure for fields.

15. In other way the leach pit shall be raised to 3feet above the ground level (with proportionate raise to the pan and basement) and connect to a bio-gas plant where the faeces is get treated immediately and produce a good fuel and rich manure.

The following are different models of low cost sanitary latrine construction which are designed and developed with its cost factors as per your need and to suit your economy.

CONSTRUCTION STRUCTURE OF LATRINE AND LEACH PIT

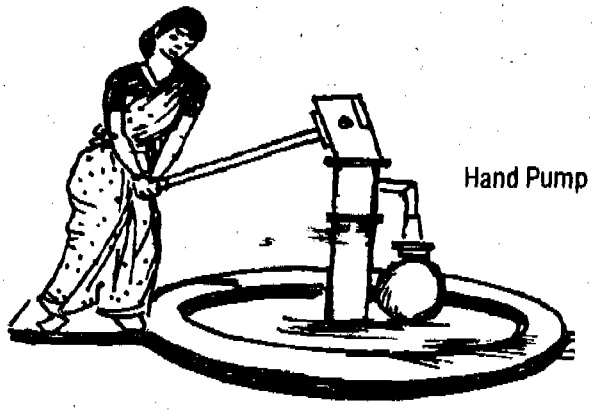


single leach pit is enough for a low cost sanitary latrine construction

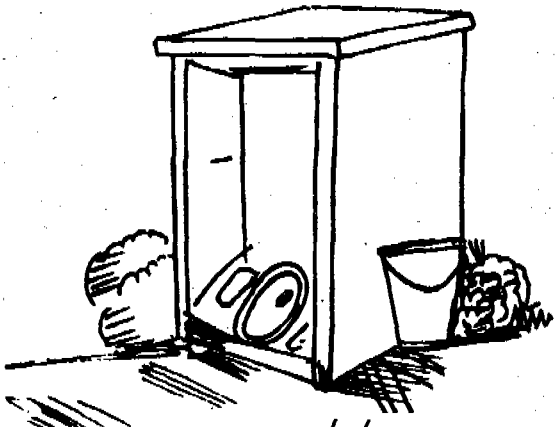
A 3.5feet diameter and 8feet depth leach pit can be used for 15 years and more for a family of five members. The leach pit can be constructed either in round shape or square shape.

When the leach pit is filled is filled with night soil, it shall be allowed to complete decomposition for six months. The compost can be desilted and used as a natural manure.

INSTRUCTION TO LATRINE CONSTRUCTION



Hand Pump



45 feet or 15 meters spacing should be maintained.

A low cost construction of latrine with leach pit may cause contamination of near by water sources.

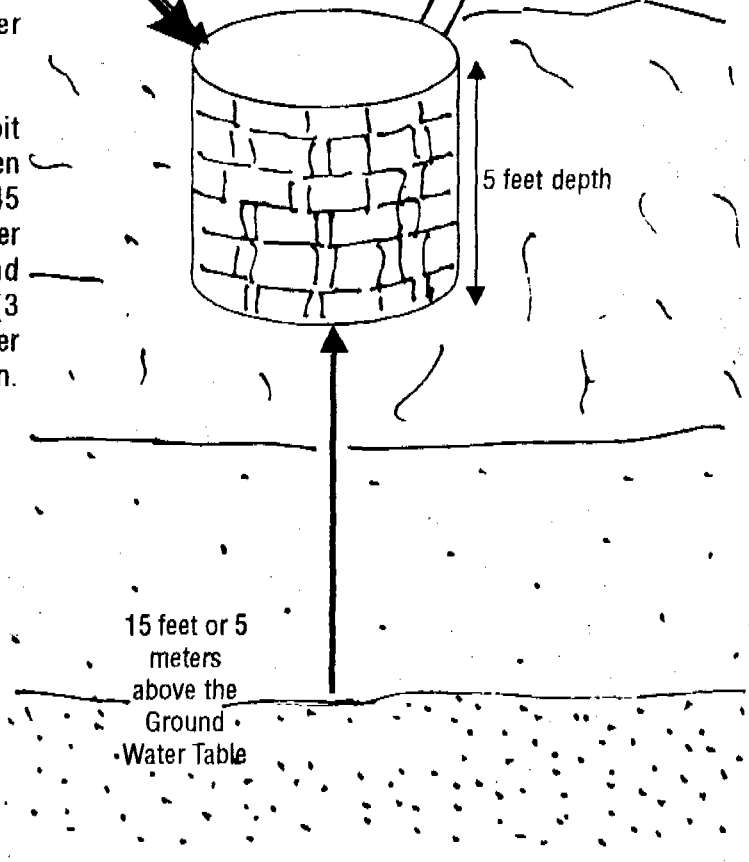
In such condition, if the leach pit depth is kept for 5 feet depth then leach pit shall be constructed at 45 feet (9 times) distance from the water sources like open well or hand pump, pond, etc., and 15 feet (3 times) above from the ground water table to prevent such contamination.

Horizontal Distance

9* 5 feet = 45 feet or 15 meter

Vertical Distance

3* 5 feet = 15 feet or 5 meter

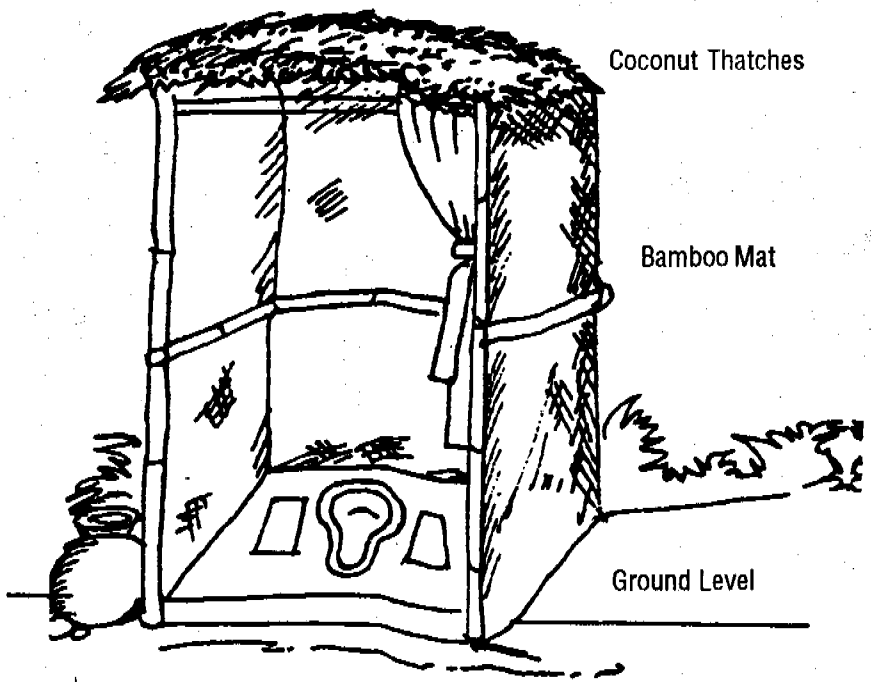


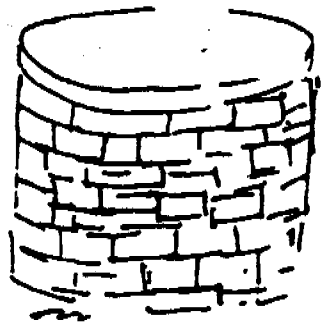
3.15. DIFFERENT MODELS OF LATRINE CONSTRUCTION

MODEL LATRINE No. - 1

LOW COST SUPER STRUCTURE

Bamboo Mat, Coconut Thatches, Palmyrah Leaves, Maize Stalks, Reeds, Gunny Bag, etc., can be Used as Low Cost Super Structures.





Leach Pit

Total Expenditure
Rs. 750/-

LOW COST SUPER STRUCTURE

Bamboo Mat, Coconut Thatches, Palmyrah Leaves, Maize Stalks, Reeds, Gunny Bag, etc., as Low Cost Super Structures.

Sl. No.	*Required Construction Material*	*Cost in Rs.*	*Advantages*	*Instructions*
01.	Cement Bag - 1 No.	170-00	Affordable to all poor people.	Lesser durability
02.	Bricks - 150 Nos.	150-00	Locally available materials at low cost.	Not safer during heavy rains and cyclones.
03.	Sand	30-00	All the construction materials are available as per your need.	Cattle may damage the low cost super structure.
04.	Leach pit cover - cement slab - 1 No.	100-00		
05.	Porcelain pan, foot rests, P-trap, and stone wares pipes.	200-00	Sanitary latrine for a disease free healthy life.	Every year or once two years in may need to be restructured.
06.	Mason and helpers labour	100-00	Compatible for village evironmental hygiene.	Leach pit should be constructed at required distance from the water sources.
07.	Total expenditure	750-00		

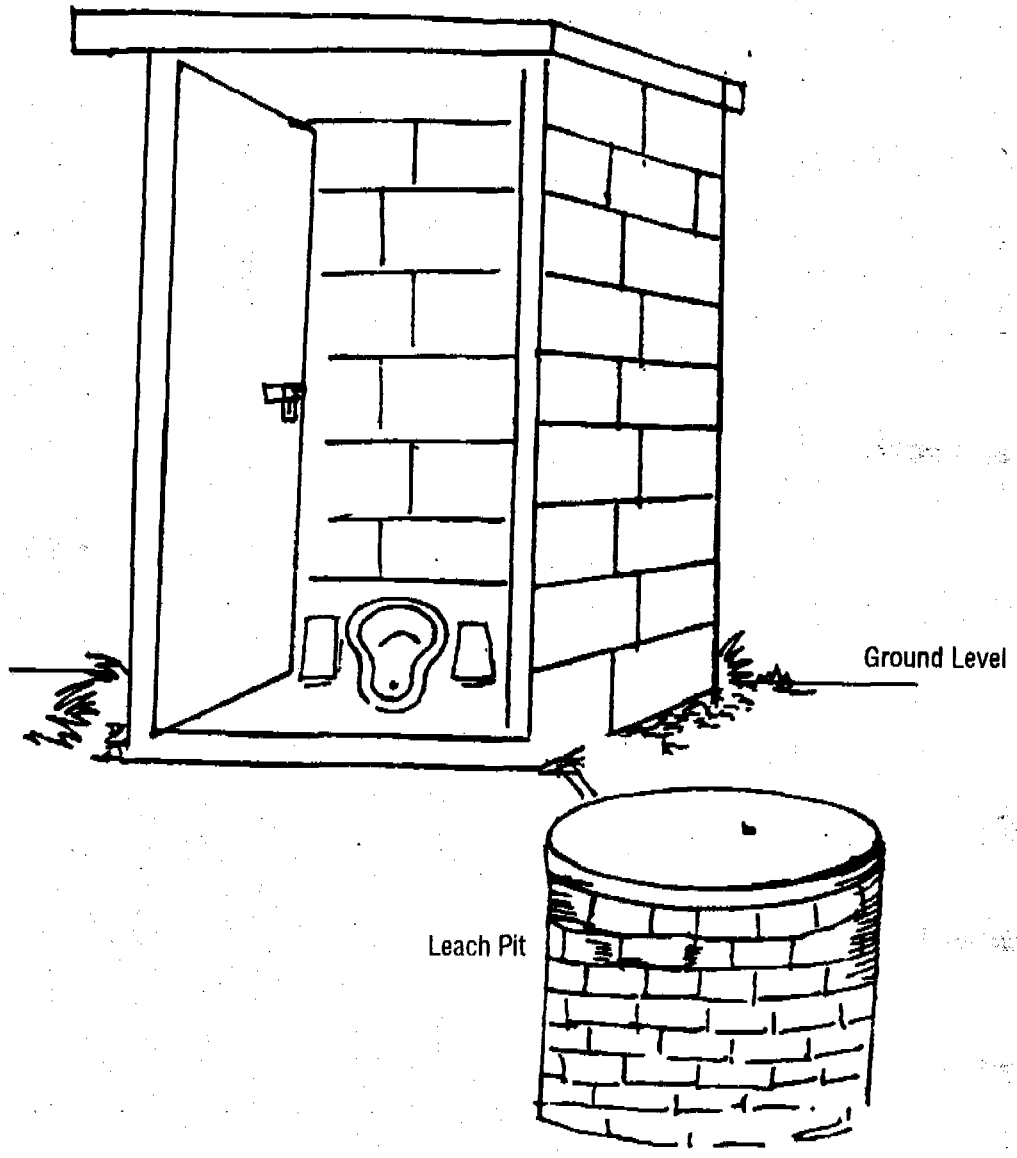
If the beneficiary contributes labour to dig out the leach pit and procure materials such as locally available rough stones for pit lining and basement works, that will reduce the cost Rs. 100/- from the total expenditure.

Using of poles and locally available low cost super structures for side wall constructions and door shall be borne by the beneficiary.

MODEL LATRINE No. 2

Cement Hollow Blocks Structure

Cement Hollow Blocks can be Used as Low Cost Super Structure.



Total Expenditure
Rs. 1950/-

MODEL LATRINE No. - 2

CEMENT HOLLOW BLOCKS AS LOW COST SUPER STRUCTURE

Cement Hollow Blocks as Low Cost Super Structure

Sl. No.	Required Construction Material	Cost in Rs.	Advantages	Instructions
01.	Cement hollow blocks 120 Nos. (16 x 8 x 4 size)	720-00	Affordable to poor people.	The hollow blocks should be made of quality, strong and well cured. Check and ensure before purchasing.
02.	Cement bag - 1.5 bag	255-00	Locally available construction materials.	
03.	Sand - 1 cart load	75-00	No cement plastering is required.	
04.	Tin sheet door lock and pegs.	200-00	It is easy to construct for for masons.	If the hollow blocks are not made of good cement mortar, the durability of latrine structure will be less.
05.	Porcelain pan, foot rests, P-trap, and stone wares pipes.	200-00	16 square feet room can be constructed with this material.	
06.	Cement roof slab and leach pit cover slab.	300-00		
07.	Mason and helpers labour.	200-00	If we construct more number of latrines at a time, the hollow blocks can be easily made by our self.	Leach pit should be constructed at required distance from the water sources.
08.	Total Expenditure	1950-00		

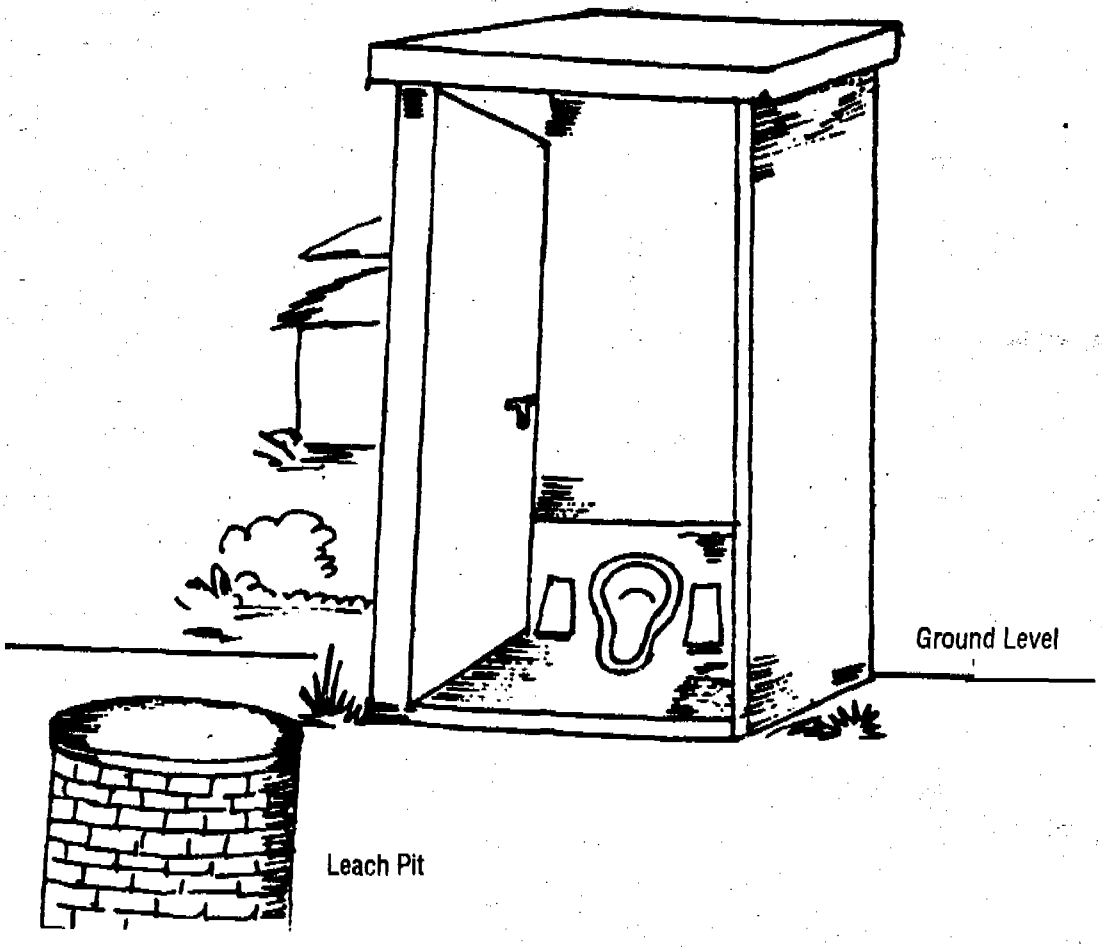
If the beneficiary contributes labour to dig out the leach pit and procure materials such as locally available rough stones for pit lining and basement works, that will reduce the cost of Rs. 100/- from the total expenditure.

If the dug out leach pit is found with hard soil structure, the full depth inner pit lining is not required. Stone slabs can be used for roofing and leach pit cover instead of cement slab. This will further reduce the cost of Rs. 300/- from the total expenditure.

MODEL LATRINE No. - 3

BRICK STRUCTURE WITH CEMENT PLASTERING

Brick Structure with Cement Plastering as Super Structure



Total Expenditure
Rs. 2200/-

MODEL LATRINE No. - 3

BRICK STRUCTURE WITH CEMENT PLASTERING

Brick Structure with Cement Plastering Super Structure

Sl. No.	Required Construction Material	Cost in Rs.	Advantages	Instructions
01.	Bricks - 700 Nos.	700-00	Too Strong.	Little more expensive.
02.	Cement bag. - 2.5 bags.	425-00	Long durablility	
03.	Sand - 1 cart load.	75-00	Locally available materials.	
04.	Tin sheet door, door lock and pegs.	200-00	Easy replicable structure.	
05.	Porcelain pan, foot rests, P-trap, and stone wares pipes.	200-00	Easy acceptable under standing of quality to village people.	Leach pit should be constructed at required distance from the water sources.
06.	Cement roof slab and leach pit cover slab.	300-00	16 square feet room can be constructued with this material.	
07.	Mason and helpers labour	300-00		
08.	**Total expenditure**	**2200-00**		

If the beneficiary contributes labour to dig out the leach pit and procure materials such as locally available rough stones for pit lining and basement works, that will reduce the cost of Rs. 100/- from the total expenditure.

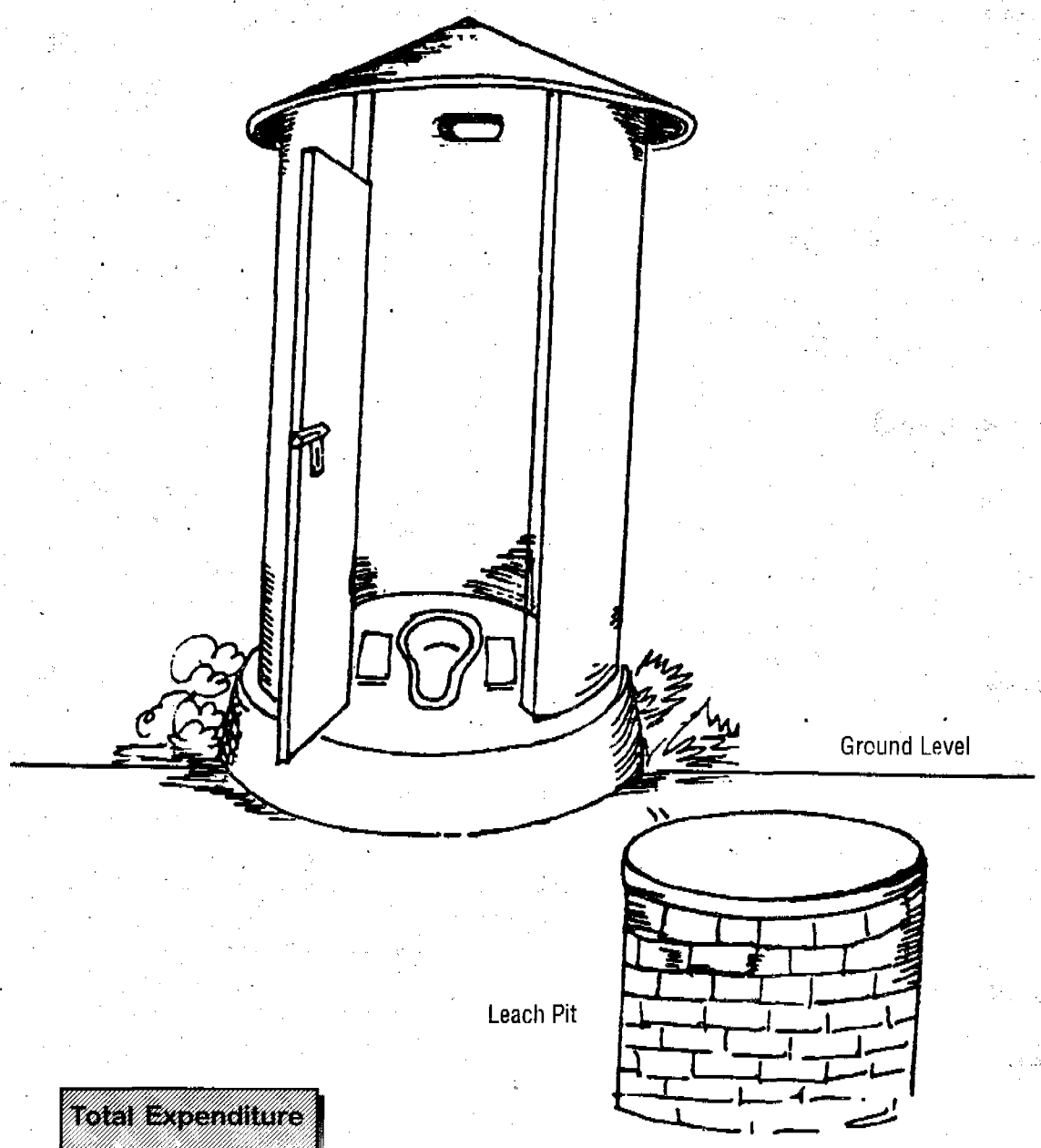
If the dug out leach pit is found with hard soil structure, the full depth inner pit lining is not requried.

Stone slabs can be used for roofing and leach pit cover instead of cement slab. This will further reduce the cost of Rs.300/- from the total expenditure.

Model Latrine No. 4

FERRO CEMENT SLAB STRUCTURE

Pre-Cast Ferro Cement Slab Structure as Super Structure.



Total Expenditure
Rs. 2450/-

Model Latrine No. 4

FERRO CEMENT SLAB STRUCTURE

Pre-Cast Ferro Cement Slab Structure as Super Structure.

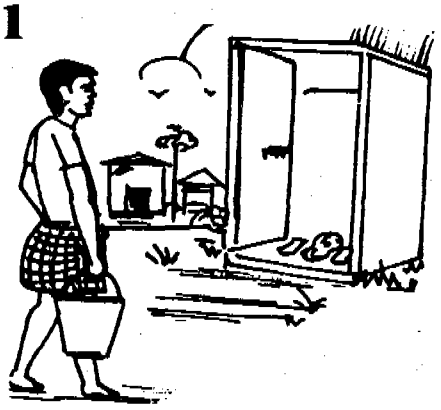
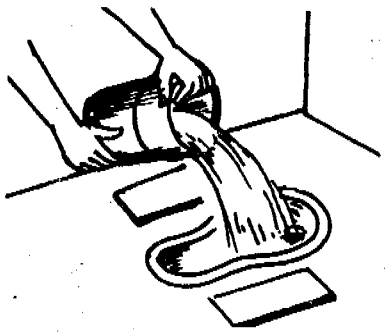
Sl. No.	Required Construction Material	Cost in Rs.	Advantages	Instructions
01.	Cement bag - 4.5 bags.	765-00	Different beautiful structures can be constructed.	More expensive and materials should be procured from the town market.
02.	5mm chicken mesh (3feet width and 40 feet length)	320-00		
03.	6mm steel (52feet) - 3.8 kg.	65-00	Easy installation.	Moulding shutters are required and it will cost more, and More care is required for construction and installation.
04.	Sand - 8 bags.	40-00		
05.	Waste oil - 4 liters.	20-00		
06.	Welded steel rod mesh 4.5 feet.	125-00	16 square feet room can be cosntructed with this material.	More cost is required for transportation and Cost will be less unless it is completely done at one place.
07.	Door lock and pegs.	100-00		
08.	Porcelain pan, foot rests, P-trap, and stone wares pipes.	200-00		No further alteration can be made.
09.	Bricks - 250 Nos.	250-00		
10.	Leach	100-00		Leach pit should be constructed at required distance from the water sources.
11.	Mason and helpers labour	475-00		
12.	Total expenditure	2450-00		

If the beneficiary contributes labour to dig out the leach pit and procure materials such as locally available rough stones for pit lining and basement works, that will reduce the cost Rs. 100/- from the total expenditure. If the dug out leach pit is found with hard soil structure, the full depth inner pit lining is not required.

Stone slabs can be used for roofing and leach pit cover instead of cement slab. This will further reduce the cost of Rs. 300/- from the total expenditure.

3.11. Use and Maintenance of Latrine

3.11.1. How to Use a Latrine?

<table>
<tr>
<td>1
 
Go to latrine with a mug and bucket full of water</td>
<td>4
 
After defecation wash and clean the anus, and pour the bucket water at a proper speed to flush out the faeces in the leach pit.</td>
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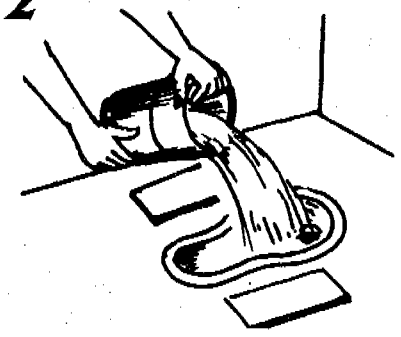
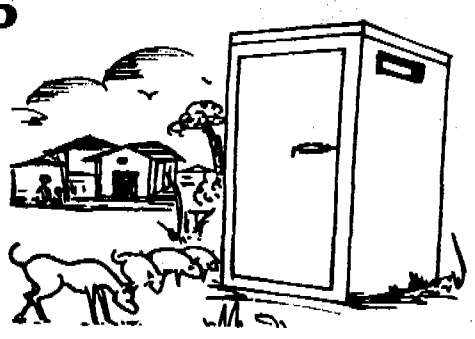
<tr>
<td>2
 
Before defecation pour a mug full of water on to the porcelain pan to wet it, that will prevent sticking of faeces in the pan, and ease the flushing and cleaning process.</td>
<td>5
 
After cleaning of anus and latrine, wash both hands with soap or any other cleaning agent (soap nut powder, ash etc.) in plenty of water.</td>
</tr>
<tr>
<td>3
 
Sit at proper position on the pan to defecate urine and faeces into the pan.</td>
<td>6
 
After use of latrine, close and lock the door of the latrine room.</td>
</tr>
</table>

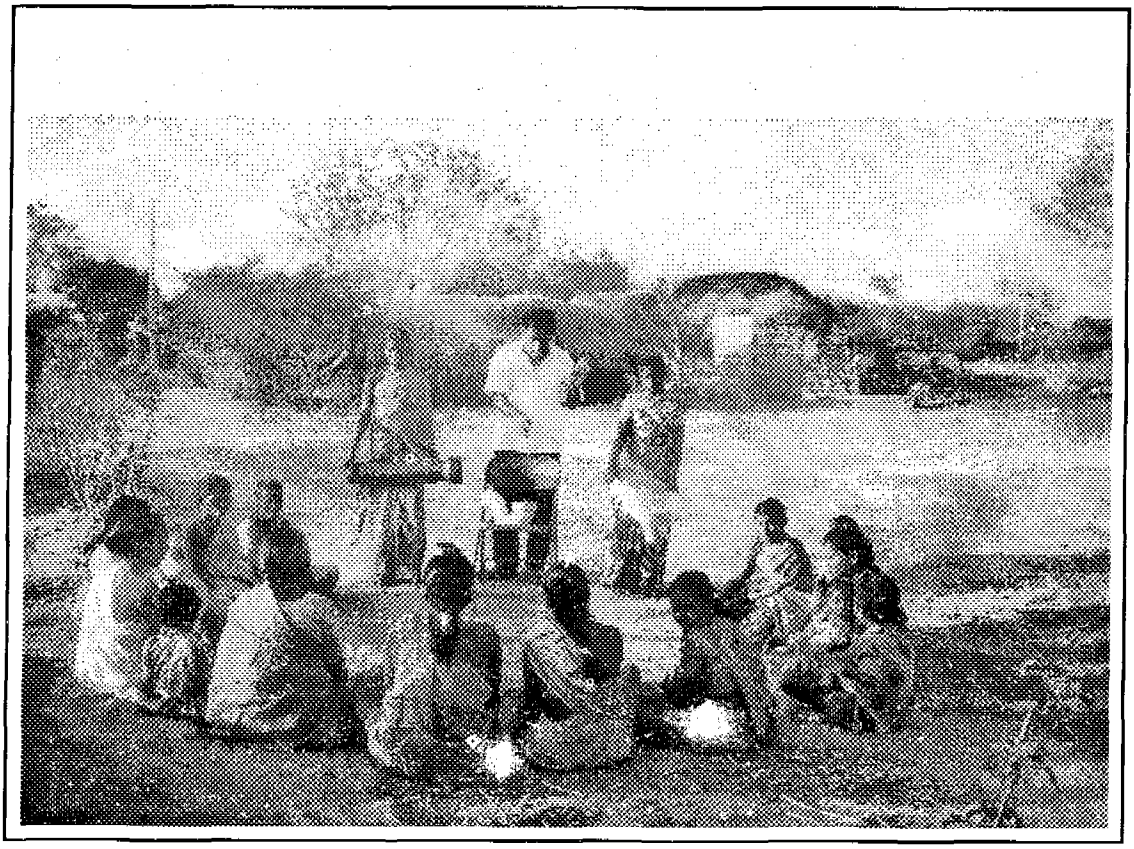
3.11.2. How to Maintain a Latrine ?

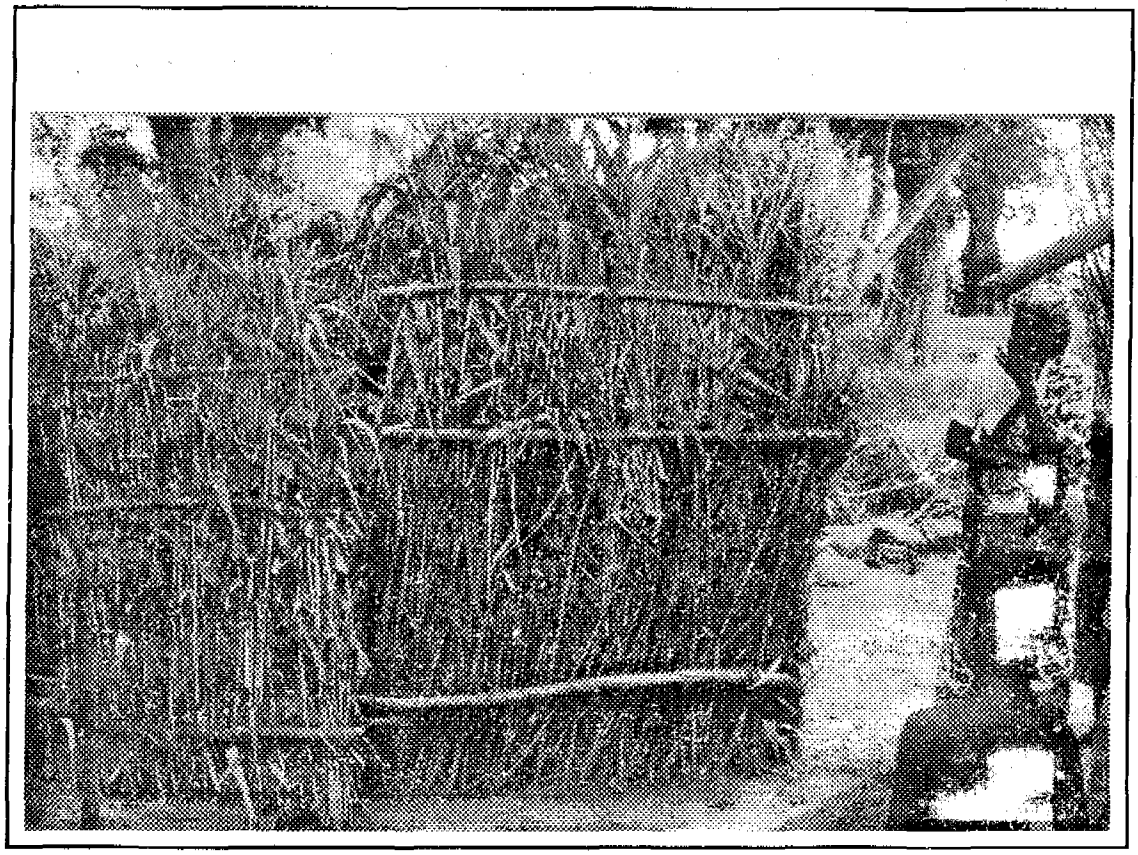
- Pour required amount of water to avoid foul smell.
- Clean the latrine pan by using a brush or broom regularly.
- Do not use any acid, phenol or detergents to clean the latrine and pan.
- Keep closed of latrine door after use.
- Train the children how to use latrine and take care of them not to put any stones or any other materials into the latrine pan.
- Do not store fire wood or crop wastes or even grains inside of the latrine room.

Diferent Models of Latrines

Trainning and motivation of Rural Women in low cost sanitary

LATRINE CONSTRUCTION





3.12. Sanitary Disposal of Wastes

Sanitation covers the whole field of controlling the environment with a view to prevent diseases and promote health. Health issues are killed with man's total environment. The accumulation of unwanted wastes in the surroundings constitutes a positive health hazard. Therefore there should be an effective removal and disposal of wastes without any risk to health. It is sanitary disposal of wastes.

We do all know that, human excreta is a source of infection. It is an important cause of environmental contamination and various faecal - borne disease. Every individual of a community has a responsibility for its safe removal and disposal, so that it dose not constitute danger to public health.

The health hazards of improper waste disposal are:

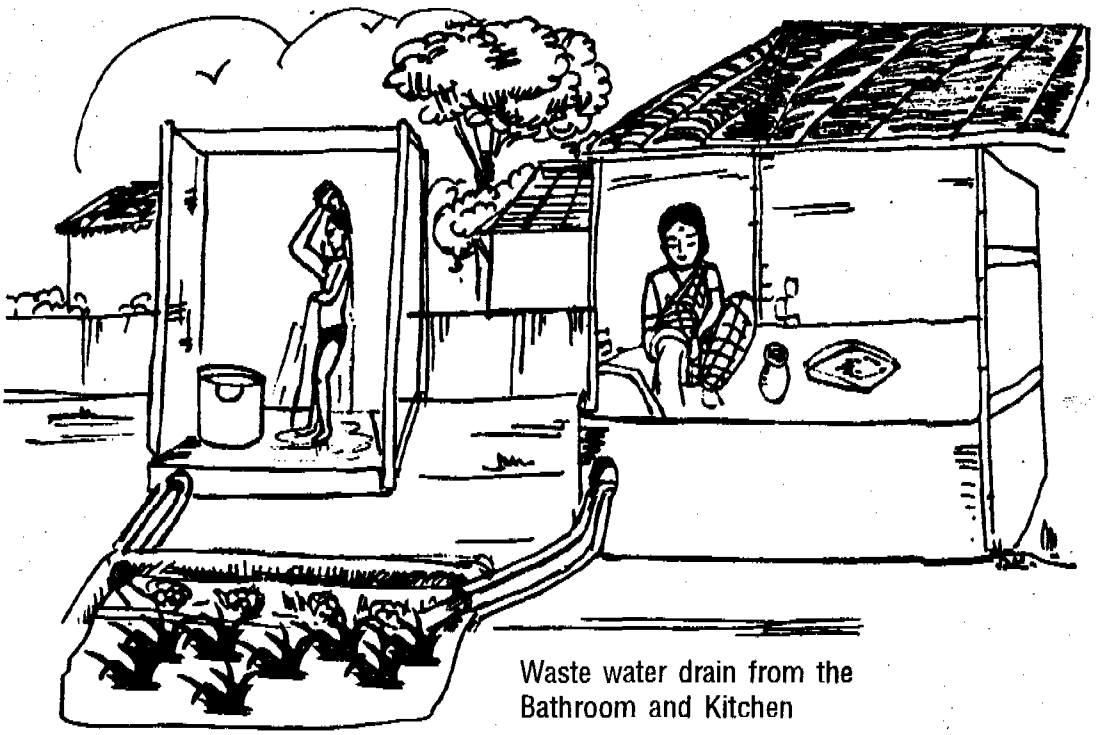
1. Soil pollution,
2. Water pollution and
3. Air pollution.

The polluted environmental condition leads to environmental degration and results into life threatening problems. To avoid and overcome all such problems, the following are important environmental sanition measures which are followed in the villages.

1. Kitchen Gardening
2. Construction of Soak Pit
3. Garbage / Maure pit
4. Compost Pit
5. Bio-gas Plant
6. Smokeless Chulha

Therefore sanitary disposal of wastes is a basic environmental health service without which there cannot be any improvement in the state of community health. The following are the various cost effective methods for the disposal of household wastes, animals wastes and agricultural wastes.

KITCHEN GARDEN



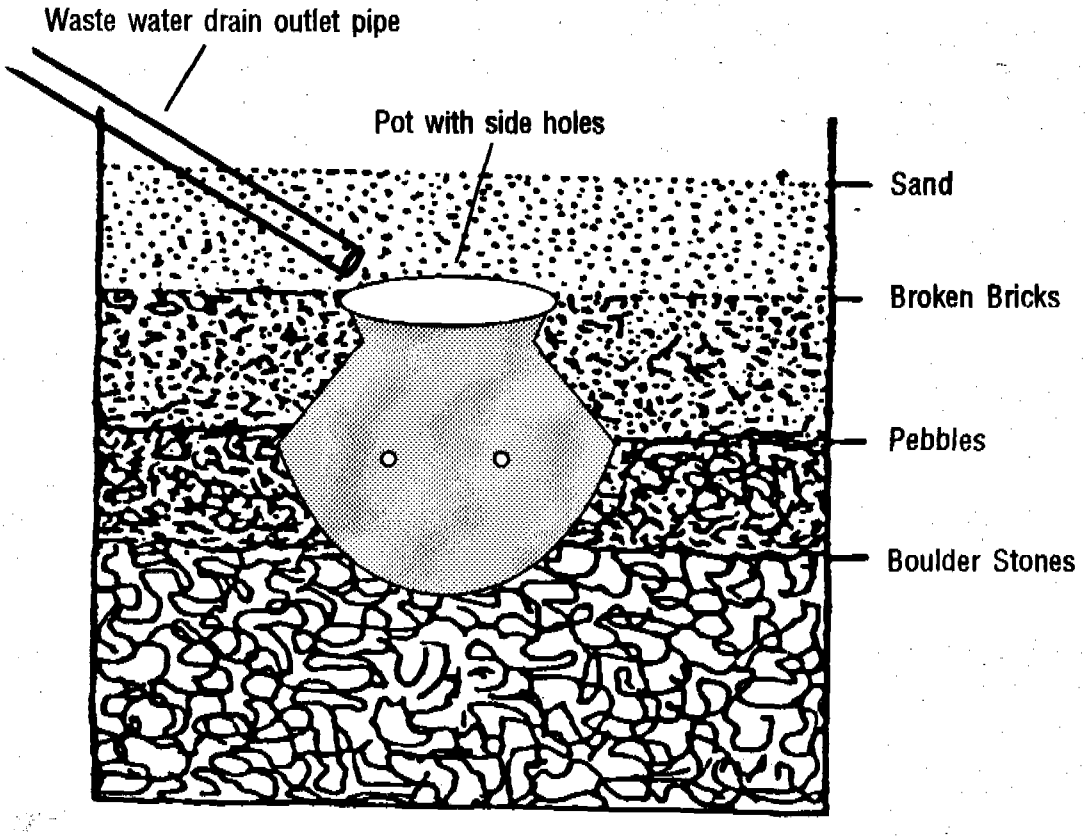
Waste water drain from the Bathroom and Kitchen

Discharge of waste water from the kitchen, bathroom and other house hold usage, can be used for kitchen gardening. Vegetables, greens, plantain, coconut, fruit trees, herbs and other plants can be raised for the nutritional requirements. The additional produce from the from the garden shall be sold out for the economic requirements.

Loose the top soil at the available space near to your house and raise a fence arround it. Make a drain from the kitchen and bathroom to the garden. Sow the seeds or plant saplings with proper spacing as per your need and interest. Safe guard the grarden from the cattle.

SOAK PIT

Construction of a soak pit is the other way of safe disposal of surplus waste water. The soak pit intakes the waste water and disperse it in to the ground, so that it prevents stagnation fo waste water and breeding of mosquitoes.



Width 3 feet *Length 3 feet *Hight 3 feet

The above dimensions can be changed as per the requirement. Dig a pit and fill it with the materials as shown in the figure. The out let of the waste water pipe should be let in to a pot with side holes placed at the centre of the pit. Accumulation of waste materials and silt in the pot shall be periodically removed.

Gargage / Manure Pit

Sweep and Collect the Wastes

Sweep the Wastes in a Garbage Pit

Construction of a garbage pit is useful for the collection of household wate, kitchen waste, agricultural waste, cow dung, etc., the pit shall be constructed at the require size and away from the house and water sources to avoid contamination and leaching. The manure can be used for fields. Construction of a garbage pit avoids breeding of flies and rodents, and gives an aesthetic view to your house.

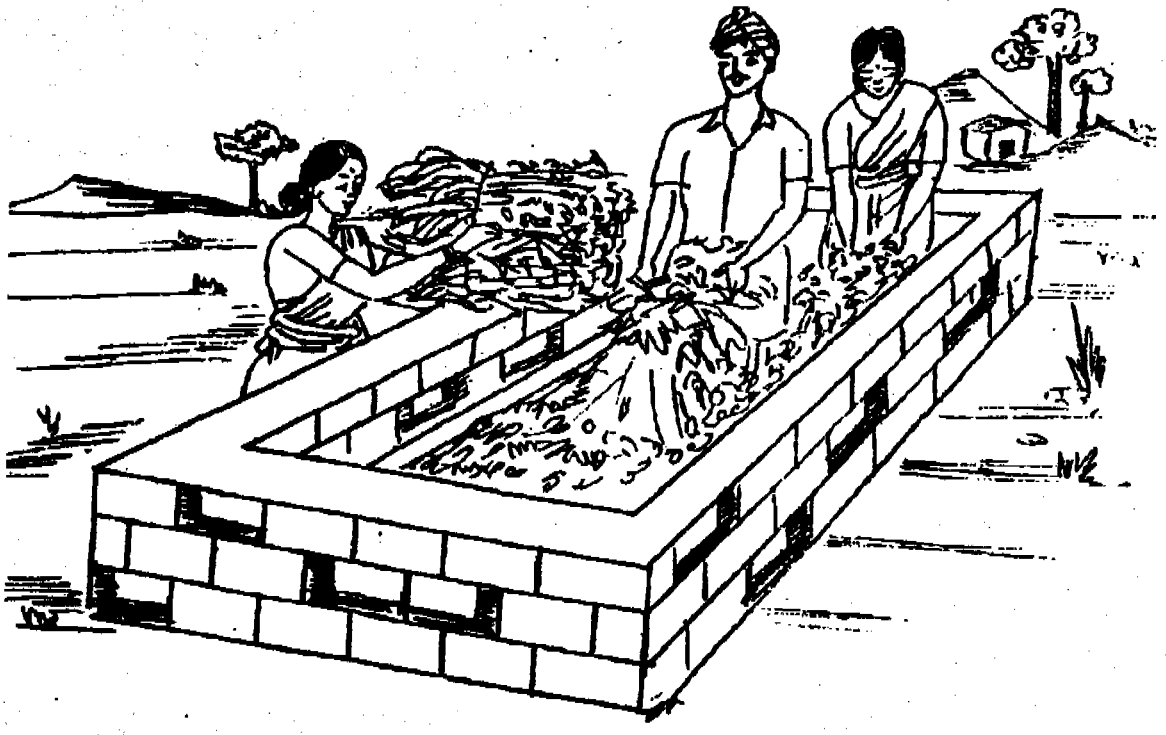
COMPOSTING

An energetic and natural fertilizer called as Organic Fertilizer which can be produced by composting crop wastes, animals wastes and other organic wastes in a compost pit.

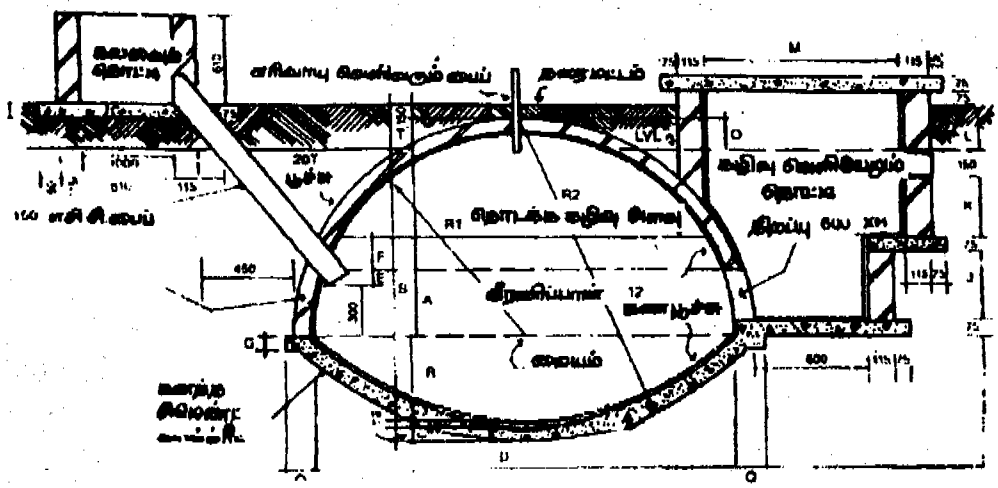
The contents required for composting are tree leaves, plants, grass, kitchen waste, crop wastes, saw dust, decayed vegetables, cow dung wiht soil and other animal wastes.

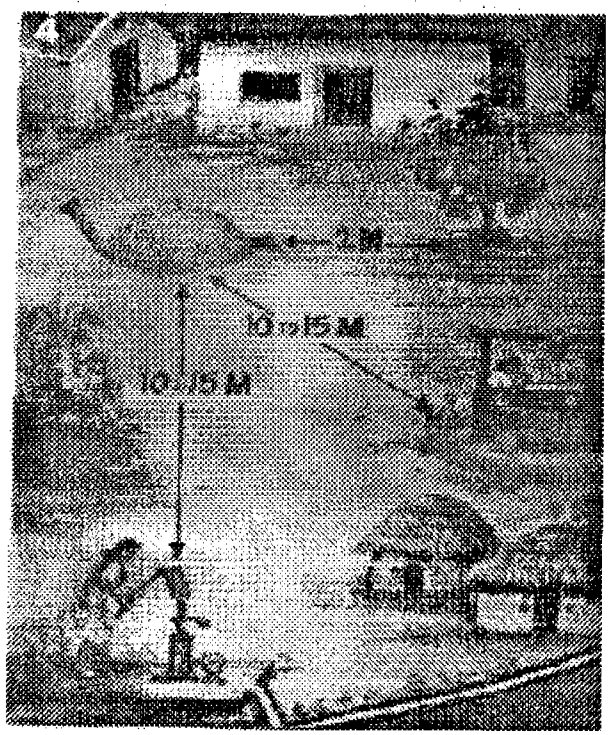
The benefits of composting such organic wates are:

1. Safe disposal of organic wastes.
2. Recycling of crop wates.
3. Increasing of fertility organic fertilizer.
4. Enriched natural organic fertilizer.
5. An alternative to use of chemical fertilizer
6. Reduction of use of pesticides.
7. Preventing environmental pollution.
8. Control of flies and rodents breeding.
9. Reduction of foreign expenditure.



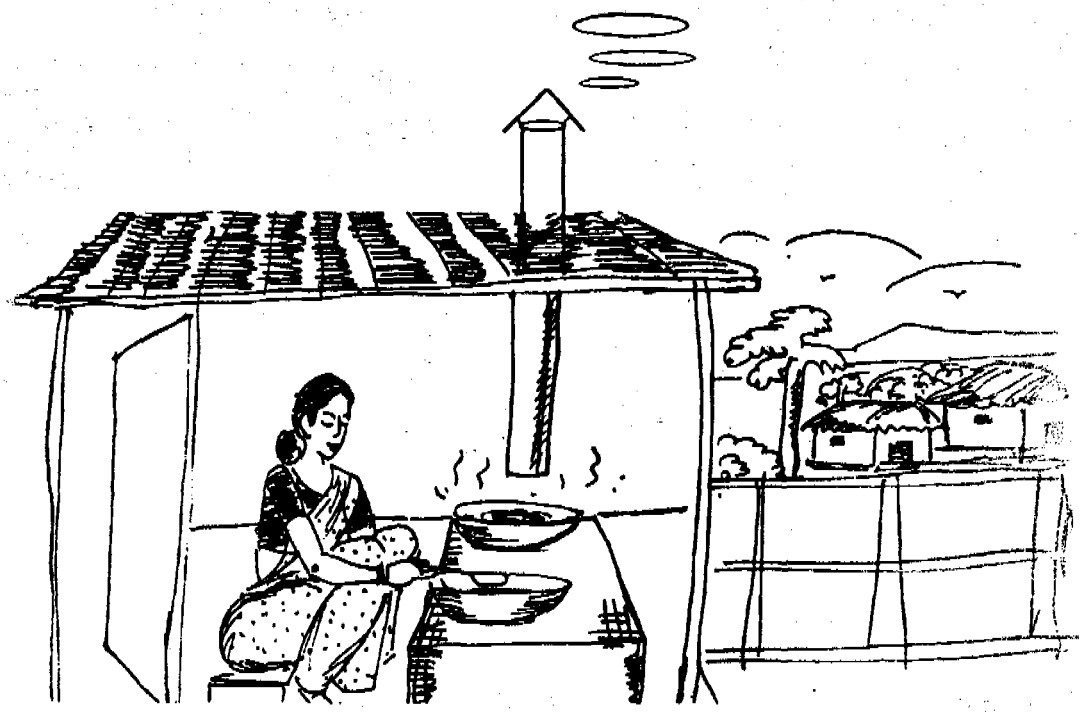
BIO-GAS PLANT





Construction of bio -gas plant is the best and effective method for disponding animal excreta, by which we get fuel energy for cooking and lighting, and manure for fields. Care should be taken in constructing a bio-gas plant that the plant should be 10 to 15 meters away from the water sources.

Smokeless Chulha (Stove)



Smokeless chulha an alternate for ordinary chulha prevents respiratory diseases to women. It also reduces the consumption of more firewood and blackening of indoor area. Government and Non Goverment Organisations are promoting smokeless chulha schemes and provide subsidies to construct a smokeless chulha in village houses.

3.13. SOME USEFUL HINTS TO FIELD WORKERS

- The purpose of hygiene education is to promote good hygiene behaviours to prevent diseases and to correctly treat them.
- Preventing disease is by breaking the disease transmission.
- Water, Sanitation, Personal Hygiene and Food Hygiene are the major routes of transmission.
- The first and most important message is Wash Your Hands - Now and Always.
- Hygiene education will help people to adopt safe Hygiene and Treatment behaviours.
- Through people learn the existing disease causing and disease preventing behavious.
- From the people understand the reasons- cultural, religious, social - why such bhaviour exist?
- Make them understand through their own perception the risk behavious which help in the transmission of dieases.
- Along with people decide what changes are necessary (e.g. Increase in percentage of people adopting hand washing).
- Fix the level of change you want to achieve (e.g. 80% of people use latrine, 60% of latrines have soaps).
- Any education by itself will not reduce the risks of transmitting diseases. The resulting action and changes as only they expected will give the necessary effect.
- Workers in the field who are concerned with hygiene education should make sure that their efforts are directed towards the main cause of contamination.
- Interact with people, address their beliefs, customs bring about their conviction in adopting hygiene behavious.
- Your work just does not stop with passing on the information to the people. You must bring out the expected changes. Participate with them, educate and improve the existing behaviours.
- Review your work, assess the changes that have taken place in the key areas of hygiene behavious.
- Compare the periodical changes with you level of expectations.
- If the progress is not satisfactory review your strategy and modify suitably.
- Record all information, events, works, progress and impact. These communicate to the outside world what you have been doing your success and the problems you have overcome. Most important records tell you at a latter date what you have made possible. Your role to the changes.